FLORIDA DEPARTMENT OF AGRICULTURE

& CONSUMER SERVICES (FDACS)

Final Performance Report

2010 Specialty Crop Block Grant Program

Florida Department of Agriculture and Consumer Services

USDA-AMS Agreement Number: 12-25-B-1061

Total Grant Funds Awarded - $4,797,413.00

STATE CONTACT
Joshua M. Johnson
Program Administrator
Florida Department of Agriculture & Consumer Services
407 South Calhoun Street
Room 415B
Tallahassee, Florida 32399-0800
(850) 617-7340
specialtycrop@freshfromflorida.com

Project	Page
Project (1): Florida Agriculture in the Classroom - Florida Agriculture in the Classroom 2010	4
Project (2): Florida Sweet Corn Exchange - Florida Sweet Corn Exchange: Consumer Research and Case Management	7
Project (3): Florida A&M University - Developing a Low-Chill and Heat-Tolerant Raspberry	13
Project (4): University of Florida - Developing Site Specific Management of Twospotted Spider Mites in Strawberries	20
Project (5): University of Florida - Developing Superior Flavor in Florida Strawberries	28
Project (6): Florida Turfgrass Association - Protecting the Environment While Increasing Competitiveness of Florida Turfgrass	36
Project (7): University of Florida - Establishing the Quality and Superiority of Florida Honeys	55
Project (8): Florida A&M University - Florida Vine Distribution and Improvement Program	83
Project (9): Florida Tomato Committee - Florida Tomato Integrated marketing Program	104
Project (10): Florida Watermelon Association - Florida Watermelon Promotion Campaign	118
Project (11): University of Florida - Increasing the Supply and Expanding Markets to Meet the Consumer Demand for Locally Grown Food	123
Project (12): Florida Nursery, Growers and Landscape Association - Industry Advancement Through Marketing, Education and Certification Campaigns	150
Project (13): University of Florida - Management of Citrus HLB by Overcoming the Salicylat Hydroxylase	170
Project (14): University of Florida - Bring Marketmaker to Specialty Crop Growers in Florida and Extend it into Ornamental Crops	175
Project (15): Miami-Dade County, Florida - Redland Raised – “Fresh from Florida Project”	184
Project (16): National Watermelon Association - Food Safety Manual Language Conversion	190
Project (17): USDA-ARS - Field Evaluation of Broad Spectrum Non-fumigant Pest Control for Strawberry and Vegetable Production	194
Project (18): Florida Specialty Crop Foundation - Novel Populations of Phytophora Intestans Associated with Severe Outbreaks of Late Blight on Tomato and Potato	208
Project (19): University of Florida - Statewide Implementation of Novel Push-Pull Strategies for Integrated Pest Management (IPM) of Thrips	215
Project (20): Florida Certified Organic Growers and Consumers, Inc. - Organic Systems Management Education Initiative for Florida Specialty Crop Producers	232
Project (21): University of Florida - Protecting Florida Avocados from Laurel Wilt	240
Project (22): University of Florida - Protective Structures for Crop Diversification, Improved Fruit Yield and Quality and Appropriate Water Management and Freeze Protection	248

Project (23): University of Florida - A Safe Harvest: Reduction of Tomato Susceptibility to Contamination with Salmonella through Cultivar Selection, Optimized Fertilization Regime and Education 263

Project (24): University of Florida - Building a Foundation for Florida Stone Fruit: Economic Analyses of Orchard Establishment and Production 276

Project (25): University of Florida - Sustainability of Fruit and Nut Crops in North Florida: Emergence of Small Farms, Enhancing Outreach and Facilitation of Direct Marketing 283

Project (26): University of Florida - Florida Small Farms - Capacity Building, Training and Outreach 293

Project (27): Farm Credit of Central Florida - Florida Agricultural Financial Management Conference 2013 306

Project (1): Florida Agriculture in the Classroom – Gardening for Grades

Contract #: 16853
Funding Year: 2010
Funding Amount: $121,502.81
Reporting Period: Final

Project Summary

FAITC's mission is to expand youth awareness and understanding of Florida agriculture and natural resources by integrating agricultural concepts into core educational disciplines and Florida Agriculture in the Classroom supporting programs.

The best way to educate Florida teachers and students about the difficulties of growing food and the importance of agriculture is to give them the tools to become Florida farmers themselves.

That's what Florida Agriculture in the Classroom's *Gardening for Grades* Resource Guide and *Gardening for Grades* School Garden Mini Grant Program has done. The resource guide gave them the direction and the mini grant program gave them the funding they needed to plant Florida commodities in their classrooms and schoolyards. The *Gardening for Grades* School Garden Mini Grant program helped them develop an appreciation for the struggles Florida farmers face every day with weather, pest and diseases and other issues. In addition, the *Gardening for Grades* lessons taught them about the importance of Florida agriculture to the state and the importance of food safety in growing food for themselves and their classmates.

Altogether, the *Gardening for Grades* School Garden Mini Grant Program resulted in 222 Florida teachers receiving $500 each to start new school gardens or replenish existing ones. In the end, the program reached beyond just the one teacher and his or her students to many teachers and students in their school. According to the final reports turned in by the teachers who received mini grants, their school garden projects reached a total of more than 2,600 teachers and more than 53,000 students statewide.

Project Approach

After amending the contract Feb. 3, 2011, which added an additional $21,502.81 to the original grant amount of $100,000, Florida Agriculture in the Classroom made available 222 $500 school garden mini grants beginning Sept. 1, 2011. By the end of October 2011, the 222 grants available had been awarded, and the electronic application system on its website closed for applications.

Florida Agriculture in the Classroom distributed the checks in three installments as the grant applications were received and approved. As a result, $110,000 of the mini grant money had been distributed by January 2012. The remaining two grants were distributed this school year (2012-13).

After teachers submitted their Final Reports May 1, 2012, Florida Agriculture in the Classroom estimated their projects reached beyond their classrooms to a total 2,644 teachers and 53,333 students statewide.

Of the 222 teacher grants awarded, 13 teachers asked for project extensions into the 2012-13 school year, 15 teachers did not submit final reports after repeated requests and two teachers didn't complete their projects and each returned their $500. (Attached is a spreadsheet with the names of teachers who received school garden mini grants, and the status of their projects.)

Goals and Outcomes Achieved

The 222 teachers who received *Gardening for Grades* School Garden Mini Grants reached beyond their classrooms to other teachers and students in their schools with their school garden projects. Altogether, Florida Agriculture in the Classroom estimates their projects reached 2,664 teachers and 53,333 students statewide.

In addition, teachers who received mini grants also received a free copy of Florida Agriculture in the Classroom's *Gardening for Grades* School Garden curriculum from which they were required to administer a pre/post test to gauge what their students learned from the school garden project.

The classroom average of the pre and post-test results from lessons in *Gardening for Grades* are as follows:

- Students' understanding of photosynthesis in the "We're the Producers" lesson grew from 53 percent on the pre test to 92 percent on the post test.
- Students' ability to identify the parts of the plant of certain fruits and vegetables in the lesson "What Are We Eating?" increased from 49 percent on the pre test to 85 percent on the post test.
- Students' knowledge of the classification of fruits and vegetables and the different varieties within a group in the lesson "Lettuce Be Different" rose from 60 percent on the pre test to 94 percent on the post test.
- Students' understanding of the composition of soil in the lesson "It All Begins with Soil" rose from 38 percent on the pre test to 92 percent on the post test.
- Students' grasp of the different inputs needed for plants to grow in the lesson "Yo Seeds, Wake Up!" increased from 51 percent on the pre test to 87 percent on the post test.

Beneficiaries

Teachers and students who participated in the *Gardening for Grades* School Garden Mini Grant program are the obvious beneficiaries because they received the funding they needed to create new school gardens or refurbish an existing ones. In the end, their projects reached beyond their classrooms to other classrooms in their schools, according to the final reports teachers submitted.

Also, the school garden projects funded by the mini grant program introduced teachers and students to nutritious Florida fruits and vegetables they might not have ordinarily tried. As a result, Florida Agriculture in the Classroom is in the process of developing *Gardening for Nutrition* curriculum, which will incorporate school garden tips and nutrition lessons into one book to debut in late 2013 or early 2014.

The Florida agriculture industry benefitted because teachers and students experience the same pest and disease and weather issues in their school gardens that farmers have in their operations. These teachers and students learned first hand how difficult it is to grow food, and developed an appreciation for the challenges farmers face every day.

Lessons Learned

Florida Agriculture in the Classroom received a six-month extension on the project to give it more time to wrap up the school garden projects.

The organization found out just how time consuming administering a grants program of this size can be. Some teachers ran into setbacks related to their tight testing schedules and Florida Agriculture in the Classroom had to be flexible, which resulted in some of the projects carrying over into the following school year (2012-13).

Overall, however, the mini grants program was a great success, and Florida Agriculture in the Classroom received approval as part of the 2012 Specialty Crop Block Grant program for another round of $500 teacher mini grants and $1,000 school garden mini grants for the 2013-14 school year.

Contact Person

Lisa Gaskalla
Executive Director
Florida Agriculture in the Classroom, Inc.
P.O. Box 110015
Gainesville, FL 32611-0015
Phone (352) 846-1391
Fax (352) 846-1390
Email gaskalla@ufl.edu

Additional Information

A digital download of Gardening for Grades is available by going to Florida Agriculture in the Classroom's website at http://www.flagintheclassroom.com/gardening.html

Project (2): Florida Sweet Corn Exchange - Florida Sweet Corn Exchange: Consumer Research and Case Management

Specialty Crop Block Grant Funding Year: 2010

Funding Amount: $165,000.00

Reporting Period: Final

Project Summary

Despite Florida's long history as the leading grower of fresh sweet corn, retailers and consumers tend to think of it as a summer vegetable. To shift that mindset to the April-May season that is Florida's peak, FSCE took steps to evaluate attitudes and awareness among both audiences to develop best practices in category management and promotion.

Given Florida's large volume and short shelf-life for fresh sweet corn, it is important that retailers are motivated to promote the product throughout the spring. Traditional retail efforts do not necessarily translate to this sales window. For instance to address the sales threat of cold weather in northern parts of the U.S., alternative ways to prepare corn other than grilling have been developed and pushed to retailers and consumers.

This project is a follow up to a 2001 SCBG that funded a category management study and development of resources both for produce managers, employees and consumers to drive Florida sweet corn sales throughout FSCE's season. Given the time between studies, the landscape has changed. Greater consolidation has led to fewer retail outlets. More rigid store policies and a push for more cohesive store branding has led to fewer outlets for point of sale materials. Also, since 2001, FSCE has undergone a brand development process that has led to a "Sunshine Sweet Corn" brand that can distinguish spring corn from Florida.

Project Approach

This project combined consumer and retail research to develop recommendations that can be shared with retail partners on best practices to promote sweet corn in the spring. Understanding consumer attitude and awareness is important in communicating recommendations to retailers. It shows that the suggestions are grounded in data. Having retail and consumer research also helps to identify the gaps in perception. In addition to research and analysis, we built resources that make up a "tool kit" that provides retailers with materials to take positive steps to better sell Florida sweet corn.

FSCE during this time initiated a branding process, which landed with Sunshine Sweet Corn (Fresh From the Sunshine State). It is a marketing brand that can be used by members to sell specific, premium seed varieties of yellow, white and bi-color corn. In addition to bolstering the value of membership, it also provides retailers with an identifiable, premium sweet corn available in the spring.

In the Spring of 2012, FSCE shipped over 2900 tool kits to 24 retailers that were customized to include price cards, back of house handling posters, retail best practices as well as consumer materials including a poster, recipe brochure and tear pads. Items were only shipped upon request. In addition to the tool kits, FSCE used their own program funds to run a sweepstakes. The goal was to motivate retailers to put signage at the point of sale that identifies Sunshine Sweet Corn, since on-product identification was extremely limited. Sweepstakes kits were shipped to 18 participating retailers in addition to the tool kits. When auditors performed store checks, however, very few displays were actually put up in the store. Further analysis in the discrepancy between POS requested and shipped and the number seen in store revealed pitfalls at multiple levels. Some kits never left the DC's where they were shipped, while others arrived at the store but remained untouched in the backroom. Retail interviews revealed multiple reasons for this, but one thing was clear. Retailers are moving away from using POS, particularly larger retailers.

Because of the lack of impact that POS shipped to stores seemed to have in overall sales, FSCE has moved away from printing and shipping large quantities, and instead keeps a modest inventory on hand to respond to requests from members and their retail customers. What we did find was that commitment from category managers to promote fresh sweet corn in April and May did lead to numerous store ads from participating retailers, with more aggressive pricing to move greater volume. As we move forward, we continue to explore ways to motivate produce directors while providing resources and insights at the store level.

Project partners included Golden Sun Marketing for retail research, Fresh Look for sales data, JRS Consulting and ORC for consumer research, and Lewis & Neale (now PadillaCRT) for project management, analysis, creative development and retail support.

Golden Sun Marketing conducted two rounds of interviews before and after the program with 12-15 category managers and buyers to better understand the challenges, opportunities and current attitudes about Florida sweet corn and the April-May sales window. Sales data purchased through Fresh Look aided in the analysis both on a weekly and market by market basis. Because of a significant disturbance in the harvest volume due to freezes, it does not provide a perfect indicator of performance, but does lead to some insights to improve retail support and program planning moving forward. Consumer research was conducted before and after the program, surveying 1000+ consumers on their buying behavior and usage at home. Some of the findings include: Southerners are more likely to purchase fresh corn in the winter and spring; loose ears in the husk is the prepared buying option; and boiling indoors is the most common cooking method regardless of flavor. This last

insight led to a recipe tear pad that included a faster way to boil corn indoors (Skillet Steaming) and some simple flavor enhancers to increase its frequency on the dinner table.

Goals and Outcomes Achieved

Activities performed included:

Pre and post project consumer survey (Separate Attachment)

In initial consumer survey was conducted in 2012 by JRS Consulting. We conducted an online survey of 1,000 adult residents between February 13th and Feb. 18th in 31 states and Washington DC (AL, AR, CT, DE, DC, FL, GA, IL, IN, IA, KY, LA, ME, MD, MA, MI, MS, MO, NH, NJ, NY, NC, OH, PA, RI, SC, TN, TX, VT, VA, WV and WI). In addition to being residents of these states, all respondents (ages 18-64) had eaten and purchased fresh sweet corn on the cob within the past 12 months and were responsible (or split responsibility) for food shopping and meal preparation in their households.

The sample was controlled to represent the US adult population on age, gender and geographic region for the states included in the sample.

A second survey was conducted following the 2013 spring season with ORC research. The report presents the findings of a survey conducted among a sample of 1,008 adults comprising 504 men and 504 women 18 years of age and older.

The online omnibus study is conducted twice a week among a demographically representative U.S. sample of 1,000 adults 18 years of age and older. This survey was live on June 24-26, 2013.

Completed interviews are weighted by five variables: age, sex, geographic region, race and education to ensure reliable and accurate representation of the total U.S. population, 18 years of age and older. The raw data are weighted by a custom designed program which automatically develops a weighting factor for each respondent. Each respondent is assigned a single weight derived from the relationship between the actual proportion of the population based on US Census data with its specific combination of age, sex, geographic characteristics, race and education and the proportion in the sample. Tabular results show both weighted and unweighted bases.

Much of the findings confirmed some of the long held beliefs that people's primary reason for not purchasing fresh sweet corn outside of the summer is due to their perception of seasonality. We are continuing to market Sunshine Sweet Corn as "Spring corn" to expand consumer perception of when corn is in season. Further, we found that weather had less of an impact on consumers intent to purchase, and more on how they chose to prepare it.

Retail interviews were conducted in 2012 and 2013. 15-20 retail buyers at chains east of the Mississippi River were interviewed by phone on topics including overall category impressions, pricing

strategy and GMO policies. There was a fair amount of misinformation discovered on Florida's promotional activities and the Sunshine Sweet brand. This led to the development of additional resources for shippers to provide to customers. The GMO issue in particular has great misunderstanding by even veteran produce buyers. Confusion between sweet corn and dent corn is common, with one retailer stating he believed over 90% of his sweet corn was GMO.

The research was combined into the best practices guide that is available at sunshinesweetcorn.com/retail.

- Pre and post project retail survey (separate attachment, summary included below):

Titles of the respondents varied from buyer, field buyer, category manager, director, and vice president. Most respondents had been buying produce for over 15 years and sweet corn for at least 5 years.

Almost all buyers indicated that the 2012 Florida Sweet Corn season was much improved over 2011. Quality in terms of grade and flavor of product was mentioned as a driving factor in their evaluation of the season. Steady supply was also mentioned by several buyers as being substantially better than the prior year.

- Florida spring corn shipments tracked 2011-2013 (Separate Attachment)

Data on spring shipments showed an increase of 21.4% in 2013 over 2011, including a 14% increase from 2011-2012 and a 6.5% increase from 2012-2013.

- Sales data purchased in top 25 markets (2012 and 2013) (Separate Attachment) - The markets seeing the largest gains in volume were Boston, MA and Buffalo, NY.
- Writing, design and printing of retail and consumer resources that comprised the tool kit (These materials may be viewed in the appendix.)
- Digital updates to website to deliver resources online (Available to view, download and order at http://www.sunshinesweetcorn.com/retail)

Goals of the program were achieved and are as follows:

- Better understand consumer and retail behavior
- Increase number of chains participating in promotions from 15 (total target 20)
- Increase sales in 2012 vs 2011 (years adjusted from original contract due to delayed start) of 5%
- Distribute 1000 kits to 30 chains (42 chains requested POS or the Sweepstakes kits)

With 42 chains participating in the promotions and requesting POS and training kits, we far exceeded our goal. The greatest measures of success, however, are growth in shipments and price with which Florida shippers are able to sell. This in turn returns a greater value back to the growers and the industry in general. The goal of a 5% increase has been achieved year over year between 2011 and 2013. The record sales in May 2013 (including two weeks when nearly 1.5 million crates were shipped) are evidence of the success of this project. Further, the industry is confident it has a great path ahead, and has increased their own assessment to work with FDACS to air Fresh From Florida television ads in spring 2014 in three test markets.

Beneficiaries

Beyond the 28 growers and 8 shipper members of the FSCE that applied for the grant, the industry in south Florida, distributors and wholesalers, retailers and even consumers benefited from this project. Florida corn growers are better equipped to provide resources to their customers that in turn make them better promoters of Florida sweet corn. Combined with best practices on holding and displaying corn, the end consumer is also a beneficiary by purchasing a better end product in the stores.

There was a 14% increase in April/May shipments between 2011 and 2012 and corn was shipped at a higher price per crate. Between 2012 and 2013, there was only a 7% increase, but it was largely due to freezes in late February/early March that dramatically impacted volume shipped in April. In fact, once volume was up, Florida had a record May with shipments totaling 5,545,253 crates, up 43% over 2012.

Lessons Learned

One thing was clear. A strong relationship between shippers and retailers is crucial in moving large volumes of a time sensitive product in a narrow window. FSCE has also invested great resources through voluntary self-assessment to grow consumer awareness and demand. This push-pull marketing effort has resulted in greater volume shipped and per crate price achieved for Florida growers and shippers. POS materials are waning in importance for retailers, but greater merchandising insights and digital tools are increasingly important in this competitive space. Ultimately they will make decisions based on performance, so helping to ensure that the product is there and people are looking for it (and putting it in their cart) will keep Florida as the largest grower/shipper of sweet corn in the U.S.

The lack of POS up in stores discovered by store audits was discouraging, however, seeing that has moved the industry to shift their own resources into new initiatives, particularly in the digital space. FSCE believes this fundamental shift in program activities was critical in not only salvaging the 2013

season after devastating freezes, but being able to call it a success following the unprecedented May shipments.

Goals of the program were achieved and are as follows:

- Better understand consumer and retail behavior
- Increase number of chains participating in promotions (total target 20)
- Increase sales in 2012 vs 2011 (years adjusted from original contract due to delayed start) of 5%
- Distribute 1000 kits to 30 chains (42 chains requested POS or the Sweepstakes kits)

Contact Person

- ☐ Mike Aerts, FFVA
  - (321) 214-5200
  - mike.aerts@ffva.com

Project (3): Florida A&M University - Developing Low Chill and Heat Tolerant Raspberry Suitable for Florida

Contract Number:16848
Specialty Crop Block Grant Funding Year: 2010
Funding Total: $103,157.00
Reporting Period: Final

Project Summary

Raspberry is a high value cool season crop and as such, cannot tolerate high temperature of the South during the normal growing season. Further, ccultivation of raspberry in Florida is significantly hampered due to prevailing hot and humid weather conditions and lack of sufficient chilling hours to induce flower and fruit production. Raspberry cultivars have been categorized based on morphological descriptions which are dependent on the environment and cultural practices. With this view, this project was developed to evaluate raspberry cultivars to identify genotypes suitable to Floridian environment. Expanding the commercial growth range of raspberry production to southern United States is undoubtedly one of the most challenging tasks that any plant breeder can face. Hence this research has taken a multidisciplinary approach and aimed to develop molecular/biochemical markers for selecting raspberry cultivars that are adaptive to the southern USA, and to identify gene/protein/s/metabolites associated with heat tolerance and low chilling requirement. Limited research exists on raspberry concerning identification of molecular and cellular components associated with heat/low chill tolerance. This research is intended to promote raspberry breeding by identifying the genes/proteins that would enhance heat/low chill tolerance characteristics of raspberry. The specific objectives of this study were to i) identify genes/proteins associated with heat tolerance, ii) identify genes/proteins/metabolites responsible for low chill requirement, iii) clone, sequence and characterize the identified genes/proteins/metabolites, iv) develop molecular and biochemical markers for screening raspberry genotypes and breeding population for heat/low chill tolerance, and v) provide hands-on experiential learning to students in various molecular/biochemical techniques and other horticulture disciplines. Raspberry cultivars with wide genetic diversity were used for identifying traits associated with low chill/heat tolerant requirement and to develop genetic markers for the identification of desirable genotypes. Outcome of this study helped identify the nature and function of genes, proteins and metabolites uniquely expressed in low-chill and heat-tolerant raspberry genotypes, and helped understand the molecular and cellular basis of tolerance. The identified molecular markers will be useful for identifying genotypes with low chill and heat tolerance characteristics. This research will diversify raspberry research and

aid in identifying and developing raspberry cultivars with enhanced heat/low chill tolerance to expand and sustain their production in southern United States and provide alternate crop to increase grower profit. Further studies coupled with field analysis will help develop low-chill/high temperature fruit set raspberry genotypes useful for cultivation in Florida. This proposal is also aimed at enhancing collaboration among scientists and diversify raspberry research as well as providing experiential learning to students in various molecular/biochemical techniques.

Project Approach

The primary goal of this research is to identify genetic diversity in chilling requirement and heat tolerance among raspberry genotypes by screening available low- and high-chill raspberry cultivars. For this purpose, eleven raspberry cultivars differing in chilling requirement were grown in the greenhouse, leaf tissue collected and analysed by RAPD technique. Of the 100 RAPD primers tested, ten primers (OPA1, OPA5, OPA7, OPA13, OPB15, OPC3, OPD13, OPE3, OPE15, OPE19) yielded an average of 12 bands per primer with sizes ranging from 200 bp to 3000 bp. These results showed significant genetic diversity among low/high-chill and -temperature tolerance cultivars. Unique DNA bands were excised from the gel, cloned and sequenced. Database search of these sequences revealed them to be XERICO protein, protein kinase, dehydration responsive protein, heat shock protein and unknown protein. Among the genes/markers identified, XERICO protein is known to possess a dual function, imparting drought tolerance and altering expression of hormone biosynthesis genes. For example, transgenic *Arabidopis* plants expressing 35S:XERICO proteins showed altered expression of plant hormone biosynthetic genes (ethylene, brassinosteroids and gibberellic acid) and increased drought tolerance (Ko et al, 2006). The other identified genes/markers viz. protein kinase, dehydration responsive protein, heat shock proteins are mainly involved in protecting plants against heat stress. Proteome analysis using high throughput 2-DE electrophoresis showed significant variation in protein profiles among raspberry cultivars. Over 400 proteins were resolved from leaf tissue by 2-DE gel electrophoresis. Differential protein expression among these cultivars was analyzed by PD quest software. High-chill cultivars showed relatively more number of proteins compared to low-chill genotypes. About 100 proteins were found to be unique to the high-chill cultivars. The data also showed that several proteins were up-regulated in high-chill cultivars compared to low-chill cultivars. The identity of some of these proteins is: Isoflavone reductase-like protein 5, Glutamine synthetase, ATP synthase beta subunit, High Chill CBD related Protein, Hairpin binding Protein and Cytosolic malate dehydrogenase. Overall, the protein analysis revealed that raspberry cultivars possess genetic variation with regards to heat/chill tolerance that can be utilized in breeding programs to develop raspberry cultivars suitable for southern United States. The markers/genes/proteins identified appears to be involved in protecting raspberry plant against heat stress and activating hormone biosynthesis genes that induces bud break and flowering.

Our project partners Drs. Kim Hummer and Chad Finn of USDA/ARS provided raspberry leaf samples and cultivars with low-chill requirement, technical knowhow and help interpret the results.

Goals and Outcome achieved

The long term goal of our raspberry breeding research is to develop low-chill and heat tolerant raspberry cultivars that require low chilling periods and withstand high heat conditions typically found in the southern region to promote flower and fruit production, and develop them as an alternate high-value crop for southern farmers. The short term goal of this approach includes understanding the relationship between environment, and flower and fruiting characteristics to identify the molecular and cellular events that precede or are essential for flower and fruit set in raspberry. In this regard, we have collected diverse raspberry genotypes from across the US and evaluated their performance, and molecular and cellular responses under Floridian conditions to determine their adaptability to this region. In addition, the response of these genotypes at the molecular level was monitored by studying changes in their gene and protein expression to identify the specific components essential for flower and fruit induction.

The information and data obtained in this project is significant in that it not only improves our understanding of environmental influence on flowering and fruiting ability of raspberry but also expands our knowledge base about the constraints limiting raspberry production in the South. Molecular studies including screening for genetic markers yielded varying amplification level of genes. The primers identified in the current study will be useful to determine genetic variation among high-chill and low-chill raspberry cultivars. The genes identified to be associated with heat tolerance and inducing hormonal biosynthesis will further shed light on the molecular events critical to flower induction in raspberry. Furthermore, proteomics studies also revealed expression of 100 novel proteins in Florida grown raspberries. Several of these proteins were found to be up-regulated in high-chill cultivars compared to low-chill cultivars. Biochemical studies revealed that raspberry cultivars do possess genetic variation with regards to heat/chill tolerance which can be utilized in any raspberry genetic improvement program for developing new cultivars with low-chill and heat tolerance characteristics. The protein data will be also useful for studying protein-protein interactions in raspberries grown at different locations, seasons, environments and help monitor environment-induced changes on leaf protein expression. Further studies on the identified genes/proteins as to their expression sequence, product, and location will greatly improve our understanding of bud break, flowering and fruiting in raspberry cultivars under Floridian climate.

Cultivar development is a long term process and requires a thorough understanding of molecular and cellular regulations, and environmental influences on their expression. This study is first of its kind on this subject and has made significant advancement in understanding the molecular genetics of low chill/heat tolerant cultivars. This would have a major impact on

marker development, germplasm evaluation, and genotype selection which would greatly accelerate southern raspberry breeding program.

Results of this research were published in industry-related scientific journals and presented at the Biennial ARD Research Symposium in April 2011 in Atlanta, GA. Approximately 500 people attended this meeting. We do not have information as to how many of these attendees were growers, and suspect that very few growers would attend such a meeting. However, many of the attendees were extension scientists and/or university faculty who interact with growers to advise and educate them. See "Additional Information" section for list of publications. We do not have exact circulation figures for each journal, but estimate the combined print and online circulation of each to be in the thousands to tens of thousands. The primary readership group for these journals is likely agricultural scientists working both in universities and extension services.

Beneficiaries

The long term beneficiaries of this project are the growers, consumers and the industry anticipating development of raspberry cultivars suitable to Florida. The results of this research will improve our understanding of genetic mechanisms active in low- and high-chill raspberry cultivars. The data will not only help raspberry breeders but also help breeders involved in developing other fruit and vegetable crops requiring low-chill and heat tolerance, and germplasm screening. The development of a southern raspberry cultivar would reap significant economic returns for southern growers and the industry. This is especially true for small farmers who are in need of high value cash crops to fill production/marketing niches for a more diversified farming enterprise. Currently blackberries and blue berries are grown successfully by small farmers and addition of raspberries will add additional economic benefits for small farmers.

Specific grower groups we expect to benefit are strawberry and blueberry growers. Florida has 212 strawberry operations covering 9,900 acres and producing over $366 million in revenue annually, and 566 blueberry operations covering 3,800 acres and producing $69 million in revenue annually. Given these growers' previous experience producing small fruit, we believe that the availability of a high value alternative crop such as raspberries could help the them to diversify and create a hedge against competition from foreign growers, which in turn should stabilize or increase profits.

Lessons Learned

The current research was initiated in an attempt to understand the underlying factors/molecular components limiting red raspberry *(Rubus idaeus)* production under Floridian conditions. The main problem is that red raspberry, like all deciduous temperate-zone fruit, needs a sufficient exposure to chilling in winter to terminate bud rest and induce bud sprouting. However, lack of adequate winter chilling causes uneven and poor bud break in spring, followed by low fruit yield. In most locations in North Florida, and in most years, the chilling is not sufficient to meet red raspberry's demands. Overcoming the chilling requirement entails better understanding of molecular and cellular events that occur during the long chilling period which would help develop novel technologies for raspberry genetic improvement. Hence, we had taken a molecular approach to monitor molecular events that occur during progressive chilling to identify critical genes and metabolites essential for inducing flowering and fruiting in raspberry. This research provided some insight into the events that occur during chilling, extent of genetic variation and help identify problems and bottlenecks in the program. However, a long term effort is needed to better understand role of these molecular events and processes, interaction among various molecular and cellular components to identify, develop and apply appropriate technologies to overcome the constraints preventing expression of desirable flowering and fruiting genes in raspberry. We have also found that it is difficult to achieve long chilling periods using growth chambers and other devices. Hence, it is recommended to grow selected cultivars under natural high-chill and low-chill locations, collect tissue samples from these locations and analyse them to determine the effect of chilling on gene and protein expression, and identify novel genes and proteins uniquely expressed in those environments among the plants.

To overcome this shortfall in chilling exposure we have conducted a series of *in vitro* and green house studies using various growth regulators. Some of our raspberry accessions generated through *in vitro* propagation showed wide differences in their ability to bloom and also when ambient temperature exceeded 95°F. Our preliminary *in vitro* studies have indicated that varying dosages of gibberellic acid can induce bud break and flowering in raspberry seedlings generated through tissue culture. This would suggest that hormone treatments would be a valuable tool for overcoming chilling requirement and obtain flower and fruit induction in Floridian climate.

Fig. 1 Raspberry plant cv. Tulameen flowering. These plants were generated using in-vitro culture and treatment of growth hormone Gibberellic acid.

Contact Person

Bobby R. Phills, PhD.
Professor of Horticulture/Small Fruits &
Director, Small Fruit Research and Outreach Program
Centre for Viticulture and Small Fruit Research
College of Agriculture and Food Sciences
Florida A&M University
6505 Mahan Drive
Tallahassee, FL 32317
Main: 850-599-3996
Direct: 850-599-8685
Cell: 850-528-4616
Email: bobby.phills@famu.edu. or bphills13@gmail.com.

Additional Information

Publications

Vasanthaiah HKN, Kambiranda D, Umar G, Basha SM and Phills BR. 2013. Raspberry Crop Improvement Through Biotechnology. In: Plant Biotechnology and Transgenic

Research, Thangadurai D, Othman RY and Biradar AP (eds), Bentham Science Publishers, USA (*Accepted*).

Umar G, Vasanthaiah HKN, Devaiah K, Basha SM, Phills BR and Hunter W. 2010. Assessment of Genetic Diversity Among Selected Raspberry Cultivars. *Proceedings of the Florida State Horticulture Society* 123: pp. 26-28.

Vasanthaiah HKN, Kambiranda D, Basha SM, Umar G and Phills BR. 2011. Development of Molecular Markers Linked to Low Chill/ Heat Tolerance in Raspberry. 16th Biennial ARD Research Symposium, Atlanta, GA, April 9-13

Project (4): University of Florida - Developing Site Specific Management of Twospotted Spider Mites in Strawberries

Funding Year: 2010
Funding Amount: $126,923.00
Reporting Period: Final

Project Summary

The twospotted spider mite, *Tetranychus urticae* (Koch) is one of the most serious pests affecting strawberry production in Florida. Both immature and adult stages can cause plant damage by feeding on strawberry leaves, inducing yield loss. Currently the most widely used tactic to suppress or control twospotted spider mites is to apply miticides to the entire field. There are several problems associated with wide-scale use of miticides including pesticide resistance, negative effects on non-target organisms and environmental contamination. The predatory mite, *Neoseiulus californicus* (McGregor), has been used as an alternative control tactic for twospotted spider mites as opposed to broad-spectrum pesticide. This method of control is effective but can be expensive. Treating only the "hot spots" where mites are present (site specific management), instead of treating the entire field is a potential management approach to control twospotted spider mites in an economical way.

Project Approach

Obj. 1. To develop twospotted spider mite sampling program using remote sensing technique

Our remote sensing work was conducted at a commercial strawberry farm in Citrus County Florida. During the 2011/2012 growing season a strawberry field (approx. 0.7 acre) was infested with mites and selected for further studies. The instrument used in our studies was three GreenSeekers® that were mounted onto a tractor to collect reflectance values from strawberry plants. These reflectance values were used to differentiate between mite-infested and uninfested strawberry plants. GreenSeekers® were mounted onto a tractor and positioned so that it could collect data from three beds of strawberries each time it passes down the row. A GPS was also mounted onto the tractor to collect the coordinates in order to generate a map of the field. Both the GPS and GreenSeekers® were connected to a computer and the data were downloaded for map preparation. The tractor was driven up and down the strawberry rows at approximate speeds of 5 mph. Based on the ratio of the differences in wavelengths between infested and non-infested plants a

Normalized Difference Vegetative Index (NDVI) value is calculated and used to generate a map. In addition, leaf samples were collected into Ziploc bags and brought back to the Small Fruit and Vegetable IPM laboratory at the University of Florida in Gainesville. Using a dissecting microscope (10X), spider mites, insect pests and beneficial insects were counted from the leaves. The output from GreenSeekers® was analyzed and a map was developed to show mite infestation levels in the field. Mite leaf counts were compared with the output from the GreenSeekers® and the data were used to determine the accuracy of the GreenSeekers® in detecting mite infestation levels.

Results

Figure 1 shows the field map produced by the GreenSeeker® showing areas with and without spider mite infestation based on the reflectance values of the strawberry plants. The green color indicates healthy plants while the red color shows high mite infestation. The yellow dots indicate where irrigation sprinklers were established while the off green color indicate various level of infestation ranging from low to very severe mite infestation (red). We can deduce from the map that most of the mite infestation was on the edge of the field or in hot spots within the field. Figure 2 indicates the relationship between NDVI values and the level of TSSM infestation. The high TSSM infestation areas had low NDVI values while the green areas with no TSSM infestation had the highest NDVI values.

Obj. 2. : To evaluate site- specific pest management for twospotted spider mites using a reduced-risk insecticide and predatory mites (N. californicus) on field-grown strawberries.

Field studies were conducted at the Plant Science Research and Education Unit (PSREU) at the University of Florida, in Citra, FL. Strawberry variety 'Festival' was grown during fall and spring 2010 to 2011 and 2011 to 2012 field seasons. Plot size was 7.6 by 7.6 square meters with 6.1 meters buffer-zone to prevent treatment interaction. Each plot included six beds with 12 rows of strawberry plants. Before planting, the field was treated with a granulated fertilizer N:P:K (10-10-10) at a rate of 560.43 kg per hectare and the soil was treated with fumigant 50:50 (Methyl-bromide: Chloropicrin) at a rate of 448.34 kg per hectare. Beds were covered with black polyethylene mulch and plants were managed according to standard Florida strawberry practices with the exception of insecticides and miticides (Laster et al.

2012). Strawberry (green tops) were planted manually by hand and overhead irrigation was run for the first ten days after transplanting followed by drip irrigation for the rest of the growing season.

Fertilizer (N:P:K) was applied through the drip irrigation every week starting one week after transplanting until harvesting. Weekly application of fungicides was applied throughout the season. No insecticides were applied to the research plots. Weeds were controlled by hoeing between rows and using an s-tine around the border of the plot.

The experimental designs were a completely randomized block with five treatments and 4 replicates. Treatments included: 1) application of *N. califonicus* over the entire plot; 2) application of *N. califonicus* only to "hot spots" [site specific treatment] based on sampling; 3) application of Acramite® to the entire
plot; 4) site-specific application of Acramite® to "hot spots" based on sampling; 5) untreated (control). Acramite® was applied two times (per spot/plot) during the entire season at the manufacturer's recommended rate. *Neoseiulus califonicus* were applied at a ratio 10 TSSM: 1 *N. califonicus*. For site-specific treatments, Acramite® and *N. califonicus* were only applied when TSSM exceeded the threshold based on sampling results. The amounts of pesticides and *N. califonicus* was recorded and calculated.

Systematic sampling was conducted weekly throughout the entire field seasons. Ten trifoliates were taken randomly from each plot every week and brought back to Small Fruit and Vegetable IPM Laboratory (SFVIPM) at University of Florida, Gainesville, FL. The numbers of TSSM motiles (adults and nymphs) and eggs were counted under a dissecting microscope (10X). Predatory arthropods were also recorded. Fruits were harvested two times per week from the inner two beds and weighed. Marketable fruits were selected according to grading standards for strawberries in Florida.

Results

Table 1. Shows total costs incurred per acre from each management approach used in the experiment. We found that site-specific application of Acramite® and predatory mites significantly reduced the cost of these treatments per acre when compared to applying the treatment on the entire plot. In particular, there was a 70% reduction in total costs of using Acramite for site specific treatment as opposed to applying on to the entire field. Similarly, there was 80% reduction in costs when applying predatory mites to hot spots (mite infested areas). Although we had to apply the predatory mites twice in the growing season, the numbers of predatory mites used in the field were significantly reduced because we only treated areas where twospotted spider mites were present as opposed to treating the entire plot.

Likewise, when using site-specific application of Acramite a small amount of the chemical was used as opposed to treating the whole area. No treatment was applied to control plots and we recorded a significant reduction in yields harvested from those plots. This is a clear indication that some type of management actions is required to control spider mites on strawberries in order to avoid losses.

Obj. 3. To develop a comprehensive extension program to train strawberry growers through on-farm demonstrations, grower's meetings and to disseminate information

A presentation and training session was given to about 85 strawberry growers in Plant City Florida on August 14, 2013. Strawberry growers learnt about the potential to use site specific management for two spotted spider mites as well as our on-going research to reduce labor for sampling twospotted spider mite in their strawberry fields. Our findings from the remote sensing study that was conducted on a commercial strawberry field was also presented to strawberry growers. In addition, our Greenseeker® work was conducted as an on-farm demonstration research project in Citrus County with growers' involvement. Therefore, the growers are able to see first-hand the results and benefits of using tractor-mounted Greenseekers® for detecting twospotted spider mites in the field.

Graduate students and Post-docs presented our findings at the Entomological Society of Americas 2011 Annual Meeting in Reno, NV. Information on using the GreenSeeker® technology was also presented to faculty and agricultural extension agents at a departmental seminar on April 12th 2012 in Gainesville, Florida. Both Ruohan Liu (former graduate student) and Teresia Nyoike (Post-doctoral Research Scientist), who worked on the project, presented their research findings at the Florida Entomological Society 2012 Annual meeting in Jupiter, FL, July 22-25. Dr. Nyoike also presented her findings at the Entomological Society of America's 2012 Annual Meeting in Knoxville, TN Nov. 11 - 14.

We were able to collaborate with commercial growers, extension specialists and crop consultants to evaluate the potential to use remote sensing in strawberry pest management. The commercial grower provided adequate space on his farm to ensure that the experiment was carried out successfully. In addition, the grower allowed his farm to be used as a demonstration site. All of the extension specialists worked together to ensure the goals and objectives of the project were carried out.

Goals and Outcomes Achieved

Goal. To develop twospotted spider mite sampling program using remote sensing technique.

When we started the project only about 3 growers out of approximately 100 (3%) were practicing IPM; however, by the end of the project about 22 growers were practicing integrated mite management. We developed and evaluate the potential to use a GreenSeeker® for sampling twospotted spider mites in strawberry system. The results were very promising and the grower who allowed us to use his farm for on-farm demonstration is very excited about the use of the Greenseeker® technology to detect spider mite damage on strawberries. He has opened more of his field for sampling using Greenseeker® or similar technology. We will continue to develop and modify the Green Seeker® technology until a device is available that commercial growers can use to sample mites.

Goal. To evaluate site-specific pest management for twospotted spider mites in strawberries

Outcome. When the project was started none of the growers used site specific management to control their mite population. By the end of the project about 15 growers (15%) were either using site specific management or were considering using this technology for the next season. Among the 15 growers, 5 of the growers' (mainly organic growers) were using predatory mites. As the technology develops and growers are more able to coordinate with their harvesting crew significantly more growers will be using site specific management. There was a 70% reduction in total costs of using Acramite for site specific treatment as opposed to applying on to the entire field. Similarly, there was 80% reduction in costs when applying predatory mites to hot spots (mite infested areas). The cost of using predatory mites has been cited as a major limitation to the adoption of using predatory mites for twospotted spider mite control in field grown strawberries. Using fewer chemicals is not only cost-effective but also desirable to the environment as the side effects to non-target organisms are reduced. Although our site specific experiment was carried out at a University research station we have been able to share our results with other strawberry growers who are excited about using site specific management. There are several growers who are planning on using site-specific pest management in their fields in the near future.

Beneficiaries

More than 60 (60%) strawberry growers in Florida have seen our presentations and have benefitted from this project. About 15 crop consultants, 6 extension agents and the Florida Strawberry Growers Association have benefitted from our project.The groups that benefited from this project are farmers, crop consultants, agricultural extension workers, grower organizations and the general public.

This project has immediate and long-term impact on the way insect pest management is conducted on a typical farm. For instance, there is no need to spray the entire farm for pests that display clumped distribution such as mites and aphids. Our research has indicated that these pests can be managed in a far more sustainable and economical way by only treating the areas that are affected by these pests.

The long-term benefits are less pesticide residues on fruits and vegetables, fewer problems associated with insecticide resistance and better protection for the environment.

Lessons Learned

When the project was developed we envisioned using a hand-held spectroscopy to conduct our remote sensing studies in strawberries. As we started implementing the project we realized that the hand-held spectroscopy had some limitations for commercial growers and as a result we decided to switch to the GreenSeekers® technology to do our remote sensing studies. The GreenSeeker® provide rapid and a cost effective means of identifying and quantifying plant stress from changes in multispectral signatures reflecting from the plant canopy. GreenSeekers® were mounted on a tractor to collect reflectance values from strawberry plants and to differentiate mite infested plants from non-infested plants. Each GreenSeeker® was positioned so that it could collect

data from three beds of strawberry each time it passes down the row. A GPS was also mounted on the tractor to get coordinates for generating a map of the field. Both the GPS and GreenSeekers® were connected to a computer and the data were downloaded for map preparation.

Contact Person:

Dr. Oscar E. Liburd, (352) 273-3918, oeliburd@ufl.edu

Additional Information:

Ruohan Liu. 2013. Development of site-specific pest management strategies for control twospotted spider mites, Tetranychus urticae (Koch) in north-central Florida strawberry fields. MS. Thesis submitted to the Graduate School, University of Florida. Gainesville, FL.

Nyoike, T. W., and O. E. Liburd. 2013. Effect of Tetranychus urticae Koch (Acari:Tetranychidae) on marketable yields of field-grown strawberries in north-central Florida Journal of Economic Entomology 106:1757-1766.

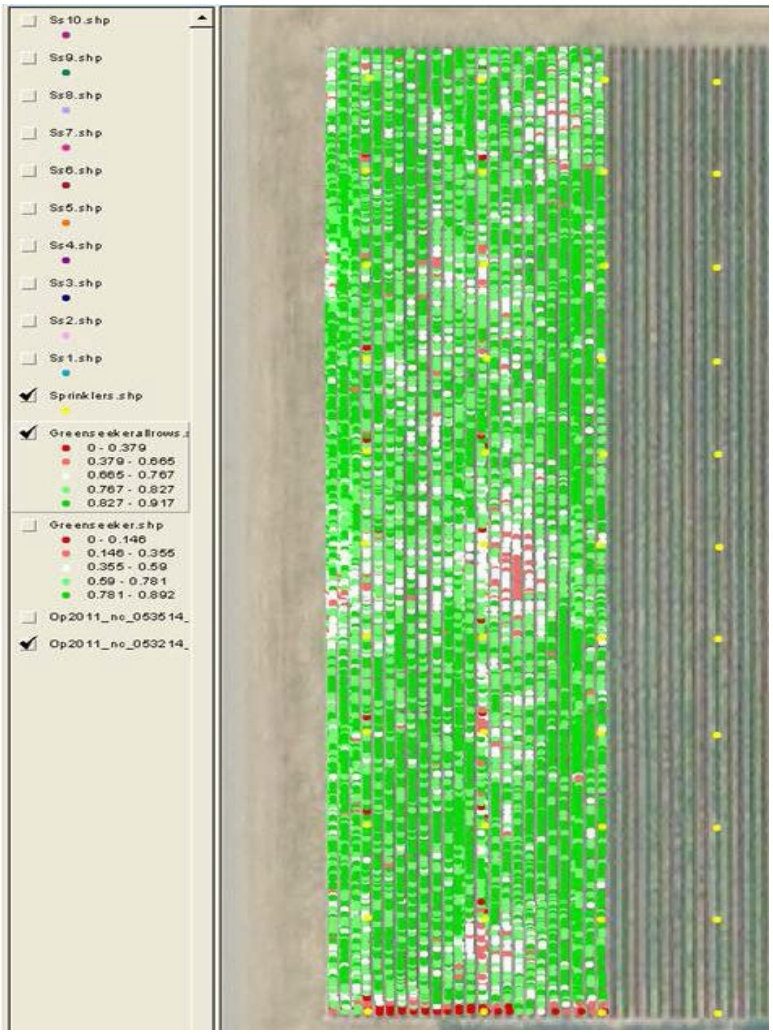


Fig.1. Field map produced from the GreenSeeker® output showing TSSM infested and non- infested strawberry plants

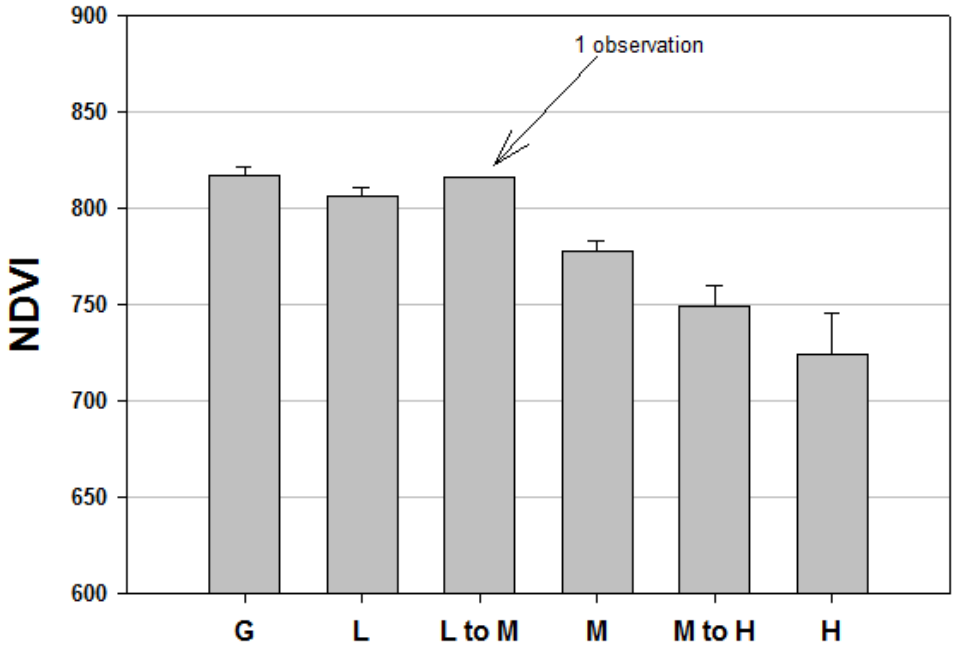


Fig.2. Correlation between NDVI value from GreenSeeker® and TSSM infestation

Project (5): University of Florida - Developing Superior Flavor in Florida Strawberries

Funding Year: 2010
Funding Amount: $253,572.00
Reporting Period: Final

Project Summary

☐ Florida strawberry producers have tremendous genetic resources for high-yielding, disease resistant, excellent shipping berries. The central problem is that pressure from other markets, namely Mexico, flood the USA market at a time when Florida berries are typically provided, and Florida growers can realize the greatest profits.

☐ We adopted an approach whereby consumer opinions would be assessed regarding the flavors of strawberries. Chemical analysis would reveal the nature of the products preferred, and the chemical constituents that governed flavors and aromas. We then proposed to use molecular tools to identify genes associated with these compounds.

☐ Gene identification would allow for the production of molecular markers, DNA sequences that would be present/absent in conjunction with the flavor/aroma trait, and allow breeders to move more quickly in breeding decisions.

Project Approach

☐ Dr. Charles Sims and his laboratory performed tests on volunteers to identify the berries that tasted best, and the sensory qualities that were perceived. We obtained ratings from many University of Florida accessions and those of competitors.

☐ Dr. Dave Clark's lab did a comprehensive workup of over 35 different strawberry varieties. They were analyzed for sugars, organic acids and volatile organic compounds. These data were important because they described the inventory of components shaping flavor and aroma in strawberry.

☐ Dr. Kevin Folta's laboratory identified genes contributing to two of these flavor compounds, gamma decalactone (peachyness) and methyl anthranilate (grape flavor). The genes were identified and molecular markers developed.

There were four central aims of the proposal. The first three were completed, the fourth is currently in use and will continue to be in use going forward. I will summarize what was found under each aim. For additional information and detail, please see the published and open access paper that came from this work (Schwieterman et al., 2013). Aims 1 and 2 should be considered together because they show the relationship between consumer preferences and the chemicals present.

Aim 1. "Flavortype" the current suite of elite cultivars using consumer sensory panels.

In this study, thirty-five cultivars harvested at 12 time points over two seasons were assessed by human sensory panels for liking. Panels were held throughout the spring of 2011 and 2012, with over 700 participants. Many trends were uncovered. Panelists found fruits less desirable late in the season. Flavor intensity was a strong contributor to consumer liking, and not related to overall volatile composition. The principle correlate with liking was sucrose, and that decreased throughout the growing season. Flavor data and preferences were collected and the major findings were only evident after Aim 2, where liking was fit against biochemical composition (next section).

These tasks were all completed as described as stated in the original Plan of Work.

Aim 2. Defining the biochemical components of consumer-preferred fruits.

The same thirty-five cultivars harvested at 12 time points over two seasons were assessed for malic acid, citric acid, glucose, fructose, sucrose, firmness, titratable acidity, pH and 81 volatile compounds. Fruits could be clustered based on their phenotypes. The results are presented in Figure 2 of Schwieterman et al., 2013. No two cultivars presented the same flavor profile, even the same genotypes within a season. One third of the chemicals identified contribute to flavor intensity. When compared against other reports, the data here show that linalool, butanoic acid, ethyl ester; butanoic acid, methyl ester; and 3(2***H***)-furanone, 4-methoxy-2,5-dimethyl- show significant positive correlation with flavor intensity. These are all remarkably different classes of chemicals, showing that the flavor experience comes from a variety of compounds. These tasks were all completed as described as stated in the original Plan of Work.

Significant results of Aims 1&2.

- Particular esters, terpenes, and furans have the most significant fits to strawberry flavor intensity.
- In total, thirty-one volatile compounds are found to be significantly correlated to strawberry flavor intensity, only one of them negatively.
- Further analysis identifies individual volatile compounds that have an enhancing effect on perceived sweetness intensity of fruit independent of sugar content. **This was a major unexpected result** and has proceeded forward for further study in the generation of fruits and vegetables with high perceived sweetness and low sugar content.
- The chemicals most associated with consumer liking were strongly affected by what time the berries were picked during the growing season.
- These findings allow for consumer influence in the breeding of more desirable fruits and vegetables.
- This approach garners insights into fruit metabolomics, flavor chemistry, and a paradigm for enhancing liking of natural or processed products.

Aim 3. Resequencing of candidate flavor-related genes in wild and cultivated accessions within consumer-delineated flavortypes.

The resequencing work varied slightly from the original proposal in that we sequenced RNA targets instead of DNA. In other words, rather than resequencing candidate genes, we used a novel pooling strategy to identify expressed genes that matched the volatile in question. This work is also in press in an open access journal (Chambers et al., 2014). In short, by focusing on expressed genes we were able to rapidly identify those underlying the volatile response. One good example is the volatile γ-decalactone, the volatile underlying peach flavors in fruits. Sequencing analysis revealed a single gene that was different between the producing and non-producing genotypes.

Many key targets emerged from this analysis including candidate genes associated with production of methyl-butanol and ethyl hexanoate. Strong correlations were identified for methyl anthranilate (grape aroma) and γ-decalactone (peach notes). The genetics indicated that γ-decalactone was controlled by a single dominant genes, so genetically this was the most intuitive target.

Analysis from bulk-analyzing transcript data from producing and non-producing fruits showed that a single gene was significantly differentially expressed between two parents, 'Elyana' and 'Mara des Bois'. Red ripe fruits from segregating progeny were analyzed for expressed gene content. A single transcript encoding an omega-6-fatty acid desaturase segregated 100% with the volatile.

The value of this resequencing approach is that this expressed sequence is misrepresented because of differences in the DNA sequence, likely. When both parental genomes were resequenced, it showed that the non-producing parent did not have the gene. **This was a significant result** because it allowed the construction of a solid molecular marker that was gene-based and only amplifiable in backgrounds that produce gamma decalactone. Figure 8 from Chambers et al (in press, Identification of a Strawberry Flavor Gene Candidate Using an Integrated Genetic-Genomic-Analytical Chemistry Approach; BMC Genomics), is shown here. Essentially if the genotype has the gene, it produces the compound, as shown in the parents and segregating progeny in Panel A. The result shows that specific backgrounds have the gene, and some do not (Panel B). It also is detected in wild accessions (Panel B). This finding has been freely shared and has been immediately implemented in breeding programs.

The same resequencing strategy is being used with respect to other volatile compounds and several strong candidates are being analyzed under a new FDACS proposal.

Aim 4. Implementation. The data from consumer preferences and cultivar biochemistry are important and are currently guiding breeding efforts in strawberry breeder Vance Whitaker's program. He also is using the gamma-decalacone marker to design crosses and make favorable parental choices to include this key volatile.

Goals and Outcomes Achieved

☐ The project was an overwhelming success. We have a chemical inventory of a large number of strawberries, along with consumer data that relates to them. This comprehensive dataset can be used to make future breeding decisions, also marketing and branding decisions.

☐ Genes controlling two key volatiles were identified and molecular markers developed. These are being immediately integrated into breeding programs.

☐ The methods developed have been clearly validated in strawberry and open the opportunity to expand into larger products and populations.

☐ Two Ph.D students used this data to complete dissertations and graduate

☐ The work will result in three peer reviewed publications in excellent journals. One has been accepted, one in second revision review and the other in late preparation.

A comprehensive catalog of favorable flavor volatiles will be determined in advanced University of Florida breeding selections and cultivars.

We now have significant consumer panel and biochemical data on 35 cultivars from several time points. The critical volatiles have been determined, and compounds known to be relevant to consume liking have been identified (Schwieterman, 2014).

Data on flavor volatiles, sugars, and acids will be used to make decisions on which strawberry genotypes to use in controlled hybridizations.

There was a massive amount of data gathered. It is summarized in pages 56-95 in Michael Schwieterman's doctoral dissertation, downloadable at http://ufdc.ufl.edu/UFE0045940/00001

Thousands of seedlings resulting from hybridizations will be screened for optimal levels of sugars, acids, and volatiles.

We have screened plants resulting from elite crosses using molecular markers, and in one set of crosses (Mara x Elyana) we have completely screened resulting progeny for specific favorable volatiles. From this, we have new selections that still lack horticultural characters like fruit size and firmness, but have superior flavor. An extension beyond the scope of proposed activities is that we have additional panels sampling these new fruits and the results are curious. Some panelists find the fruit flavor amazing, others find it medicinal. More work is being done on these new selections going forward.

New breeding lines selected from among the seedlings will be re-evaluated via consumer panels to measure improvements in flavor.

As mentioned above, progeny from select crosses have been evaluated and we have received mixed results.

Beneficiaries

☐ University of Florida breeding program. We now have two molecular markers that track with important volatiles. This will speed breeding of new, more flavorful products.

☐ Florida's strawberry growers will benefit from improved products with better flavors, helping them compete with a specialty high flavor product.

☐ The data generated can be recycled to generate additional molecular markers for use in the breeding program, and the work is being continued under a new FDACS grant to Vance Whitaker.

The data have been presented in the following stakeholder venues:

Florida Agritech, August 2012 (75 attendees)

Florida Strawberry Field Days February 2013 (150 attendees)

Florida Agritech 2013 (150 attendees)

Eckland International Strawberry Symposium, January 2014, (200 attendees)

The work was also presented in several national and international conferences by M. Schwieterman, A.H. Chambers, K.M. Folta, and V.M. Whitaker.

The Florida strawberry industry is extremely interested in this work. Right now the biggest problem is depressed prices due to overproduction and foreign influx of berries. There is a huge push to increase flavor and aroma, as this will differentiate Florida berries from others, at least in the short term. The industry is intimately tied to the Florida Strawberry Breeding Program and they are enthusiastically waiting for the next cultivars. The central goals are flavor and aroma, in addition to traditional production traits.

We also have shared these resources with other companies that grow strawberries in Florida. They understand the important volatiles and can use our molecular markers. All information has been freely distributed, some even before publication.

Lessons Learned

☐ We understand which strawberry varieties consumers like, and why they like them. We understand the compounds that govern flavors.

☐ We have identified genes associated with key flavors and have developed ways to track them in populations, allow us to make predictions about whether a given plant will have a high potential to

produce a flavorful fruit. We can do this at the seedling stage, saving massive funds, and conserving environmental impacts.

☐ When starting with the consumer we can effectively target key traits, rather than relying on what the breeders think should be approached.

Contact Person

☐ Kevin Folta, Associate Professor and Chairman, Horticultural Sciences Department, University of Florida

- 352-273-4812
- kfolta@ufl.edu

Additional Information

Publications

Chambers, A.H.g, Plotto, A., Bai, J., Stodghill, P.V., Whitaker, V.M., Folta, K.M. (2014) Identification of a strawberry flavor gene using an integrated genetic-genomic-analytical chemistry approach. BMC Genomics. (revised, in second review)

Schwieterman, M.L., Colquhoun, T.A., Bartoshuk, L.M., Jaworski, L.A., Gilbert, J.L., Tieman, D.M., Odabasi, A.Z., Moskowitz, H.K., Folta, K.M., Klee, H.J., Sims, C.A., Whitaker, V.M., Clark, D.G. (2014) Strawberry Flavor: Diverse chemical recipes, a seasonal influence, and their effect on sensory perception. PLoS One (in press)

Chambers, A.H, Pillet, J., Plotto, AH, Bai, J., Whitaker, V.M., Folta, K.M. (2014). Gene candidates producing the grape notes in strawberry. (in preparation).

Presentation

The work in this project was presented by students, postdocs and the PIs at 3 international conferences, 6 national conferences and numerous state and local meetings.

Forward

The work from this proposal was the basis for a continuation of the project via separate FDACS funding to Vance Whitaker. We will use the methods and data for this work to solicit federal support.

Project (6): Florida Turfgrass Association - Protecting the Environment While Increasing Competitiveness of Florida Turfgrass

Funding Year: 2010
Funding Amount: $211,425.00
Reporting Period: Final

Project Summary

- ☐ Provide a background for the initial purpose of the project, which includes the specific issue, problem, or need that was addressed by this project.

The aim of this research and education project, Florida-Friendly Turfgrass: Benefitting the Environment and Increasing the Competitiveness of the Turfgrass Industry, is to use science-based information to improve the competitiveness and prosperity of the turf industries in Florida. Our main objective is to develop science-based information on the environmental benefit of turfgrass that will result in strengthening the competitive position of the turfgrass industry in Florida. Specifically we will evaluate the interactive effects of irrigation and nitrogen fertilizer management programs. The goal is to determine how irrigation management affects nitrogen leaching. The work will be conducted through a partnership among the turfgrass and allied industries, Florida Turfgrass Association's Florida Turfgrass Research Foundation, and the University of Florida, IFAS. The results from this project will help strengthen the position and profitability of the turfgrass industry as a provider of an environmentally-friendly product and practices that fit the state's Florida-Friendly Landscaping goals.

Briefly the research goals of this project were to understand the impacts of various fertilizer and irrigation practices on leaching of nitrate-N. Irrigation treatments were chosen to cover the range of reasonable possibilities in the urban landscape, including the use of a soil moisture sensor. The nitrogen treatments were chosen to represent a range of N management programs, including N management when a summer fertilization blackout (prohibition on fertilization) is in place. All possible combinations of these two factors were implemented in the research area. We measured turfgrass growth and health, and nitrate-N leaching responses for these treatments.

- ☐ Establish the motivation for this project by presenting the importance and timeliness of the project.

There is a need to use science-based information to improve the competitiveness and prosperity of the turf industries in Florida. Turfgrass is currently seen in a negative light by some individuals for its

use of irrigation and fertilizer. Current University of Florida recommendations for irrigation and nitrogen fertilization were developed to provide for adequate turfgrass health and also to protect the environment from pollution. There is a need to develop specific turfgrass health and environmental results for the combinations of irrigation and N fertilization. These two inputs need to be managed together. Our main objective is to develop science-based information on the environmental benefit of turfgrass that will result in strengthening the competitive position of the turfgrass industry in Florida. Understanding the importance of managing N and irrigation together will help strengthen the industry as providing an environmentally-friendly turfgrass product.

- ☐ If the project built on a previously funded project with the SCBGP or SCBGP-FB describe how this project complimented and enhanced previously completed work.

  N/A

Project Approach

- ☐ Briefly summarize activities performed and tasks performed during the grant period. Whenever possible, describe the work accomplished in both quantitative and qualitative terms. Include the significant results, accomplishments, conclusions and recommendations. Include favorable or unusual developments.

Table report A. Florida Turfgrass Association – Protecting the Environment While Increasing Competitiveness of Florida Turfgrass. This table summarizes accomplishments according to goals for the project. Details are presented below the table following the format of the USDA Annual Activities report.

Goal	Accomplishments toward meeting goal
Create homeowner survey	Completed - The survey was created shortly after the start of the project in late 2011 and administered in the first quarter of 2012. Preliminary results were presented in the report of the second quarter of 2012. The final extensive report for the homeowner part of the project was reported in the third quarter report in 2013. Summary is presented below.
Install research plots; identify demonstration sites	Completed - This part of the project was completed in the three months following the start of the project. See quarterly reports in 2011.

Collect research data	Completed - Data collection began in the summer of 2011 and continued through the expiration date for the project in June 2013. There have been no problems with the equipment or the data collection or analytical procedures.
Meetings and sharing of progress from project	Completed - We have shared all quarterly reports with the collaborators on the project through the contracting organization, The Florida Turfgrass Association. We have regularly updated the FTGA and allied Associations about progress and results for the project. We have shared results with the sponsors through regular field days and presentations at conventions. All educational meetings and field days have been reported in the quarterly reports and summarized below.
Summarize survey results to date	Completed - The pre-education survey results were summarized in the second-quarter report for 2012. The post-survey has been administered in early 2013 and results were presented in the third quarterly report in 2013. Summary of findings are presented in this final report below.
Development of web site and educational materials	Completed - We have developed the educational materials for deployment to the existing websites by providing linkages to the official document home site. See discussion below in this final report.
Continue research data collections	Completed - This part of the project was on-going until the last month of the project (June 2013). We continued to apply research treatments, collect and analyze research data. Overall project research results are summarized below. Details on research results were presented in all quarterly reports.
Prepare educational materials	Completed - Educational fact sheets have been prepared and are in the process of being published.
Field days, meetings, workshops, etc.	Completed - We have completed the field days, demonstrations, and workshops during 2011 - 2013. See individual quarterly reports.

Specific accomplishments on this project have been reported in detail, including statistical data analyses, figures, tables of results, and conclusions, and extension work **in each quarterly report beginning in**

2011. Briefly listed below are the major mileposts and accomplishments for the project by quarter and project end:

Overall quarterly general conclusions from:

Third Quarter 2011:

- After a slow start due to late receipt of budget parameters, all test plots are established.
- All treatments have been applied and responses to treatments are being measured.
- Homeowner survey has been developed and will be deployed this fall.
- Plans are being made for the outreach and education component of this project. Plans will be finalized in October 2011.
- We will continue the application of treatments and measure leaching and clippings growth.

Fourth Quarter and Year End 2011:

- Leaching is greater when turfgrass is not fully established or is not growing actively.
- Leaching declined to low levels after the turfgrass became established. After establishment and even after fertilizer application in late summer (IAFS treatment) very small amounts of N were leached.
- Increased irrigation amounts did not lead to increased water leaching but did lead to increased N leaching

First quarter 2012:

- Turf color was improved with the IFAS fertilizer treatment compared with other treatments
- The largest amount of water has been applied with the homeowner program and the greatest amount of leached water was with the homeowner irrigation program.
- Amounts of leached N were low. More N was leached with the greater rate of N.

Second Quarter 2012:

- A busy and productive quarter for the project. Field research continued. Irrigation treatments and fertilizer treatments have been applied through nearly a full cycle since beginning the project.

- Even though there are greater accumulated water and fertilizer application we have observed very small amounts of nitrate-N leaching, less than 10 % of the total applied.
- Extension activities were carried out on several fronts. Completed the first symposium education program. Knowledge gain due to the program was 25%. Two more to be presented in the third quarter of 2012.
- One homeowner demonstration was completed in 2012 in Gainesville.
- The homeowner survey data have been summarized and are being statistically analyzed.

Third Quarter 2012:

- Leaching is minimal with all irrigation treatments.
- Leaching is about 10 to 15% so far over the course of the experiment.
- Recommended N rates lead to least leaching losses.
- Best management practices are best for minimizing leaching and providing for acceptable high-quality turfgrass

Fourth Quarter 2012:

- Color was better with the treatment that allowed fertilization in the summer.
- Leaching is minimal with all irrigation treatments.
- Leaching is about 10 to 15% so far over the course of the experiment, and most of this from the period just after sod installation and Tropical Storm Debby.
- Increasing N above the recommended rate risks N leaching.
- N leaching with recommended rates is no more than leaching where no N was applied.
- Recommended N rates led to least leaching losses.
- So far, even though the Homeowner treatment resulted in more water being applied, there does not seem to be an increase in the leaching of N
- Best management practices are best for minimizing leaching and providing for acceptable high-quality turfgrass.

First quarter 2013:

- This first quarter of 2013 was a relatively dry period.
- More water moved below the root zone as leachate with the homeowner irrigation treatment.
- Leaching of N was greatest with the Homeowner irrigation program coupled with the higher rate of N.
- Best management practices are best for minimizing leaching and providing for acceptable high-quality turfgrass.

Second Quarter 2013:

- This second quarter of 2013 was a busy period with increased sampling as the turfgrass resumed spring growth.
- More water moved below the root zone as leachate in the second quarter of 2013 and over the project to date, with the homeowner irrigation treatment.
- Leaching of N was greatest with the Homeowner irrigation program coupled with the higher rate of N.
- Best management practices are best for minimizing leaching and providing for acceptable high-quality turfgrass.

Third Quarter 2013:

- Third quarter of 2013 was a busy period with increased sampling as the turfgrass continued active growth.
- Water use was least with the soil moisture sensor and greatest with the homeowner irrigation program.
- Leaching of N was not affected by treatment in the summer, due to active growth and nutrient uptake by the turfgrass.
- Best management practices continued to prove best for minimizing leaching and providing for acceptable high-quality turfgrass.

Research accomplishments:

Methods:

We evaluated St. Augustinegrass turf and leaching responses to N and irrigation treatments. This research was accomplished in a field research area specifically design for this project. Drainage lysimeters were installed to capture leachate from all plots so we could measure nitrate-N leaching loads. Our treatments were:

N Treatments:

1. Treatment #1: Control: No N application. This treatment allowed us to measure background nitrate leaching.
2. Treatment #2: 1 lb of 30% CRN in March, 2 lbs of 50% CRN in May, 1 lb of 30% CRN in October; addresses N Blackout (June-Sept). This treatment involves the current recommended rate of N (4 lbs/1000 square feet) but withholds n application in the summer.
3. Treatment #3: 2 lbs of 30% CRN in March, 2 lbs of 50% CRN in May, 2 lbs of 30% CRN in October; addresses N Blackout (June-Sept). This treatment is the same as treatment #2 but includes a

greater amount of N to test the hypothesis that increased rate of N above the recommended rate will result in more nitrate-N leaching.

4. IFAS-Treatment #4: 4 applications of 1 lb of N bi-monthly- Apr (30% CRN), June (50% CRN), Aug (50% CRN), and Oct (30% CRN). This is the recommended best management practice including a summer application of N.

Irrigation Treatments:

1. Homeowner with rain sensor. ¾ inch every second day (MWF) in the spring, summer, fall, and twice per week in the winter. This is the homeowner typical practice of regular irrigations by a time-clock but including a rain-out sensor to turn the system off with rain.
2. IFAS Recommendation: Monthly adjustment based on historical rainfall and plant requirements, relying on the FAWN irrigator scheduling tool.
3. Soil Moisture Sensor: Sensors installed subsurface to indicate when adequate moisture is present to dis-allow (bypass) a scheduled irrigation event.

Turfgrass was established in the summer of 2011 and treatments were applied from the beginning of the project through June of 2013. The following response variables were measured throughout the research project:

- Turfgrass growth, measured by clippings production
- Clippings nitrogen content as a measure of turfgrass health
- Visual and meter measurements of turfgrass color as a measure of turfgrass health and aesthetic value
- Root growth dry matter as a measure of turfgrass health and vigor
- Amount of irrigation water applied by treatment
- Soil moisture
- Amount of rainfall, since rainfall may be a factor in nitrate leaching
- Amount of leachate captured in the lysimeters
- Nitrate-N leaching as a measurement of environmental impact of the irrigation and nitrogen fertilization treatments used

We collected data on these variables at regular intervals throughout the years. All data was subjected to statistical analyses and results were reported for each quarter. A brief summary of research findings are presented here. The soil at the research site was a sandy soil, comprised of 97% sand (Table 1).

Table 1. Soil texture and water characteristics of the Tavares sand (Hyperthermic, uncoated Typic Quartzipsamments) taken from the University of Florida Citra Turfgrass Research Facility

Soil depth	**Sand**	**Silt**	**Clay**	**Organic matter**	**Bulk density**	**Available water holding capacity**
cm	%	%	%	%	g cm–3	m m–1

0-15	96.7	1	2.3	1.25	1.45	0.075
15-30	--	--	--	<0.5	1.65	0.035

Table 2. Effect of N and irrigation treatments on overall turfgrass chlorophyll content, visual quality and color from Jul. 2011 to Jun. 2013

Treatments	**Chlorophyll content (reading)**	**Overall visual quality †**	**Overall visual color‡**
IR treatments ††			
Homeowner	211a¶	6.32a	6.36a
IFAS-using weather data	208a	6.09a	6.20a
Soil moisture sensor	201a	5.98a	6.16a
N treatments§			
ZeroN control	191b	5.78b	6.04c
Treat 2 Blackout-4 lb N	193b	5.83b	6.02c
Treat 3 Blackout-6 lb N	206b	6.18b	6.26b
Recomm. No blackout-4 lb N	237a	6.73a	6.65a
Summary of ANOVA effects			
N treatments (N)	**	**	**
Irrigation (I)	NS	NS	NS
N × I	NS††	NS	NS
Date (D)	***	**	***
D × N	NS	NS	NS
D × I	NS	NS	NS
D × N × I	NS	NS	NS

** Significant at the p = 0.01 level.

*** Signifi ant at the p = 0.001 level.

† Visual quality was rated on a 1 to 9 scale, with 1=worst, 6=minimally acceptable, and 9=best quality tall fescue.

‡ Visual color was rated on a 1 to 9 scale, with 1=brown, 6=minimally acceptable, and 9=darkest tall fescue.

§ N Treatment: ZeroN =No N application; Blackout4= lb of 30% CRN in March, 2 lbs of 50% CRN in May, 1 lb of 30% CRN in October; Blackout6 = 2 lbs of 30% CRN in March, 2 lbs of 50% CRN in May, 2 lbs of 30% CRN in October; NoBlackout4= 4 applications of 1 lb of N bi-monthly- Apr (30% CRN), June (50% CRN), Aug (50% CRN), and Oct (30% CRN)

†† Irrigation Treatments: Home = ¾ inch every second day (MWF) in the spring, summer, fall, and twice per week in the winter; IFAS: Monthly adjustment based on historical rainfall and plant requirements; Sensor: Soil Moisture Sensor based

¶ Mean separation within columns and treatment factors by Fisher's protected LSD test, p = 0.05.

Turfgrass visual quality, color ratings and chlorophyll readings were not affected by any interaction among factors (Table 2). This allowed us to focus on the main effects of nitrogen, irrigation, and date. Irrigation treatment did not have an effect on any quality parameter, and all quality ratings were at or

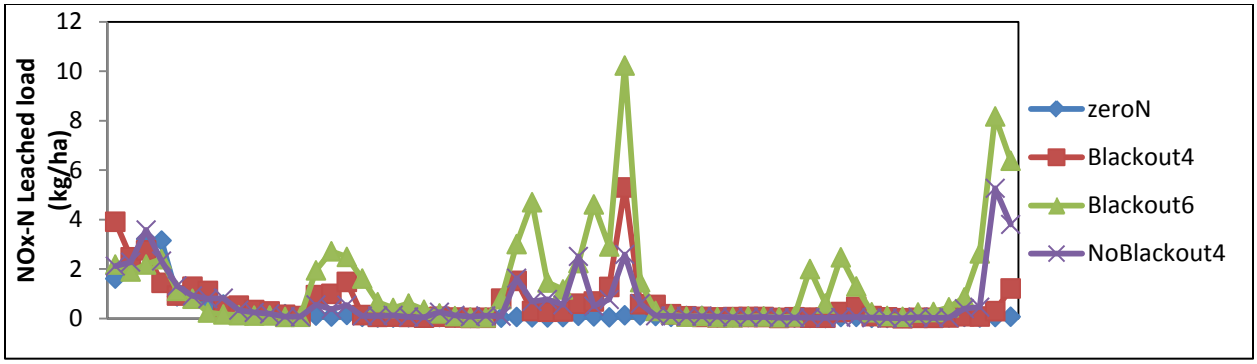
above acceptable minimum of 6.0 rating (Table 2). This result is not unexpected since the irrigation treatments were chosen as representative of reasonable water management practices. Fertilizer treatment affected turfgrass quality and color. Color was greener with more N fertilizer.

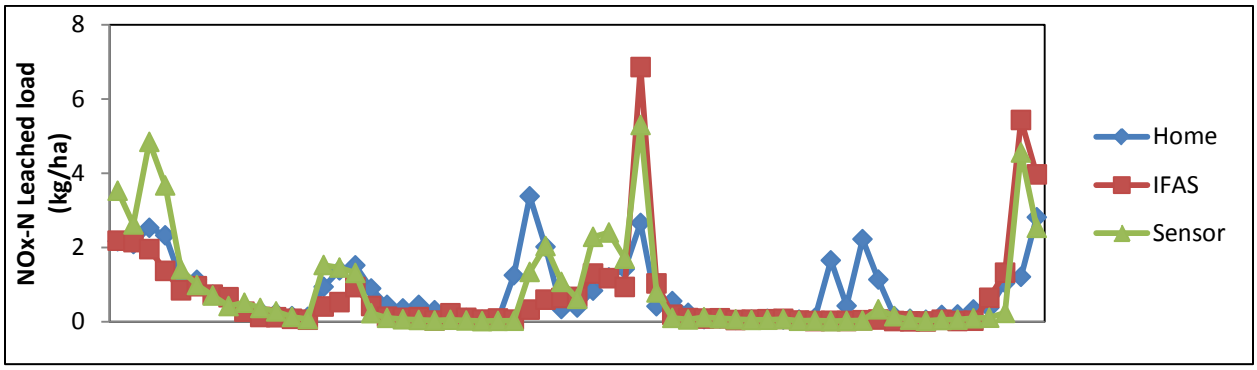
Table 3. Effect of N and irrigation treatments on 2-yr total clipping yield, clipping tissue total Kjeldahl nitrogen (TKN) concentration, and N uptake of turfgrass from Jul. 2011 to Jun. 2013 (averaged over sampling dates).

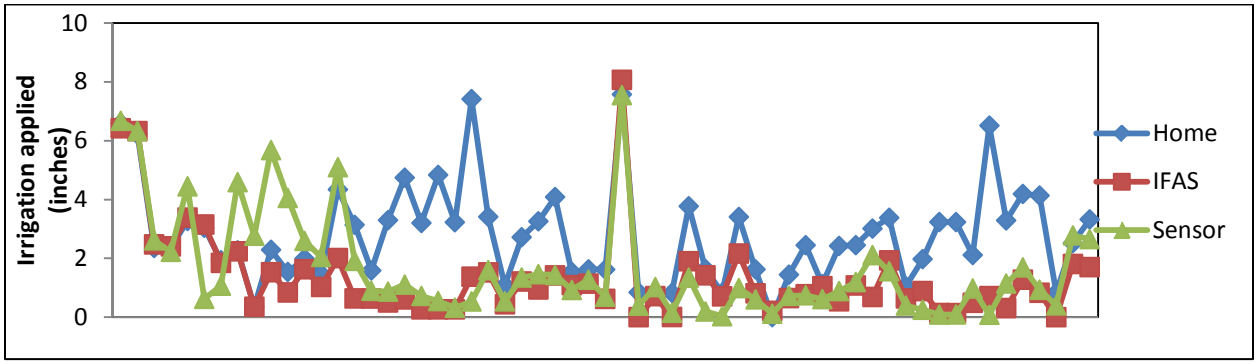
	Yield†	**Yield† TKN‡**	**N uptake§**
Sampling dates	**g m-2**	**%**	**g m-2**
IR treatments			
Homeowner	106ab	1.56a	1.66ab
IFAS-using weather data	120a	1.48a	1.77a
Soil moisture sensor	100b	1.49a	1.49b
N treatments§			
Zero N control	84c	1.41b	1.48bc
Treat 2 Blackout-4 lb N	105b	1.43b	1.21c
Treat 3 Blackout-6 lb N	106b	1.56a	1.65b
Recomm. No blackout-4 lb N	130a	1.63a	2.12a
Summary of ANOVA effects			
N treatments (N)	*****	**NS**	*****
Irrigation (I)	*	*	*
N × I	**NS**	**NS**	**NS**

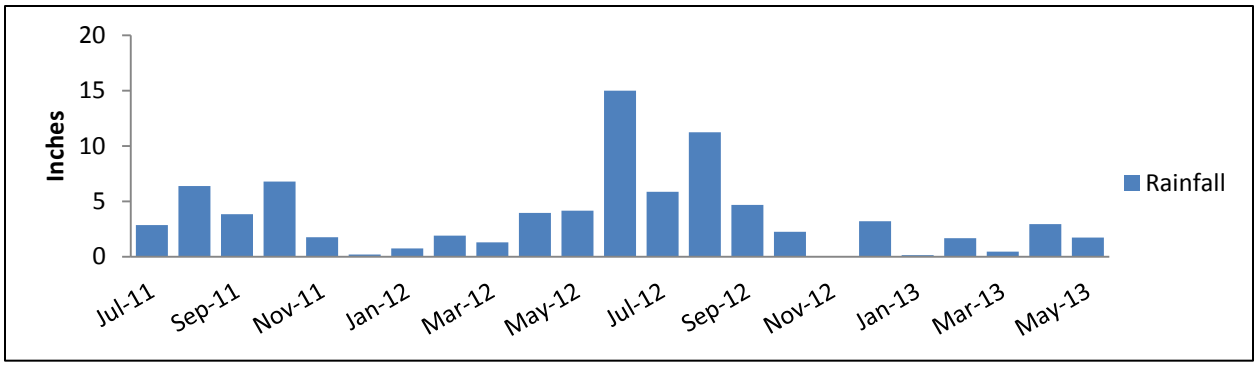
There were negligible effects of irrigation on turfgrass growth and N content (Table 3). Turfgrass growth increased as N fertilization increased. More water was applied with the homeowner irrigation treatment compared with either the IFAS or soil moisture sensor treatments (Figure 1). The soil moisture sensor treatment resulted in least water application especially when there was ample rainfall (summer periods). The largest amount of water was applied with the homeowner program and the greatest amount of leached water was with the homeowner irrigation program in certain periods of the year (Figure 1). Overall, amounts of leached N were low. Our research shows that turfgrass is uniquely able to absorb N efficiently, especially at recommended rates of N. As the N rate increased above the recommended rate, then leaching losses increased slightly, especially during periods of excessive rainfall, for example the summer of 2012 during Tropical Storm Debby.

Fig. 1. Effect of treatments on nitrate concentration in leachate from Jul. 2011 to Jun. 2013. Each mean is the average of four N treatments of the same irrigation. Numbers above the data points are Fisher's protected LSD at *p* = 0.05. A) effect of different N fertilization treatments (zeroN, Blackout4, Blackout6, NoBlackout4); B) effect of different irrigation treatments (Home, IFAS, Sensor); C) irrigation volume of different irrigation treatments (Home, IFAS, Sensor); D) rainfall data.









Extension component of project: Below is summarized the extension objectives from the project plan of work (see table above).

Turfgrass symposia:

We completed three turfgrass symposia programs for three locations in Florida. Details on knowledge gain are reported in 2012, but averaged at least 25% due to the educational material presented. We met our goal of training county agents and industry leaders, but the attendance of governmental regulators was poor and under the projected 20 individuals.

- June 7, 2012, Tallahassee, Florida
- July 24, 2012, Kissimmee, Florida
- August 2, 2012, Ft. Lauderdale, Florida

Field days (examples):

- May 5, 2012, Community nutrient management demonstration, Gainesville Florida (25 attendees)
- June 7, 2012, Project field day for FTGA Board of Directors, at the Citra research site.
- October 11, 2012, Turf Field day, Citra, FL. (110 attendees)
- June 6, 2013, Project field day for FTGA Board of Directors, at the Citra research site.
- Several additional smaller field days for special visitors in 2012 and 2013.

Annual FTGA Convention workshops:

- September 26, 2012, Orlando, Florida, with special workshop on BMPs (35 attendees)
- September 6-9, 2013, Orlando, Florida, with special workshop on BMPs (25 attendees)

Educational materials developed:

More than 15 educational presentations were made by personnel under this project – details on dates, venues, and titles are presented in the quarterly reports.

The following IFAS articles have been published:

1. "The Role of Soil Management in Minimizing Water and Nutrient Losses from the Urban Landscape" http://edis.ifas.ufl.edu/ss593

2. "Managing Landscape Irrigation to Avoid Soil and Nutrient Losses" http://edis.ifas.ufl.edu/ss586
3. "Maximizing the Benefits of Reclaimed Water for Irrigating the Landscape and Protecting the Environment" http://edis.ifas.ufl.edu/ss587
4. "Conducting a Blue Dye Demonstration to Teach Irrigation and Nutrient Management Principles in a Residential Landscape" http://edis.ifas.ufl.edu/ss594

Demonstration:

One homeowner association (Mentone in Gainesville, FL) demonstration was carried out in 2012. This demonstration included presentations made by project personnel regarding irrigation and fertilizer management.

Power points (major power points, in addition to the ones made individually by project personnel): We have developed the following power point presentations under this project (these power points are in conjunction with the fact sheets with the same title. These power points and fact sheets are being posted on the extension publication website and provided to the turfgrass industry for use in their own educational materials.

- Soils in home landscape
- Irrigation Management to avoid nutrient losses
- Reclaim Water
- Conducting Blue dye leaching test
- How to deal with Summer blackout

Fact sheets:

We have produced the following 5 fact sheets for this project. These fact sheets have been reviewed and are being published in the Extension publication website.

- Soils in home landscape
- Irrigation Management to avoid nutrient losses
- Reclaimed Water
- Conducting Blue dye leaching test
- How to deal with Summer blackout

Homeowner practices surveys:

During 2012-2013 we carried out the process to survey homeowners about their irrigation and fertilization practices. In January 2012, the survey titled *Your Florida Yard and You,* was mailed to 1000 Orange County residents. The recipients were randomly chosen from a list of 7,700 addresses that had been classified by Orange County Utilities as high water users. To encourage a higher return of completed surveys each recipient received a $1.00 incentive in the packet. The number of surveys returned was 293, almost a 30 per cent return rate. The survey included 32 questions related to irrigation and fertilizer practices and waterfront plantings and care. There were 14 questions seeking demographic information.

The results of the homeowner surveys were reported in detail in the third quarter report for 2013.

Summary of Findings from homeowner surveys:

- The data from the focus groups found that there were a several barriers for the participants when it came to increasing their water conservation practices. The barriers included:
    - Lack of knowledge about proper lawn care
    - Confusion over how many days residents were allowed to water per week
    - Inability to use the irrigation timer properly
    - Pressure from the HOA to water the grass so the lawn would be perfect.
- The norm is to abide by the restrictions and water twice a week when the restrictions allow twice a week and once a week when the restrictions change to only once a week.
    - Following water restrictions is perceived as a means of conservation.
- Responses showed homeowners were willing and open to increasing their conservation practices just as long as it didn't result in a notification or fine from their HOA.
- Homeowners were accepting of their neighbors who were trying to conserve water and understood that their grass might not look as good as it had in previous years.
- Responses demonstrated that if a water reduction program was to be presented to them, it would not be well received if it came from the HOA.
    - This was due to the perception that the HOA already had too many rules required for residents, coupled with the fact that less water was seen as a contradiction to what the HOA required, a "perfect lawn."
    - Participants often felt pressured and bullied by the HOA's.
- Homeowner participants expressed a need to step up awareness to the general population that water was a finite resource.
- Participants felt that unless the government stepped in to tell the HOAs to decrease their demands, they could not fully participate in a program that reduced their outdoor water use.

    - Earlier results did not bring to light the struggle residents experience when they live in a community with a homeowners association.
    - Residents are confused when they hear from the HOA to water the grass to keep it green and at the same time they are hearing from the water management district or their water utility company to reduce their outdoor water use.
    - Homeowners, face the choice of watering to keep the HOA happy or face a fine or embarrassment in front of their neighbors or possibly have to re-sod the yard or save money and water on the monthly water bill.
    - Data indicate they are willing but not able to perform both behaviors.
- The survey data and the focus group responses both indicated that the participants wanted to conserve more water and had positive pro-environmental attitudes.
- More similarities between both groups (survey and focus group) could be found in the need to learn proper use of the irrigation timer and more efficient use of the automated irrigation system.
    - This could help homeowners obtain some skills that potentially would increase their water conservation efforts.
- MOST SIGNIFICANT FINDING: until the HOA relaxes their standards about perfect grass homeowners are not going to take any chances by reducing the amount of water they apply to their lawn.

Website:

We have produced several of the fact sheets and power points for listing on the existing websites for the Florida Turfgrass Association. We decided not to develop a totally different website which would be duplication of existing websites. Rather we decided to post the educational tools on the University of Florida Extension website http://edis.ifas.ufl.edu. Industry websites will link to these publications, making the process of providing educational material more efficient.

Overall project:

Overall general conclusions from the project:

- Leaching of N is minimal with all irrigation and fertilization treatments.
- Leaching minimal and was most often associated with the high irrigation rate with the homeowner irrigation management practice, the highest N rate, or with excessive rainfall.
- Recommended N rates lead to least leaching losses, even though overall leaching losses were small.
- Best management practices are best for minimizing leaching and providing for acceptable high-quality turfgrass. This involves the combination of recommended rates of nitrogen and it involves the incorporation of weather-based scheduling of irrigation, or the use of soil moisture sensing. Using the recommended practices for irrigation and nitrogen fertilization will result in savings of water with negligible losses of N to leaching.

- Increased education is needed for homeowners about how to manage irrigation systems and fertilization. Homeowners hear conflicting messages about water and nutrient conservation from homeowners associations and regulators. The HOA rules seem to demand more inputs of water and fertilizer to keep the grass green while regulators restrict watering and fertilizer. There needs to be some consistency to the messages.
- The homeowner survey results and the field research results in this project come together in that fertilizer and water can be conserved while achieving the goal of healthy turfgrass in the communities.

☐ Present the significant contributions and role of project partners in the project.

Contributions of project partners:

The University of Florida personnel conducted all research and educational activities for the project. These activities included:

1. The field research (installation of plots, collection and analyses of all data, and writing of all reports)
2. Educational programs, workshops and writing educational fact sheets
3. The homeowner survey, collecting and analyzing data

The turfgrass industry has contributed in the following areas:

- Assisted in advertising our Turfgrass Symposium educational programs:
    - June 7, 2012, Tallahassee, Florida
    - July 24, 2012, Kissimmee, Florida
    - August 2, Ft. Lauderdale, Florida

- Participated in Field days
    - June 7, 2012, Project update for FTGA Board of Directors, Citra project site.
    - October 11, 2012 and October 9 2013, Turf Field day, Citra, FL. (110 attendees)
- Held Annual Convention, September 26, 2012 and Sept 6-9, 2013 in Orlando, Florida, with special workshop on BMPs

Goals and Outcomes Achieved

☐ Supply the activities that were completed in order to achieve the performance goals and measurable outcomes for the project.

Research activities:

1. Project site development: We developed the research site complete with turfgrass plots and the irrigation application and data collection equipment
2. Conducted field research: See specific results outlined above. We conducted two season's of data collection including turfgrass growth and quality parameters and nitrate-N leaching leads.
3. Wrote reports: We submitted quarterly reports of all research activities and progress. We described all activities, outcomes, and problems. We described how we addressed all problems.

Extension activities:

1. We conducted a complete survey of homeowner knowledge about fertilizer and irrigation practices. Results were reported in quarterly reports and the summary of the results are presented above in this final report.
2. We wrote 5 educational fact sheets and power points.
3. We held educational workshops and numerous individual educational activities and field days with the stakeholders. All of these activities were reported in detail in the quarterly reports.
4. We presented information on the project at annual Florida Turfgrass Association Conferences.

☐ If outcome measures were long term, summarize the progress that has been made towards achievement.

N/A. This is a final report for this project.

☐ Provide a comparison of actual accomplishments with the goals established for the reporting period.

This is a final report. Please see the table above (Table report A). It provides a one-to-one comparison of our goals and accomplishments for the entire project. All accomplishments were reported in quarterly reports.

Briefly, some major accomplishments were;

1. Leaching of N is minimal with all irrigation and fertilization treatments.
2. Leaching minimal and was most often associated with the high irrigation rate with the homeowner irrigation management practice, the highest N rate, or with excessive rainfall.
3. Recommended N rates lead to least leaching losses, even though overall leaching losses were small.

4. Best management practices are best for minimizing leaching and providing for acceptable high-quality turfgrass. This involves the combination of recommended rates of nitrogen and it involves the incorporation of weather-based scheduling of irrigation, or the use of soil moisture sensing. Using the recommended practices for irrigation and nitrogen fertilization will result in savings of water with negligible losses of N to leaching.
5. Increased education is needed for homeowners about how to manage irrigation systems and fertilization. Homeowners hear conflicting messages about water and nutrient conservation from homeowners associations and regulators. The HOA rules seem to demand more inputs of water and fertilizer to keep the grass green while regulators restrict watering and fertilizer. There needs to be some consistency to the messages.
6. The homeowner survey results and the field research results in this project come together in that fertilizer and water can be conserved while achieving the goal of healthy turfgrass in the communities.

- ☐ Clearly convey completion of achieving outcomes by illustrating baseline data that has been gathered to date and showing the progress toward achieving set targets.

Outcomes of the project were achieved. The outcomes are listed above. Using recommended fertilizer rates of 1.0 lb/1000 sq ft in each of 4 applications per year and irrigating according to the recommended practices (using evapotranspiration as a guide) resulted in negligible nitrate-N leaching. Overall the conclusion was that homeowners should follow nitrogen and irrigation best management practices for healthy turfgrass and minimizing nitrate-N losses to the environment. Turfgrass is an environmentally-friendly landscape plant when fertilization and irrigation best management practices are followed.

Beneficiaries

- ☐ Provide a description of the groups and other operations that benefited from the completion of this project's accomplishments.

Florida Turfgrass Association, a statewide organization of individuals, organization and companies involved in issues pertaining to turfgrass in Florida. The Florida Turfgrass Association provides strong leadership as an umbrella organization to provide funding for research; promote research and education; create legislative power; sponsor an annual conference and trade show; and provide services, communications, and business and networking opportunities for professionals in and associated with the Turfgrass industry.

Turfgrass Producers of Florida: Turfgrass Producers of Florida members are dedicated to the environmentally-responsible production of quality sod for sports, home, commercial and roadside uses. Originally founded in 1989 as the Florida Sod Growers Cooperative, the organization became Turfgrass Producers of Florida in 2013. Through education, outreach and research, TPF supports our member businesses and shares the value of turfgrass in responsibly-managed, Florida-Friendly landscapes.

Florida Golf course Superintendents Association: The purpose of the Florida Golf Course Superintendents Association shall be to promote sustainable turf management and unify the golf course superintendents of the state. To achieve these goals, the FGCSA will engage in cooperative communications and education efforts with various interested organizations and regulatory and governmental offices to achieve the highest standards of professionalism.

- ☐ Clearly state the quantitative data that concerns the beneficiaries affected by the project's accomplishments and/or the potential economic impact of the project.

The beneficiaries are interested in the quantitative relationship between nitrogen fertilization program and irrigation management with nitrate-N leaching. Nitrate-N leaching leads to pollution of groundwater. In Florida groundwater is connected to surface water though the springs. High nitrate-N concentrations in a water body can impair that water body for its intended use. The turfgrass industry desires to understand how turfgrass can be managed to be an environmentally-friendly plant for the landscape. Turfgrass must be fertilized to achieve good turfgrass health and aesthetic value. This project showed that using BMPs for nitrogen fertilization and irrigation can result in healthy turfgrass and protect the environment.

Lessons Learned

- ☐ Offer insights into the lessons learned by the project staff as a result of completing this project. This section is meant to illustrate the positive and negative results and conclusions for the project.

1. Best management practices are best for minimizing leaching and providing for acceptable high-quality turfgrass. This involves the combination of recommended rates of nitrogen and it involves the incorporation of weather-based scheduling of irrigation, or the use of soil moisture sensing. Using the recommended practices for irrigation and nitrogen fertilization will result in savings of water with negligible losses of N to leaching.
2. Increased education is needed for homeowners about how to manage irrigation systems and fertilization. Homeowners hear conflicting messages about water and nutrient conservation from homeowners associations and regulators. The HOA rules seem to demand more inputs of water and fertilizer to keep the grass green while regulators restrict watering and fertilizer. There needs to be some consistency to the messages.

- ☐ Provide unexpected outcomes or results that were a effect of implementing this project.

There were no major unexpected results.

- ☐ If goals or outcome measures were not achieved, identify and share the lessons learned to help others expedite problem-solving.

There were no outcomes that went un-achieved for this project.

Contact Person

- ☐ Name the Contact Person for the Project
  Dr. George Hochmuth, University of Florida, Gainesville, FL
  - Telephone Number - 352-294-3114
  - Email Address - hoch@ufl.edu

Additional Information

- ☐ Provide additional information available (i.e. publications, websites, photographs) that is not applicable to any of the prior sections.

Project (7): University of Florida - Establishing the Quality and Superiority of Florida Honeys

Contract Number: 16868
Funding Year: 2010
Total Funding: $61,066.00
Reporting Period: Final

Project Summary

The purpose of this project is to increase the competitiveness of Florida honeys by demonstrating that they are good sources of antioxidant and antimicrobial compounds. The compounds in honey responsible for these effects are flavonoids (quercetin, kaempferol, luteolin, apigenin, hesperetin, myricetin) and phenolic acids (caffeic, coumaric, ferrulic, ellagic, chlorogenic) (*1*). Additional antimicrobial components in honey include dicarbonyls (e.g., glyoxal and methylglyoxal) (*2*). The quantity of these components varies widely according to the floral and geographical origins of honey. Florida honeys, especially those with dark colors, are expected to have higher phenolic content and antioxidant capacities. We aimed to establish the nutritional quality of Florida honeys by 1) identifying bioactive phytochemicals in Florida honeys of different floral sources 2) measuring the contents of bioactive phytochemicals and antibacterial dicarbonyls, 3) assessing the antioxidant/free-radical scavenging capacities and antimicrobial activities, and 4) publishing and disseminating the information gained in this study.

The major motivation for this project was to provide science –based evidence that Florida honeys are rich sources of bioactive phytochemicals and thus possess antimicrobial activity. The importance of this project was to profile the phenolic and dicarbonyl compounds in various Florida honeys to determine if they possess added health benefits. With the completion of this project it is believed that the market value of Florida honey has the potential to increase and thus, increase the beekeeping industry and honey production.

Project Approach

This project focused on profiling various honey varieties prevalent in Florida. We collected 43 samples from local Florida beekeepers and ordered 3 Manuka honey samples from different New Zealand beekeepers. The samples were categorized by floral source, monofloral and wild-type based on the information given by the beekeepers. The wild-type samples were further divided into season (Fall, Spring, Summer) and geographical location (north, central, south) in Florida. **Table 1** profiles the samples by the criteria mentioned above. These samples were then tested for antimicrobial efficacy, color

analysis, antioxidant capacity through three different established assays (Total Phenolics, ORAC, and DPPH), and dicarbonyl and phytochemical identification/quantification.

The results of the antioxidant capacity (ORAC), free radical scavenging (DPPH), total phenolics, and color tests for all 46 samples can be seen in **Table 2**. These values are the averages of three repetitions and were used to determine which samples had higher antioxidant capacity. Total phenolic values and ORAC values should show a high correlation due to the fact that phenolic compounds generally have high antioxidant capacity. The color of the samples should also be highly correlated to the total phenolic content because darker plants (blueberries, grapes, pomegranate) have been shown to have high levels of phenolic color compounds. The total phenolic content ranged from 250 µg GAE/g of fresh honey in a Clover sample (#42) to 1570 µg GAE/g in an Avocado sample (#41). The ranges seen in other varietal honeys from previous research was between 5 µg/g to upwards of 1300 µg/g (*3*). The two highest total phenolic values coming from both the avocado samples (#11, 41) tested. The DPPH values for the samples ranged from 1 µmol TE/g sample in an Orange Blossom sample (#21) to over 13 µmol TE/g sample in an Avocado sample (#41). The ORAC values ranged from 1.478 µmol TE/g in an Orange Blossom sample (#21) to 18.15 µmol TE/g in a Wild-type sample (#7). The important conclusion from the table 2 data was that the avocado variety had the highest total phenolic content, the highest DPPH values, had high ORAC values and were significantly darker than the other variety samples tested. The three Manuka samples examined were in the middle range for all assays in **Table 2**. Since there were so many samples examined it was hard to see clear significant differences between each sample for each assay tested. However, trends could be seen with Orange Blossom and White Clover consistently having lower values for the assays tested. In order to be able to get a more definitive interpretation of results in would be necessary to profile each sample by pollen testing to estimate what % of each sample came from what flower genus. High antioxidant foods such as, blueberries have shown to have upwards of 45,000 µg GAE/g of fresh fruit (*4*), which is roughly 30 times higher than the honey varieties tested.

The main dicarbonyls thought to contribute to honeys antimicrobial properties are 3-deoxyglucosone, methylglyoxal, and glyoxal. These compounds are precursors to the advanced glycation end products from the Maillard Reaction. Each honey was derivitized with OPD (o-phenylenediamine) to form quinoxalines that could be identified using MS/MS technology and quantified using external standards. The range and median values of each compound is presented in **Table 3**. It was clear that 3-deoxyglucosone was the most prevalent carbonyl in all varieties tested. However, the methylglyoxal was at a much higher concentration in the Manuka samples #15, 45, 46, 267 µg/g, 1595 µg/g, and 371.3 µg/g, respectively. The next highest concentration of methylglyoxal was 18.7 µg/g seen in a Palmetto sample (#3). This matches the current research that shows Manuka honey is significantly higher in Methylglyoxal than any other variety tested to date (*2, 5, 6*). **Figure 1** is a HPLC-DAD chromatogram of the carbonyls identified and quantified in Manuka sample #45.

All samples underwent an extraction procedure using C18 cartridges in order to extract all phenolic phytochemicals to be identified and quantified. The compounds identified using MS/MS technology can be seen in **Table 4**. Many of the compounds identified in the Florida honeys have been seen in other varieties, such as coumaric acid, syringic acid, rutin, ellagic acid, abscisic acid, pinocembrin, pinobanksin, hesperetin, galangin, apigenin, narigenin, and chrysin (*7, 8*). The concentration of these compounds can vary for many reasons including the floral source, geographical location of the plant,

and time of year of harvest. **Table 5** shows the concentration of each individual phenolic acid or flavonoid that we were able to quantify in each sample. **Figure 2** is an HPLC-DAD chromatogram of Orange Blossom sample 10 that indicates which peaks were able to be quantified in each individual sample. The phytochemicals quantified were not measurable in sample 39 and 43 due to poor sample quality. The total amount of the 17 compounds quantified in each sample can be seen in **Table 6**. A Manuka sample (#15) had the highest total phytochemical concentration of all the samples tested.

Finally the antimicrobial capacity of each honey sample was evaluated by using the agar well diffusion method. The samples were autoclaved to reduce peroxide-based antimicrobial activity to focus on the antimicrobial capacity based on bioactive compounds alone. **Figure 3** shows the antimicrobial activity of honeys against *Staphylococcus aureus* the only microbe tested in which honeys showed antimicrobial activity against. **Table 7** and **Table 8** show which samples showed antimicrobial activity separated by floral source, monofloral versus wild-type, respectively. A significant fraction of Florida honeys (23/43) possessed antistaphylococcal activity similar to or exceeding that of commercially available Manuka honey. The results of the BPW with catalase treatment suggest that the antimicrobial activity of the honeys tested are primarily attributed to glucose oxidase/hydrogen peroxide activity. Further, it was shown that heat treatment by autoclaving reduces but does not completely inactivate the glucose oxidase activity of Florida honeys. No significant correlation was found between the antimicrobial activity of the honeys tested and their varietal, region of collection, or season of collection. It was noted, however, that multifloral honeys tended to have more consistently high levels of antimicrobial activity against *S. aureus* than the monofloral honeys. Further testing on additional mono- and multifloral Florida honeys would be helpful in determining whether this trend is significant.

Abbreviations used:
ORAC: oxygen radical absorbance capacity
DPPH: 2,2-diphenyl-1-picrylhydrazyl
GAE: gallic acid equivalent
TE: Trolox equivalent

Table 1. Characterization of tested honeys.

Sample No.	Floral Type	Region of Florida	Season Harvested
1	Palmetto *Sabal palmetto*	North	Spring 2010
2	Wild	Central	Fall 2010
3	Palmetto *Sabal palmetto*	Central	Summer 2010
4	Gallberry Ilex coriacea	Central	Unknown
5	Tupelo *Nyssa ogeche*	Central	Unknown
6	Brazilian Pepper *Schinus terebinthifolius*	Central	Fall 2010
7	Wild	North	Summer 2010
8	Gallberry Ilex coriacea	North	Unknown
9	Tupelo *Nyssa ogeche*	North	Unknown
10	Orange Blossom (citrus) *Citrus sinensis*	Central	Spring 2011
11	Avocado *Persea spp.*	Central	Unknown
12	Wild	South	Fall 2010
13	Wild	Central	Fall 2010
14	Brazilian Pepper *Schinus terebinthifolius*	Central	Unknown
15	Manuka 16+ *Leptospermum scoparium*	New Zealand	Unknown
16	Tupelo *Nyssa ogeche*	North	Unknown

17	Wild	Central	Fall 2010
18	Wild	Central	Summer 2010
19	Wild	North	Fall 2010
20	Gallberry Ilex coriacea	Central	Unknown
21	Orange Blossom (citrus) *Citrus sinensis*	North	Unknown
22	White Clover *Trifolium spp.*	South	Unknown
23	Wild	Central	Fall 2010
24	Palmetto *Sabal palmetto*	South	Unknown
25	Black Mangrove *Avicennia germinans*	South	Unknown
26	Blueberry ***Vaccinium spp.***	South	Unknown
27	Tupelo *Nyssa ogeche*	North	Unknown
28	Wild	Central	Fall 2010
29	Tupelo *Nyssa ogeche*	North	Unknown
30	Wild	Central	Summer 2010
31	Wild	North	Spring 2011
32	Orange blossom (citrus) *Citrus sinensis*	South	Unknown
33	Wild	Central	Fall 2010
34	Wild	Central	Fall 2010
35	Orange blossom (citrus) *Citrus sinensis*	Central	Unknown
36	Palmetto *Sabal palmetto*	South	Unknown

37	Wild	Central	Spring 2011
38	Wild	Central	Fall 2010
39	Wild	Central	Fall 2010
40	Wild	North	Fall 2010
41	Avocado *Persea spp.*	South	Unknown
42	White Clover *Trifolium spp.*	North	Unknown
43	Brazilian Pepper *Schinus terebinthifolius*	North	Fall 2010
44	Blackberry ***Rubus*** spp.	North	Summer 2010
45	Manuka 15+ *Leptospermum scoparium*	New Zealand	Unknown
46	Manuka 12+ *Leptospermum scoparium*	New Zealand	Unknown

Table 2. Total Phenolic content, free radical scavenging, antioxidant capacities and color analysis of different honey varieties.

Samples	Total Phenolics (ug/g)	DPPH (umol TE/g sample)	ORAC (umol TE/g sample)	ABS_{450} (AU, 50% w/v)
Manuka				
46	1031.298 ± 46.088	5.521 ± 0.974	11.321 ± 3.218	0.224 ± 0.010
15	1083.257 ± 14.172	4.009 ± 1.140	15.423 ± 9.308	0.298 ± 0.018
45	773.922 ± 27.021	5.378 ± 0.871	6.924 ± 0.233	0.310 ± 0.014
Wild-Type				
2	852.717 ± 25.788	7.396 ± 0.625	6.617 ± 4.79	0.292 ± 0.013
7	936.082 ± 3.844	4.310 ± 0.056	18.153 ± 5.095	0.220 ± 0.017
12	1044.308 ± 12.590	5.949 ± 0.929	15.923 ± 1.678	0.341 ± 0.019
13	932.54 ± 17.632	6.623 ± 0.444	6.051 ± 1.065	0.412 ± 0.019
17	843.71 ± 13.085	4.406 ± 0.867	10.757 ± 2.374	0.267 ± 0.016
18	980.648 ± 6.815	5.116 ± 0.529	4.667 ± 3.159	0.480 ± 0.035
19	879.505 ± 39.554	5.905 ± 0.880	12.585 ± 2.198	0.304 ± 0.004
23	661.588 ± 12.057	8.288 ± 0.495	6.701 ± 0.040	0.380 ± 0.056
28	670.04 ± 22.626	8.290 ± 0.192	12.645 ± 2.991	0.233 ± 0.011
30	649 ± 18.655	8.062 ± 1.275	4.125 ± 0.573	0.282 ± 0.013
31	477.858 ± 10.220	5.069 ± 0.453	9.341 ± 6.243	0.299 ± 0.035
33	815.298 ± 15.765	6.747 ± 0.463	7.208 ± 2.577	0.508 ± 0.053
34	400.387 ± 5.244	3.496 ± 0.404	2.198 ± 0.087	0.149 ± 0.009
37	604.1 ± 14.79	5.727 ± 0.753	7.053 ± 0.632	0.301 ± 0.018
38	518.355 ± 9.305	4.520 ± 0.193	4.703 ± 0.851	0.242 ± 0.008
39	629.455 ± 2.095	8.751 ± 0.463	11.769 ± 2.372	0.251 ± 0.014
40	845.67 ± 31.976	5.910 ± 0.825	5.666 ± 6.972	0.261 ± 0.016
Orange Blossom				
10	828.545 ± 17.789	5.591 ± 0.019	6.156 ± 3.347	0.348 ± 0.018
21	593.082 ± 28.383	1.126 ± 0.459	1.478 ± 1.360	0.077 ± 0.005

32	386.125 ± 14.451	2.740 ± 1.048	4.262 ± 0.961	0.117 ± 0.013
35	286.117 ± 3.299	1.535 ± 1.003	4.868 ± 2.081	0.084 ± 0.003
Black Mangrove				
25	730.345 ± 33.942	8.630 ± 0.687	7.457 ± 0.329	0.489 ± 0.040
Tupelo				
5	820.388 ± 23.019	5.437 ± 1.295	7.691 ± 0.639	0.241 ± 0.017
9	773.433 ± 15.669	4.506 ± 0.728	6.864 ± 1.141	0.145 ± 0.003
16	997.198 ± 12.444	7.767 ± 0.591	27.993 ± 1.404	0.218 ± 0.012
27	649 ± 25.800	7.069 ± 0.361	11.777 ± 1.067	0.208 ± 0.011
29	690.817 ± 15.772	7.183 ± 0.396	12.711 ± 4.557	0.192 ± 0.010
Palmetto				
1	766.6 ± 27.1	2.711 ± 0.924	5.085 ± 0.420	0.163 ± 0.008
3	851.178 ± 12.246	7.396 ± 0.625	12.780 ± 0.961	0.248 ± 0.065
24	529.712 ± 7.757	4.888 ± 0.518	4.773 ± 0.632	0.284 ± 0.065
36	457.258 ± 1.732	3.748 ± 0.548	5.771 ± 0.486	0.143 ± 0.008
Brazilian Pepper				
6	918.762 ± 11.237	6.648 ± 0.073	5.484 ± 3.377	0.353 ± 0.021
14	890.975 ± 23.061	6.199 ± 0.315	14.975 ± 3.850	0.264 ± 0.012
43	642.837 ± 13.342	8.691 ± 0.733	10.545 ± 0.683	0.292 ± 0.017
Blueberry				
26	466.415 ± 4.908	2.887 ± 1.146	3.126 ± 3.984	0.269 ± 0.012
Blackberry				
44	532.353 ± 31.127	3.009 ± 0.736	6.272 ± 0.592	0.168 ± 0.005
Gallberry				
4	1004.125 ± 13.666	3.302 ± 1.304	16.520 ± 1.784	0.272 ± 0.010
8	694.303 ± 47.599	3.876 ± 0.308	3.1755 ± 0.575	0.115 ± 0.004
20	735.945 ± 11.849	3.477 ± 0.511	11.571 ± 2.910	0.172 ± 0.115

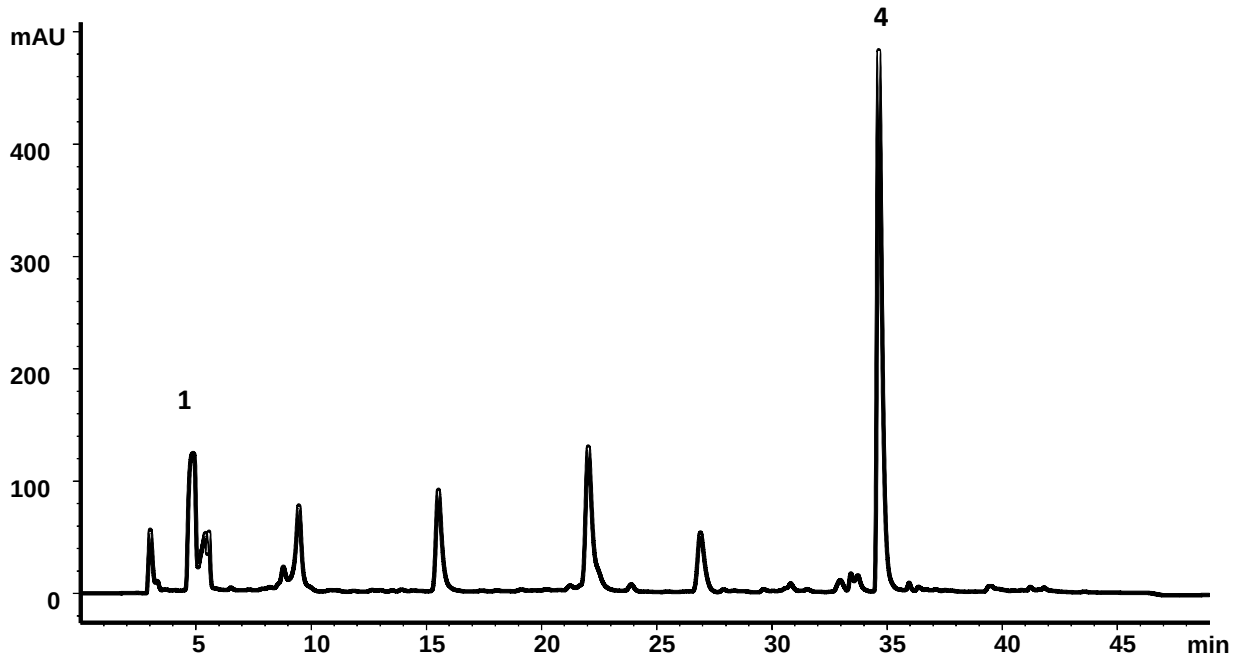
Avocado				
11	1357.672 ± 9.931	10.994 ± 1.065	15.451 ± 6.124	0.604 ± 0.020
41	1570.202 ± 33.411	13.319 ± 0.731	14.298 ± 4.031	1.764 ± 0.065
Clover				
22	844.865 ± 41.000	3.567 ± 0.580	3.849 ± 0.064	0.299 ± 0.049
42	250.55 ± 17.590	1.758 ± 0.163	6.272 ± 0.592	0.055 ± 0.002

Results are mean ± SD of three determinations on fresh weight basis. #ORAC values are mean of two determinations on fresh weight basis.

Table 3. Amounts of 1,2-dicarbonyl compounds in honey samples.

A-dicarbonyl	Range (µg/g of sample)	Median (µg/g of sample)
3-deoxyglucosone	169.9-2943	558
Glyoxal	ND-6.840	3.16
Methylglyoxal	Trace-1594	5.79

ND: No detection (not present in the sample), Trace: minimal amounts to small to be quantified



2

3

Figure 1. HPLC-DAD chromatogram of Manuka sample (45) at 312nm. HPLC-DAD chromatogram of the quinoxaline derivatives of Manuka honey. 1. OPD 2. 3-deoxyglucosone 3. glyoxal 4. methylglyoxal

Table 4. Compounds identified in various honey samples and their retention times (RT), MS and MS/MS characteristics. *

Peak no.	Compound	RT	$[M-H]^-$	MS^2 $[M-H]^-$

Tentatively identified compounds using MS/MS without access to external standard.

1	Coumaric-4-acid glucoside*	9.2	325.6	163.5
2	Chlorogenic Acid	13.6	352.6	190.5
3	quercetin 3,3' dimethyl ether*	15.7	329.3	300.5
4	Syringic acid	17.6	197	
5	Unknown 1	21.2	559	360.6, 270.5, 198.6
6	Unknown 2	22.1	267.8	248.6, 194.6, 166.5, 220.6, 242.8
7	Coumaric Acid	23.2	162.7	118.5
8	Unknown 3	26.5	279 431	138.5 310.5, 160.5, 276.6
9	isorhamnetin-7-o-rutinoside*	29.0	623	458.4, 313.5, 271.5
10	Unknown 4	30	523	361.7, 301.6, 198.5, 154.6
11	Unknown 5	31.3	363	199.6, 163, 154.6
12	Rutin	32.8	608.8	301.1
13	Ellagic Acid	33.9	300.8	256.5, 200.5, 164.5, 228.4, 178.4, 240.6
14	Trans-Trans Abscisic Acid*	35.5	262.7	218.6, 200.6
15	Unknown 6	37.1	317	278.6, 270.5, 219.4, 182.4, 286.8, 226.6
16	Cis-Trans Abscisic Acid	38.4	262.6	152.5, 218.6
17	Pinobanksin 5-methyl ether*	39.9	285	271, 252
18	Naringenin	40.4	270.6	198.7
19	Pinobanksin*	41	270.6	252.6, 150.5, 224.5
20	Hesperetin	41.7	300.6	285, 256.5,198.5, 240.6, 138.5
21	Luteolin	42.1	284.9	150.6, 240.5, 198.4,

22	**Isosakurametin***	**43.2**	**284.8**	**150.5, 242.8**
23	**Kaempferol**	**43.8**	**285.5**	**150.5, 256.5**
24	**Apigenin***	**44.3**	**269.2**	**253.5, 224.4, 196.5**
25	**Unknown 7**	**45.8**	**326.5**	**210.6, 170.6, 228.6**
26	**Pinocembrin**	**46.7**	**254.6**	**212.5, 150.5**
27	**Chrysin**	**48.3**	**253**	**208.3, 150.6, 180.5**
28	**Galangin**	**48.8**	**269.6**	**197.5**
29	**Unknown 8**	**53.6**	**409**	**334.5, 227.4, 296.8, 326.7**

Figure 2. HPLC-DAD Chromatogram of Orange Blossom sample 10.

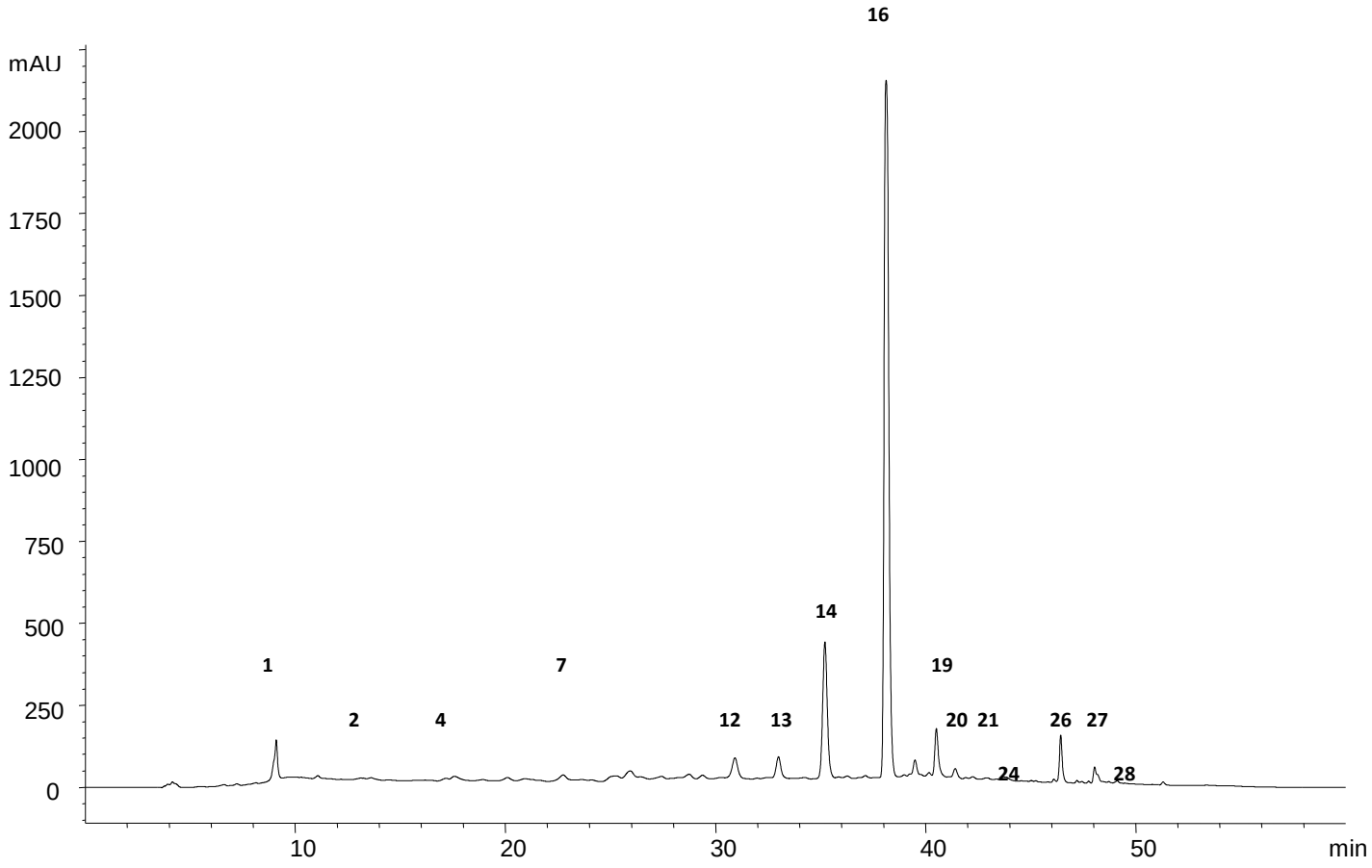

mAU
2000
1750
1500
1250
1000
750
500
250
0
10
20
30
40
50
min
1
2
4
7
12
13
14
16
19
20
21
24
26
27
28

Table 5. Concentration in µg/g fresh sample of each compound that could be quantified using external standards. Trace-low amounts that can't be quantified, ND: not detected in sample.

sample	Peak 1*	Peak 2	Peak 4	Peak 7	Peak 12	Peak 13	Peak 14	16
1	trace	1.014	ND	0.458	2.462	3.542	15.185	26.789
2	trace	0.534	ND	Trace	0.699	0.702	0.283	1.302
3	trace	1.642	2.228	trace	69.740	1.584	12.477	20.201
4	trace	0.830	0.585	trace	1.331	0.881	7.602	24.012
5	trace	1.183	1.724	trace	10.012	4.705	16.152	22.380
6	trace	0.861	0.588	trace	ND	0.507	0.399	3.756
7	trace	1.307	0.341	0.08	4.647	3.936	24.832	59.053
8	trace	1.000	ND	trace	2.910	3.004	25.161	27.251
9	trace	0.745	0.549	trace	6.606	5.776	6.731	8.986
10	trace	0.672	0.458	trace	2.839	1.956	4.687	28.799
11	trace	1.391	0.421	trace	2.381	2.426	12.806	29.640
12	trace	1.132	0.473	trace	2.457	3.782	6.266	19.823
13	trace	0.506	0.775	trace	0.259	0.548	1.006	4.292
14	ND	ND	0.999	trace	4.303	1.992	0.842	2.021
15	trace	ND	ND	0.413	ND	226.904	0.662	2.412
16	trace	0.678	ND	trace	7.692	6.361	18.136	20.960
17	0.850	2.246	1.981	0.421	44.439	ND	20.918	33.992
18	0.359	ND	5.424	3.151	0.786	3.060	2.174	9.563
19	trace	1.401	ND	0.555	ND	0.839	8.943	20.386
20	trace	0.692	0.721	trace	ND	ND	14.281	25.314
21	trace	ND	3.908	trace	6.079	ND	6.166	15.707
22	2.820	1.081	ND	trace	2.952	ND	0.944	1.533
23	1.113	6.298	5.396	0.018	2.853	1.921	0.640	2.220

24	trace	0.605	1.864	trace	1.758	1.544	2.453	8.602
25	trace	4.060	2.322	trace	1.575	1.306	2.347	5.592
26	trace	ND	0.941	1.308	1.719	1.263	1.254	3.969
27	trace	ND	ND	trace	6.363	4.722	20.857	24.765
28	trace	1.893	1.618	trace	1.284	1.164	0.552	1.430
29	trace	ND	0.750	trace	5.020	7.078	5.814	7.720
30	trace	ND	ND	trace	ND	ND	0.123	0.946
31	trace	ND	0.819	trace	1.075	2.060	10.161	18.227
32	trace	ND	2.098	ND	7.544	ND	trace	0.219
33	trace	0.601	ND	0.158	5.418	ND	5.533	22.430
34	ND	1.255	ND	1.202	0.652	1.369	1.400	3.370
35	1.587	ND	5.364	trace	6.240	0.666	1.848	4.866
36	ND	ND	1.309	trace	0.406	0.561	0.127	0.283
37	ND	1.695	ND	6.994	1.460	2.200	3.600	8.230
38	trace	1.372	ND	trace	ND	ND	5.518	17.435
40	trace	1.060	ND	0.040	ND	ND	13.834	30.499
41	11.761	ND	ND	trace	ND	3.386	1.529	5.993
42	trace	ND	0.388	trace	ND	1.668	ND	0.496
44	trace	ND	2.894	trace	0.525	0.911	0.479	2.144
45	trace	0.557	ND	trace	93.598	2.344	ND	0.704
46	trace	1.421	ND	trace	ND	2.190	5.436	12.133

sample	Peak18	Peak 19+	Peak 20	Peak 21	Peak 23	Peak 24	Peak 26	Peak 27	Peak 28
1	0.919	0.907	0.057	2.731	1.449	2.206	trace	0.080	ND
2	Trace	1.454	trace	0.651	0.645	ND	0.944	0.295	0.363
3	0.101	6.593	trace	1.033	1.752	0.829	1.810	0.375	0.679

4	Trace	0.068	trace	1.489	0.947	ND	trace	0.122	ND
5	ND	9.770	trace	2.883	1.508	ND	3.763	0.925	0.662
6	Trace	2.805	trace	0.818	0.883	ND	2.260	0.510	1.078
7	Trace	1.405	trace	1.329	0.500	0.934	1.399	0.180	1.069
8	ND	4.952	trace	1.715	0.566	0.695	trace	0.053	1.203
9	ND	2.501	trace	1.264	1.293	ND	trace	0.068	0.626
10	Trace	2.825	trace	1.136	0.757	0.765	2.494	0.528	0.781
11	Trace	Trace	trace	3.425	0.662	1.376	ND	ND	0.498
12	ND	Trace	trace	1.031	0.703	ND	trace	0.207	ND
13	Trace	0.252	trace	2.854	0.578	0.633	0.015	0.172	ND
14	Trace	9.089	trace	1.888	1.310	2.903	6.008	1.143	0.754
15	0.226	2.700	0.626	ND	ND	2.106	2.076	0.390	0.618
16	2.617	4.925	0.923	2.507	2.164	3.846	0.192	0.339	0.778
17	0.161	11.589	trace	ND	1.664	ND	4.229	0.881	ND
18	Trace	8.878	trace	2.443	1.026	0.769	2.952	0.652	1.042
19	Trace	12.465	trace	2.454	0.837	0.662	7.377	1.045	0.763
20	ND	3.776	trace	1.253	0.796	ND	1.659	0.436	ND
21	Trace	2.905	trace	0.985	0.669	ND	2.099	0.315	ND
22	ND	1.003	trace	0.888	0.368	ND	0.342	0.279	ND
23	Trace	0.352	trace	0.943	0.281	0.556	trace	0.124	0.356
24	ND	8.873	0.353	3.326	1.511	0.883	2.943	0.849	0.967
25	ND	0.654	trace	1.194	0.663	ND	trace	0.200	0.339
26	ND	10.125	trace	1.809	1.163	0.780	5.821	0.904	1.105
27	ND	11.090	trace	3.187	3.291	ND	6.798	1.004	ND
28	ND	Trace	trace	ND	0.246	0.643	trace	0.149	ND
29	ND	5.018	1.989	8.083	ND	ND	4.731	0.891	ND

30	Trace	0.692	ND	ND	0.217	0.539	0.163	0.188	ND
31	0.017	4.872	trace	2.656	0.908	ND	3.012	0.501	ND
32	Trace	Trace	trace	0.572	1.094	0.642	trace	0.055	ND
33	ND	7.836	trace	0.984	1.686	0.857	3.226	0.774	ND
34	ND	0.779	trace	1.063	0.625	ND	trace	0.091	0.674
35	0.139	Trace	trace	0.984	2.237	1.053	trace	0.098	ND
36	0.071	Trace	trace	0.549	0.672	0.781	trace	0.047	ND
37	ND	0.232	trace	1.186	2.146	0.865	0.257	0.143	ND
38	ND	Trace	ND	1.403	0.380	ND	trace	0.118	0.426
40	Trace	0.001	trace	1.429	1.588	ND	0.477	0.112	0.536
41	ND	Trace	trace	0.839	0.692	ND	ND	ND	ND
42	ND	7.629	trace	0.904	3.269	0.799	10.99	0.963	0.868
44	ND	Trace	trace	0.553	0.783	0.626	ND	ND	ND
45	0.144	2.416	trace	1.582	ND	ND	3.265	0.601	0.563
46	Trace	Trace	trace	0.727	0.722	ND	trace	ND	ND

***calculated using coumaric acid standard; +calculated using pinocembrin standard**

Table 6. Total phytochemical concentration measured.

Sample #	Total Measured Phytochemical Concentration (µg/g)
1	57.799
2	7.874
3	121.042
4	37.867
5	75.667
6	14.465
7	101.012
8	68.510

9	35.146
10	48.698
11	55.024
12	35.872
13	11.891
14	33.252
15	239.133
16	72.119
17	123.371
18	42.277
19	57.725
20	48.929
21	38.832
22	12.209
23	23.071
24	36.529
25	20.252
26	32.160
27	82.077
28	8.979
29	47.094
30	2.869
31	44.308
32	12.224
33	49.504
34	12.480
35	25.081

36	4.806
37	29.008
38	26.653
40	49.575
41	24.200
42	27.978
44	8.915
45	105.774
46	22.630

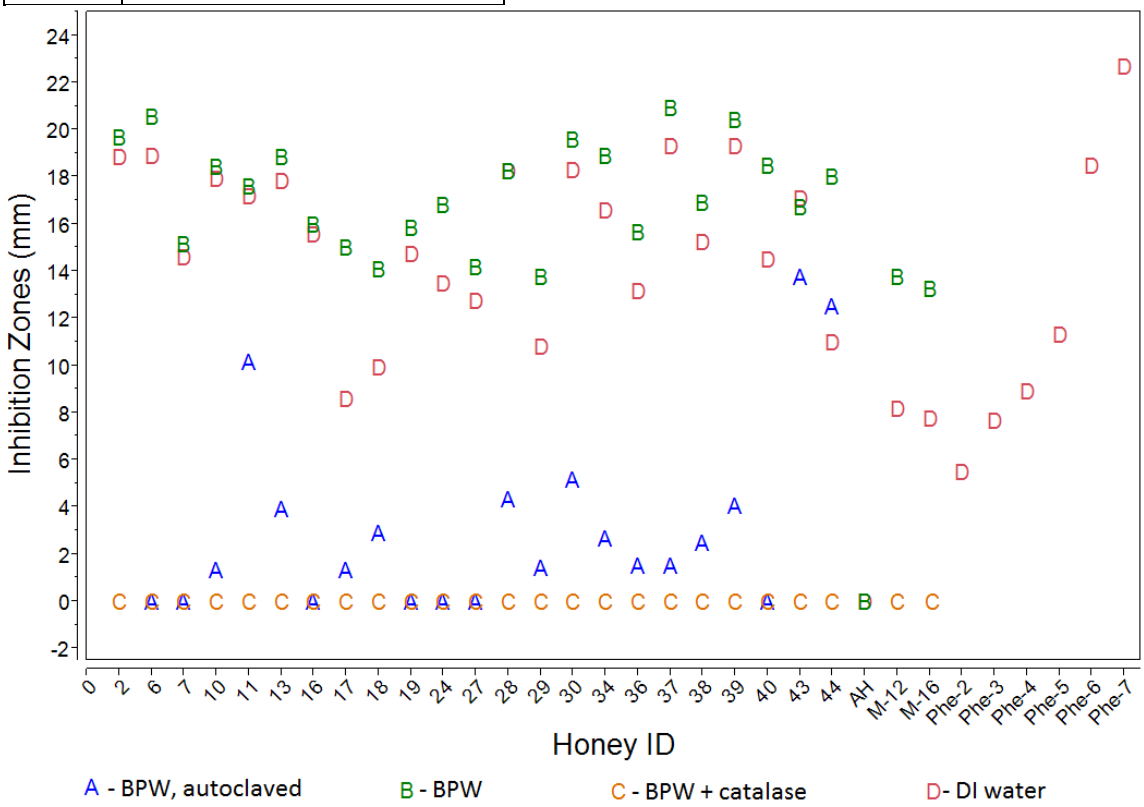


Figure 3. The inhibition zones, including the 5mm well, for twenty-one Florida honeys, artificial honey (AH), Manuka Honey #46 (M-12), Manuka Honey #15 (M-16), and the phenol standards (Phe2-7). The diluents DI water and BPW were tested, as well as BPW spiked with catalase, and BPW with autoclaving.

Table 7. Monofloral honeys tested, according to varietal, region, and antimicrobial activity against *S. aureus*. –: No observed antistaphylococcal activity, +: moderate antistaphylococcal activity, ++: high antistaphylococcal activity.

ID	Varietal	Region	Antimicrobial Activity
21	Orange blossom	North	-
32	Orange Blossom	South/central	+
35	Orange Blossom	Central	-
1	Citrus/palmetto	North	-
10	Citrus	Central	++
3	Palmetto	Central	+
24	Palmetto	South/central	++
36	Palmetto	South/central	+
6	Brazilian Pepper	Central	++
14	Brazilian Pepper	Central	+
43	Brazilian Pepper	North	++
11	Avocado	Central	++
41	Avocado	South	-
5	Tupelo	Central	+
9	Tupelo	North	+
16	Tupelo	North	++
27	Tupelo	North	++
29	Tupelo	North	++
22	Clover	South	-
42	Clover	North	-
4	Gallberry	Central	-
8	Gallberry	North	-
20	Gallberry	Central	-
17	Golden Raintree	Central	++
18	Beauty Berry	Central	++
25	Black mangrove	South	-
26	Blueberry	South/central	-
44	Blackberry	North	++

*golden raintree and beauty berry were later classified as wild type varieties.

Table 8. Wild type (multifloral) honeys tested according to region, season, and antimicrobial activity against *S. aureus*. –: No observed antistaphylococcal activity, +: moderate antistaphylococcal activity, ++: high antistaphylococcal activity.

ID	Region	Season	Antimicrobial Activity
13	Central	Spring	++
28	Central	Fall	++
37	Central	Spring	++
33	Central	Fall	+
38	Central	Fall	++
39	Central	Fall	++
30	Central	Summer	++
23	Central	Fall	-
2	Central	Fall	++
31	North/Central	Spring	-
34	North	Fall	++
19	North	Fall	++
7	North	Summer	++
40	North	Fall	++
12	South	Fall	-

Mr. Jerry Hayes, Chief Apiary inspector at the beginning of this project assisted in the collection of honey samples from local beekeepers and marketing of this research in the Melitto Files. Dr. Liwei Gu supervised the antioxidant, color, phytochemical and carbonyl analysis, which was performed by his graduate student Sara Marshall. Dr. Schneider and Dr. Oleksandr Tokarskyy completed the antimicrobial testing for this project. Sara Marshall gave two presentations about the research, once in 2011 at the Florida State Beekeeper's Association annual meeting and in November 2012 at the Palm Beach Beekeepers monthly meeting. The research was also presented at the 2012 American Chemical Society annual meeting by Dr. Gu's lab and again by Dr. Schneider's lab at the annual International Association for Food Protection meeting. More than 2,500 food safety professionals attended the presentation at the 2012 International Association for Food Protection Meeting. The data for how many of these people were beekeepers or specialty crop stakeholders were not available. This project was funded and supported by the Florida Department of Agriculture and Consumer Services' specialty crop block fund 2011-2013.

Goals and Outcomes Achieved

Beside the analytical tests performed in order to determine the quality of Florida honeys versus honeys from other areas of the world it was important to communicate the results of this research to the scientific community and the public. This was approached by setting up talks at local beekeeper meetings to express the importance of knowing some of the natural health benefits that could be found in honey. One presentation was given at a local beekeepers end of the year meeting (Palm Beach Beekeeper's Association-November 2012). About 55 people were in attendance. The research was also introduced in the science realm by it being presented at multiple international meetings.

Most of the goals established for this project were completed successfully within the grant period. For example, it was proposed that the antioxidant capacity, antimicrobial activity, and phenolic concentration would be analyzed on over 40 different Florida honeys. The research was presented at multiple national meetings in the science community in order to bring awareness to the importance of honeys beneficial compounds and the quality of Florida honeys versus other honeys. An extension publication is currently being developed for publication by September 2013.

One presentation was made at the Florida State Beekeepers Annual meeting in October 2011. Though several hundred people attended the meeting about 100 people attended the presentation.

300 flyers were not distributed at the Institute of Food Technologists meeting because the research was not presented at this meeting. 300 flyers were not distributed at the American Chemical Society Meeting because promotional flyers for specific products are not allowed to be distributed in the research presentations at this meeting. Flyers are only allowed in the vendor portions of this meeting and as we performed the academic research on these products we do not qualify as a vendor.

Beneficiaries

This project focused on helping beekeepers and honey producers, as well as the general public. Beekeepers now have science based evidence of which varieties maybe more beneficial and thus this could help to increase the honey production industry. An increase in honey production should increase the beekeeping industry as a whole, which could greatly affect the Florida agricultural economy. With the previous lack of scientific evidence on beneficial compounds in Florida honey this project has now brought attention the use of honey as a natural medicinal food and not just a sweetener. The project helps the scientific community by presenting knowledge on various honey varieties' phenolic and carbonyl profiles, antimicrobial capabilities, and antioxidant capacities.

This study provides scientific evidence that Florida honeys have equal or greater antimicrobial activity and phenolic composition compared to honeys from other countries. In the long term, this added value will raise the prices of Florida honey and make beekeeping in Florida more profitable. As a result, an increase in beehives throughout the state can be expected, which will subsequently help to promote the production of all specialty crops that rely on bees for pollination.

The 600 active members of Florida State Beekeepers Association will benefit directly from this project by learning that Florida Honeys possess health-promoting and anti-microbial properties. Outcomes from this research will make Florida honey more competitive and appealing to consumers in the market. Dissemination of knowledge in meeting further benefited the research community and the general public.

Lessons Learned

There were some issues with the completion of this project. With the large number of samples tested it was a hard to determine how much the floral source actually affects the antioxidant capacity, antimicrobial properties, and the phytochemical concentration. Since the samples were mostly donated and there is not a honey certification program in Florida it was difficult to determine the exact amount of each floral nectar in each sample. This raised concerns that a labeled avocado sample may not actually have a high percentage of nectar from the avocado source. A possible fix to this issue is doing pollen testing or to introduce another method that could be used to identify the % of honey from each floral source.

One goal that was not achieved to date was an official publication of the research. Currently multiple manuscripts are being prepared for submission to a reputable journal later this year. The magnitude and the time necessary to fully complete all goals set may have been underestimated.

Contact Person

Liwei Gu
352-392-1991 ext. 210
lgu@ufl.edu

Additional Information

Sections of this research were presented at two separate national meetings. The antimicrobial data seen in the attached poster titled Survey of Antimicrobial Activity of Florida Honeys was presented at the International Association for Food Protection Annual meeting in July 2012. The antioxidant data and phytochemical identification data in the second attached poster was presented at the American Chemical Society Annual meeting in August 2012.

References:

1. Bertoncelj, J.; Dobersek, U.; Jamnik, M.; Golob, T., Evaluation of the phenolic content, antioxidant activity and colour of Slovenian honey. Food Chemistry **2007,** 105, 822-828.

2. Mavric, E.; Wittmann, S.; Barth, G.; Henle, T., Identification and quantification of methylglyoxal as the dominant antibacterial constituent of Manuka (Leptospermum scoparium) honeys from New Zealand. Molecular Nutrition & Food Research **2008,** 52, 483-489.

3. Gheldof, N.; Wang, X. H.; Engeseth, N. J., Identification and quantification of antioxidant components of honeys from various floral sources. Journal of Agricultural and Food Chemistry **2002,** 50, 5870-5877.

4. Ehlenfeldt, M. K.; Prior, R. L., Oxygen radical absorbance capacity (ORAC) and phenolic and anthocyanin concentrations in fruit and leaf tissues of highbush blueberry. J Agric Food Chem **2001,** 49, 2222-7.

5. Oelschlaegel, S.; Gruner, M.; Wang, P.-N.; Boettcher, A.; Koelling-Speer, I.; Speer, K., Classification and Characterization of Manuka Honeys Based on Phenolic Compounds and Methylglyoxal. Journal of Agricultural and Food Chemistry **2012,** 60.

6. Stephens, J. M.; Schlothauer, R. C.; Morris, B. D.; Yang, D.; Fearnley, L.; Greenwood, D. R.; Loomes, K. M., Phenolic compounds and methylglyoxal in some New Zealand manuka and kanuka honeys. Food Chemistry **2010,** 120, 78-86.

7. Andrade, P.; Ferreres, F.; Amaral, M. T., Analysis of honey phenolic acids by hplc, its application to honey botanical characterization. Journal of Liquid Chromatography & Related Technologies **1997,** 20.

8. Biesaga, M.; Pyrzynska, K., Liquid chromatography/tandem mass spectrometry studies of the phenolic compounds in honey. Journal of Chromatography A **2009,** 1216.

Project (8): Florida A&M University - Florida Vine Distribution and Improvement Program

Contract Number: # 016849
Specialty Crop Block Grant Funding Year: 2010
Funding Total: $133,262.00
Reporting Period: Final

Project Summary

Viticulture is still an underdeveloped agricultural enterprise in Florida. Estimated total annual sales of Florida wines are in the range of $16 million generated by production of 357,611 gallons of wine from 43 state wineries. In comparison the annual Florida wine consumption is about 57.5 million gallons with the estimated expenditures on wine at the rate of $1.3 billion. The industry operates under very challenging conditions for grape growing in the American South East characterized with the fast growing non-*vinifera* local grape varieties and the nations' biggest wine markets.

Jointly sponsored by FDACS and VAC Increased Acreage Program has placed serious effort to facilitate and speed up the growth and development of the Florida grape growing industry. Florida legislators during their spring 2010 session released "House Resolution 9131: Recognizing Florida's vineyards and wineries for their valuable contributions to Florida's rich history, culture and economy."

Capitalizing on the developed capacity and industry cooperation under previous "The Florida Vine Improvement and Distribution Project" (Specialty Crop Grant Program 2008) FAMU's Center for Viticulture and Small Fruit Research 1/ to establish in protected environment and maintain for industry use the G1 nuclear disease free planting stock of 15 economically important muscadine and American native hybrid varieties; and 2/ partnering with the Florida Department of Agriculture and Consumer Services (FDACS) to implement the Vine Improvement and Distribution Program for disease free true-to-type grape cultivars and work to prevent the spread of economically important grape pests and diseases and toward development certification program for southern grapes.

Project Approach

This project was focused on the **collection of scientific data** on the infestation of transmitted through planting stock diseases (viruses, crown gall, *Eutypa* and Pierce's disease) and **diagnostic and therapy** of 15 economically important muscadine and Florida hybrid grape varieties which composed the core of the G1- nuclear disease free grapevine stock for the state of Florida and southeastern United States.

We worked closely with the local nurseries, Florida Viticulture Advisory Council, the Florida Grape Growers Association.
Florida A & M University Center for Viticulture is and will continue partnering with the Florida Department of Agriculture and Consumer Services (FDACS) to implement the Vine Improvement and Distribution Program. The Program was initiated in 2006 with the modest financial support of the Florida Viticulture Trust Fund and continues in collaboration with the Florida Department of Agriculture and Consumer Services to target developing of grape clean planting stock for Florida and establishing phytosanitary standards for the production of clonally-propagated true-to-type grapevines (muscadines and PD's tolerant American natives hybrids) free of targeted, transmittable, diseases through testing, diagnosis, and therapy.

Early monitoring of viruses, bacteria, and fungal diseases in grapevine and small fruits is very crucial for the survival and improved production. Diseases can be transmitted from the mother vine to planting materials, if the materials are not properly screened for pathogen infections. Molecular diagnostics i.e. ELISA and PCR based tests were employed for this purpose due to their specificity and simplicity. Although the late stage symptoms of grapevine viruses, fungus, or bacterial infection are often manifested of themselves, the availability of early detection ELISA and PCR-based diagnostic tests is giving the growers and breeders great advantage. This approach facilitates the detection of pathogen infections before symptoms are revealed.

Goals and Outcomes Achieved

1.Risk assessment of the transmitted by planting stock diseases in Florida vineyards

We conducted growers' survey for the spread of various economically important diseases in Florida vineyards. Based on the completed vineyards' site visits (>20), growers' reports (5) and numerous personal communications we have been able to accumulate data for the disease occurrence and frequency. Our results have been presented at the 2011 and 2012 FGGA conferences . *Eutypa*, crown gall and viruses were recognized as a major treat for the phytosanitary status of the planting stock in Florida.

The comprehensive grower survey was conducted during the 2011 Annual Grape Growers Conference were we organized two special sessions: "Vineyard Management and Cultural Practices" and "Improvement and Therapy of Grape Planting Stock " (please see in the attachment copy of the Conference Agenda and the Survey Instrument). The data from the survey and the onsite visits have been used to identify *Eutypa*, crown gall and viruses as a major treat for the phytosanitary status of the planting stock in Florida and to prepare a 3 fold extension brochure (please see the copy of the brochure in the "Additional Information" section).

The total membership of the FGGA vary between 120 and 200 individual members both commercial growers and hobbits. For the life of the project we cover 117 individual grape growers . We have been able to survey 67 FGGA members and 7 non-members attending the two special session organized our program during the 2011Annual Grape Growers Conference. In addition 10 non- members and 8 members have been surveyed during our 2011 Grape Pruning and Pesticide Management Workshop (please see in the attachment the copy of the program for the workshop). In 2012 during our Annual Grape Pruning Workshop we surveyed additional 20 non-members and 5 FGGA members.

A copy of the survey instrument is included in the “Additional Information” section.

We contributed large amount of data and we continue to participate at the National Clean Plant Network via the online platform: ‘Collaborative Tools’ where we share procedures and protocols for activities with all the NCPN crops (please see in the attachment copy of the document deposit at the database). Our results generated important awareness in the network and we have been invited to collaborate with the team of Dr. Marc Black on a new approved NCPN project: "Clean plant nursery increase strategies for southern-adapted grape and muscadine".

2. Diagnostic and therapy of economically important muscadine and American native hybrid varieties

A total of 25 varieties (initially were selected only 15 and 10 more were added by the growers recommendations) were tested for 21 viruses (18 by ELISA, 3 viruses by RT-PCR), *Agrobacterium vitis and* PD*'s* by selective media, *Eutypa* by RT-PCR in the beginning and at the end of the growing seasons 2011 and 2012. In season 2011 two of the muscadine varieties 'Magnolia' and 'Supreme' tested positive for Grape leafroll virus 1. This was the first report for the occurrence of economically important virus in commercial muscadine variety. In addition in season 2012 the newly released muscadine variety "Majesty" confirmed also positive for GLRV var1. The diagnostic work was done in house and from an accredited outside facility. In our case we have been cooperating with Cornell University as the diagnostic facility for the Grape East CPN. Disease elimination was utilized by isolation of meristem cultures from the single source at 0.3 to 0.5 mm size of the explants. The single source offspring’s were retested at the end of the 1st year in the greenhouse after developing of the woody tissue. Again any suspected vine was marked and discarded. As per the developed SOP for the program, the vines in the nuclear block will be retested beginning and the at the end of the growing season 2013.

3. Established nuclear disease free planting stock in protected environment (under screen) for supporting the Foundation Vineyard and nursery service blocks.

In season 2010 and 2011 the single copy disease free mother grapevines from 15 muscadine and American native grape varieties and rootstock were produced. To avoid secondary contamination with *Eutypa* and Pierce's disease a screen was installed and the 1st PD free screen house with holding capacity of 15 varieties was established in season 2012 with the Florida SCBG fund (Fig. 2). For the live of the program we have been able to meet and exceed the benchmark of 15 varieties in the initial work plan to undergo testing and therapy and to be planted in the G1 block. In season 2012 the disease testing of 10 more variety was completed and disease elimination via in vitro culture is undergoing.

The disease elimination protocols used in our program are in coordination with the well established scientific practices. Taking into consideration that we are in process of harmonizing and establishing the nationwide guidelines for the NCPN of Grape in US and the fact that our foundation block is its second year and the vines will be retested beginning and the at the end of the growing season 2013 it is important to proceed with caution and avoid any preliminary statements. It is open venue for future work with FDACS and our partners in the NCPN to established certification guidelines specially for muscadines sand southern grapes. This current program is building the necessary capacity for the completion of this important process.

4. Implementing the clean planting stock and disease BMP (Best Management Practices) program

Clean grapevine material undergone phytosanitary selection and in vitro disease elimination was never available in Florida and the Southeast in the past.

Our Florida Vine Improvement and Distribution Project/Program (SBG 2008, 2010) is the first ever effort to be undertaken in that direction.

The Foundation Certified Mather Block was planted in Fall 2011 and Spring 2012. The vines in the foundation block are still young and the production capacity for green and dormant cuttings is still limited.

We worked closely with the industry by vineyard site visits, workshops, field days, lectures and demonstrations at the growers meetings in Florida and neighboring states to implement the clean planting stock and pest and disease "good agricultural practices". Workshops were conducted in the beginning (February) and in the middle of the growing season (May) and have been used for training and distribution of knowledge and materials about the importance of the clean planting stock.

Outreach

For the life of the project, we conducted more than 20 vineyard site visits, 2 pruning and decease management workshops, and 2 special clean vine sessions. A total of 117 individual grape growers attended at least one of these events.

Beneficiaries

117 Florida grape growers were direct beneficiaries of this program. Additionally, all 200 members of the Florida Grape Growers' Association are expected to benefit from the outreach materials and publications produced by this project.
Our program provides assistance on a regular basis for grape growers and nursery producers from Florida, Georgia, Alabama, Louisiana, North Carolina and Texas.
We are the only specialized grape research facility for Florida and South East and the first one to initiate and specialize in clean vine distribution program for muscadines and American native grapes.
During season 2012 green cuttings were provided to Sirvent Vineyards, St. Jon's Vineyard, Bradley Farms and other individual small growers in Florida. Dormant cuttings and potted plants from Florida hybrid varieties was produced for Sirvent Vineyards, Seven Ranch Vineyard in Texas and for extension experimental plots in Auburn University, Alabama
1) Special presentations:
a) Tsolova, V: The Viticulture Center at Florida A&M University – American Native Southern Grape Varieties and Clean Plants. National Meeting of the National Clean Plant Network (NCPN), May 11, 2010 in Davis, CA.
b) Tsolova et all, 2011: The Importance of Grape Clean Planting Stock, Annual FGGA Conference, January 21, 2011, Lakeland FL
c) Tsolova, V: FAMU Grape Clean Plant Center for American Native Southern Grapes, 17 International ISVG (International Council for the Study of Grape Virus and Virus like Diseases), October 7-12, 2012 Davis, CA

Lessons Learned

Grape growing and wine making are still underdeveloped agricultural enterprises in Florida. The region presents unique challenges to the development and propagation of disease-resistant cultivars suited to its climatic and environmental conditions. At the same time, great potential exists for the development of a viable and sustainable viticulture industry in Florida. The absence of certified planting materials for muscadines and Florida bunch grapes is a major constraint that negatively impacts the future growth and development of southeastern grape and wine industry. Often times, the vines or planting materials were purchased without any assurance of quality from the supplier. This has resulted in a growing number of muscadine vineyards being affected with serious diseases such as *Eutypa*, and crown gall after the third year of growth. These diseases are usually spread by contaminated planting materials without knowledge of the growers. This situation, in addition to the naturally very high disease pressure (PD's and fungal diseases) if allowed to continue will have serious repercussions for the grape and wine industry in the region.
Our program is the first attempt to generate important knowledge in regards of the healthy status of the existing vineyards and currently available grape planting stock in the state. In addition our program provide services and training in vine propagation, various grafting

techniques and improved planting material management practices. The established G1 certified mother block for sustainable production of grape clean planting stock will enhance the productive efficiency and competitiveness of grape growing in Florida and the southeastern states. We will continue our cooperation with FDACS and the Florida Grape Growers Association (FGGA) to address growers needs for healthy and improved quality planting stock and we will continue assisting growers in the state considering nursery business.

Contact Person

Dr. Violeta Colova(Tsolova)
Professor-Viticulture and Development Biology
Center for Viticulture Science & Small Fruit Research
Florida A&M University
6505 Mahan Dive
Tallahassee, FL 32317
Phone: (850)4127394
Fax: (850)5612617
E-mail: Violetka.Colova @famu.edu

Additional Information

Pathogen list - FAMU

Group	Pathogen	Symbols	ELISA	qPCR	PCR	Herb. Ind.	Woody Ind.
Nepoviruses							
	Grapevine fanleaf virus	GFLV	Cornell				
	Tomato ringspot virus	ToRSV	Cornell				
	Tobacco ringspot virus	TRSV	Cornell				
	Arabis mosaic virus	ArMV			Cornell		
	Peach rosette mosaic virus	PRMV			Cornell		
	Blueberry leaf mottle virus	BLMoV					
	Grapevine Bulgarian latent virus	GBLV					
	Grapevine chrome mosaic virus	GCMV					
	Raspberry ringspot virus	RpRSV			Cornell		
	Tomato black ring virus	TBRV			Cornell		
	Grapevine Anatolian ringspot virus	GARSV					
	Grapevine deformation virus	GDeV					
	Artichoke Italian latent virus	AILV					
	Cherry leaf roll virus	CLRV					
	Strawberry latent ringspot virus	SLRSV			Cornell		
Closteroviruses							
	Grapevine leafroll associated virus 1	GLRaV-1	Cornell				
	Grapevine leafroll associated virus 2	GLRaV-2	Cornell				
	Grapevine leafroll associated virus 2RG	GLRaV-2RG					
	Grapevine leafroll associated virus 3	GLRaV-3	Cornell				
	Grapevine leafroll associated virus 4	GLRaV-4	Cornell				
	Grapevine leafroll associated virus 4 strain 5	GLRaV-5	Cornell				
	Grapevine leafroll associated virus 4 strain 6	GLRaV-6	Cornell				
	Grapevine leafroll associated virus 7	GLRaV-7	Cornell				
	Grapevine leafroll associated virus 4 strain 9	GLRaV-9	Cornell				
	Grapevine leafroll associated virus 4 strain Car.	GLRaV-Car					
	Grapevine leafroll associated virus 4 strain Pr	GLRaV-Pr					
	Grapevine leafroll associated virus 4 strain De	GLRaV-De					
Vitiviruses							
	Grapevine virus A	GVA	Cornell				
	Grapevine virus B	GVB					
	Grapevine virus D	GVD					
	Grapevine virus E	GVE					
	Grapevine virus F	GVF					
Foveaviruses							
	Grapevine rupestris stem pitting associated virus	GRSPaV					
Maculaviruses							
	Grapevine fleck virus	GFkV			Cornell		
	Grapevine red globe virus	GRGV					
Marafiviruses							
	Grapevine syrah virus-1	GSyV-1					
	Grapevine rupestris vein feathering virus	GRVFV					
	Grapevine asteroid mosaic-associated virus	GAMaV					

Trichoviruses							
	Grapevine berry inner necrosis virus	GINV					
	Grapevine Pinot gris virus	GPGV					
Tombusvirus							
	Grapevine Algerian latent virus	GALV					
Ilarviruses							
	Grapevine Angular Mosaic Virus	GAMV					
DNA viruses							
Badnaviruses							
	Grapevine vein clearing virus (new report)	GVCV					
Unassigned							
	Grapevine red blotch-associated virus (Same as Grapevine cabernet franc-associated virus)	GRBaV (GCFaV)					
Viroids							
	Australian grapevine viroid	AGVd					
	Hop stunt viroid	HpSVd					
	Citrus exocortis viroid	CEVd					
	Grapevine yellow speckle viroid-1	GYSVd-1					
	Grapevine yellow speckle viroid-2	GYSVd-2					
	Grapevine yellow speckle viroid-3	GYSVd-3					
	Grapevine yellow speckle viroid-4	GYSVd-4					
Phytoplasmas							
	Universal detection	Phyto			Eurofins		
	Australian grapevine yellows phytoplasma (Candidatus Phytoplasma australiense)						
	Grapevine bois noir phytoplasma (Candidatus Phytoplasma solani)						
	Grapevine flavescence doree phytoplasma (Candidatus Phytoplasma vitis)						
	Grapevine yellows phytoplasma						
	Tomato big bud phytoplasma						
Bacteria							
	Xylella fastidiosa (Pierce's Disease)	PD			Eurofins		
	Agrobacterium vitis				Eurofins		
	Xanthomonas campestris pv. viticola						
	Xylophilus ampelinus						
Fungal	*Eutypa* dieback				Eurofins		
Diseases of unknown etiology							
	LN33 stem grooving						
Phantom diseases							
	Grapevine Tunisian ringspot virus (Not in GenBank, but in Virus Taxonomy[1] book.)	GTRSV					
	Grapevine Ajinashika disease luteovirus (Not in GenBank or in Virus Taxonomy[1] book. See citation: Namba et.al., 1991.)						
	Grapevine line pattern virus (Not in GenBank or in Virus Taxonomy[1] book. See citation: Lehoczky et al., 1987.)	GLPV					
	Grapevine labile rod-shaped virus (Not in	GLRSV					

	GenBank or in Virus Taxonomy[1] book. See citation: Faggioli et.al., 1992.)						
	Palatinate grapevine yellows (Not in GenBank. See citation: Angelini et.al., 2001.)	PGY					
	Vergilbungskrankheit (German grapevine yellows) (Not in GenBank. See citation: Maixner et.al., 1995.)						
	Sowbane mosaic virus (In GenBank. See citation: Bercks & Querfurth, 1969.)	SoMV					
	Grapevine stunt virus (Not in GenBank or in Virus Taxonomy[1] book. See citation: Namba and Martelli, 1993.)	GSV					

[1]King M.Q. A., Adams M.J., Carstens E.B., Lefkowitz E. (eds). Virus Taxonomy. Ninth Report of the International Committee on Taxonomy of Viruses, Elsevier-Academic Press, Amsterdam, The Netherlands.

Florida Vine Improvement and Distribution Program: Grape Growers Survey

This survey of Florida grape growers will document existing vineyard composition and practices with a focus upon practical issues affecting health, harvest, yield and ultimately your success. FAMU Center for Viticulture collects information to help you. Our staff will contact you in person to facilitate data collection and assist you with the details of the survey. Please donate a few moments and fill out this form or participate in an interview.

We will all benefit from collection of good information. FAMU Center for Viticulture will collect and analyze the data, MAINTAINING COMPLETE CONFIDENTIALITY for individual vineyards and growers! The summary data will be used to better target extension and applied research efforts, and will be available for use of the Florida grape growers, researchers and extension agents.

Thanks in advance for your help! Contact details follow on the last page.

Dr. Violeta Colova

All information provided below will be considered *Confidential* and handled accordingly. Please complete a separate survey for each vineyard.

Vineyard	Contact
County	Tel
Street	Cell
City	Email

This vineyard

Year established	Acreage gross ☐ Net ☐

This page[1]: MUSCADINES □ or BUNCH GRAPES □

Oldest vines	Acreage gross □ Net □
Terrain & soils	Row space Vine space

Vineyard site summary: vine number □ or acres □

Block Name	Planned 1 yr	1 year	1 – 4 year	4 + years

Grape variety performance table
Simply over-write the gray labels in each cell

Table Row	[name][2]	[name]	[name]	[name]	[name]
1	[% vineyard][3]	[% vineyard]	[% vineyard]	[% vineyard]	[% vineyard]
2	[yield]4	[yield]	[yield]	[yield]	[yield]
3	[1st c.c.]5	[1st c.c.]	[1st c.c.]	[1st c.c.]	[1st c.c.]
4	[vigor][6]	[vigor]	[vigor]	[vigor]	[vigor]
5	[pest & disease][7]	[pest & disease]	[pest & disease]	[pest & disease]	[pest & disease]
6	[other]8	[other]	[other]	[other]	[other]
7	[rank]9	[rank]	[rank]	[rank]	[rank]

Management

[1] If you grow both muscadines and bunch grapes at the same vineyard please copy this page and do one for each
[2] Name of own-rooted or if grafted : scion/rootstock;
[3] % vineyard total should equal 100
[4] Yield: tons/acre
[5] Vine age of first commercial crop
[6] Vigor rate as 1 (weakest) – 5 (strongest)
[7] Pest & disease please identify specific ones particular to this variety
[8] Other issues: cold hardiness, dieback or poor yield associated with this variety
[9] Rank for satisfaction: 1 (worst) – 5 (best)

This page[10]: MUSCADINES □ or BUNCH GRAPES □

1. Trellis/Training System _____

2. Pest & Disease issues _____

3. Protection[11] _____

4. Spray criteria[12] _____

5. Other practices[13] _____

6. Irrigation system _____

7. Irrigation timing _____Qty./vine_____

8. Fertilizer(s) used_____

9. Fert dates _____

10. Fert rate _____

11. Fert application method(s)_____

12. Fert criteria _____

13. Fert adj by variety ? Yes □ No □ Any differ ? _____

14. Harvest/how do you set date _____

15. Harvest methods _____

16. Postharvest handling _____

17. Grape market: Winery_____% Juice _____% Fresh retail ____% Jellies etc ____%

Wholesale _____% Other _____

This page for MUSCADINES & BUNCH GRAPES

---

[10] If you grow both muscadines and bunch grapes at the same vineyard please copy this page and do one for each
[11] Protection: spray schedule & products
[12] What determines when to spray?
[13] Special treatments like growth regulators or deficit irrigation to name two

18. Use of pomace _____

19. Floor cover_____

20. Floor mgmt _____

21. Frost practices_____

22. Bird practices_____

23. Industry opportunities _____

24. Industry issues & limitations _____

_____

_____

25. Info sources rate 1(least useful)—5(most useful): Extension ___ University

___Growers & Profess. Assoc.___ Internet ___ Published ___

26. Research suggestion _____

27. Info you can use but can't readily find _____

_____

Our contact details

Dr. Violeta Colova (Tsolova)
Professor, Viticulture & Development Biology
Center for Viticulture & Small Research
Florida A & M University
6505 Mahan Drive
Tallahassee, FL 32317
Phone: (850) 412-7394
Fax: (850)561-2617
E-mail: Violetka.Colova@famu.edu
famcolov@comcast.net

_____date

Grape and Small Fruit Pruning Workshop
Center for Viticulture and Small Fruit Research

Florida Vine Improvement and Distribution Program: Q and A sesion

1. What is meant by 'Pruning' and how often should I prune?

2. What does pruning do for the Tree or Vine?

3. Why is it important to know the fruiting habit of a plant?

4. What is meant by bleeding or sap running? Why is it of any concern?

5. What is fruit thinning and why should I be concerned? What is overload?

6. What should be my goal, more fruits or larger fruits?

7. Is it possible to increase diseases by pruning & what can I do to reduce it?

8. When should I fertilize in relation to pruning? What type to use?

9. When should you not prune your plants?

10. How do you prune berries (blackberry, raspberry, and elderberry)

11. What are the major differences between pruning vines vs trees?

12. How should I clean my pruning equipment and with what?

13. If I know I have a diseased plant, when should I prune it?

14. What can I do to help control diseases and insects?

15. What about pruning wounds? How can you treat or prevent them?

16. When is the preferred time of the year to prune?

17. When should you ever Summer prune?

18. What pruning equipment and supplies do you need for pruning?

19. What other questions that we can respond to during the workshop.

20. Remember that the question that you are waiting for someone else to ask will probably never get asked. So, ask it yourself.

FGGA ANNUAL CONFERENCE – JANUARY 21-22, 2011
PROGRAM AGENDA

THEME: CREATING EXCELLENT WINE

FRIDAY, JANUARY 21, 2011 Moderated By Kevin Callanan, Lakeridge Winery

11:00 AM **Registration**

1:00 PM Opening Remarks **(Bob Paulish, President)**

GRAPES ARE BENEFICIAL / BEGIN WITH GOOD GRAPES

1:15 PM Grape Nutraceuticals and Health Benefit Project Update
Liwei Gu - UF

1:40 PM Increasing the Nutraceutical Content of Muscadine Grapes to Enhance Antioxidant Characteristics
Hermanth Vasanthaiah - FAMU

2:05 PM Grape Breeding Research
Jiang Lu – FAMU

2:30 PM **Break**

2:50 PM Vineyard Management and Cultural Practices Research Update
Violeta Colova – FAMU

3:15 PM Muscadine Grapes
Dennis Gray - UF

3:35 PM Improvement and Therapy of Grape Planting Stock
Stoyanka Krastanova – FAMU

4:00 PM Great Grapes Make Great Wine
Barry Gump – FIU

STATE OF THE FGGA AND ANNUAL MEETING

5:15 PM State of the FGGA
Bob Paulish, President

5:30 PM **FGGA Annual General Meeting**
Bob Paulish, President

6:00 PM FGGA BOARD MEETING AND ELECTION OF OFFICERS
Bob Paulish, President

6:30 PM **MEET-AND-GREET**
Wine and Juice Tasting and Social Hour
Hosted by Florida Wineries and Hobbyist Wine Makers

DINNER

7:30 PM Opening Remarks **(Bob Paulish)**
Guest Speaker:
Barbara Insel, Stonebridge Research
"Results of Economic Impact Study for Florida Viticulture"

FGGA ANNUAL CONFERENCE – JANUARY 21-22, 2011
PROGRAM AGENDA

THEME: CREATING EXCELLENT WINE
SATURDAY, JANUARY 22, 2011 Moderator: Kevin Callanan, Lakeridge Winery

7:00 AM Registration

CONCURRENT SESSIONS 8:00 – 10:20

JUST GETTING STARTED

8:00 AM Growing Grapes
John Sirvent, Sirvent Farm & Vineyard

8:30 AM The Tools You Need to Get Started
Dee Roberson

9:00 AM Making a Good Bottle of Wine
Donnie Nettles

VETERAN GROWERS AND WINERIES

8:00 AM Blanc du Bois Study Results
Charlie Sims - UF

8:20 AM Certified Florida Winery Marketing Plan
Gary or Charles Cox

9:00 AM Department of Agriculture Update
Tom Thomas, Florida Department of Agriculture

9:20 AM Contribution of Extensions
Mercy Olmstead – UF

9:40 AM Grape Biotechnology Research
Mehboob Sheikh – FAMU

10:00 AM Pierce Disease Resistance Project Update
Don Hopkins – UF

10:20 AM Break

GENERAL SESSION

10:20 AM Cleaning and Sanitation Options in Wineries
Randy Worobo, Cornell

12:00PM Lunch

1:00 PM Tips for the Small Winery
Barry Gump – FIU

2:15 PM Break

2:35 PM Grower's Guide for Muscadine Grapes
Stephen Leong - FAMU

3:15 PM Wine Kits and Alternatives
Sue Elliott

3:45 PM Closing Remarks and Other Announcements
Bob Paulish, President

Meet the Researchers
All Day
At Your Leisure

Florida A&M University

Vine Improvement and Distribution Program

"Meeting Industry Needs for Clean Vines"

A Program by the

Center for Viticulture and Small Fruit Research

College of Engineering Sciences,

Technology and Agriculture

In Collaboration with

Florida Department of Agriculture and Consumer Services

Registration

Quick and easy, please register today by:

Fax (850) 875-7257
Telephone (850) 875-7255

_____
Name (1)

_____
Name (2)

_____
Farm or operation name

_____
Address

_____
City, State

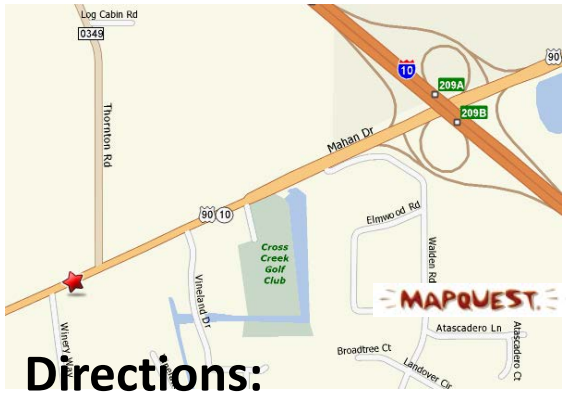
_____
Zip **Telephone**

_____
Email address

Location:

Florida A&M University/CESTA
Center for Viticulture and
Small Fruit Research
6505 Mahan Drive
Tallahassee, FL 32308

(850) 599-3996



Directions:

From Tallahassee: Go East on Tennessee St./Mahan Drive (US-90 East) to 6505 Mahan Drive.

From Quincy: Get on I-10 East. Take Exit 209A (US-90 West) to 6505 Mahan Drive, Tallahassee.

From Monticello: US-90 West to 6505 Mahan Drive, Tallahassee or get on I-10 West and take Exit 209A (US-90 West) to 6505 Mahan Drive, Tallahassee.

Vineyard Management and Pesticide Safety

February 9, 2011
9:00 A.M. -12:00 P.M.

Florida A&M University/
College of Engineering
Sciences, Technology
& Agriculture

Center for Viticulture
and
Small Fruit Research
Tallahassee, FL

Program Agenda

9:00 AM	Registration
9:15	Welcome
9:30	Pesticide Safety
10:00	Vineyard Management
10:30	Hands on Demonstration
	- Young vines
	- Matured vines
11:30	Discussion and Evaluation
12:00 PM	Adjourn

Center for Viticulture and Small Fruit Research

Stephen Leong, Ph.D., Program Director

Violetka Colova-Tsolova, Ph.D., Professor

David Smithwick, Farm Manager

Cooperative Extension and Outreach Programs

Alex Bolques, Extension Agent

Lester Muralles, Extension Agent

Charles Brasher, Extension Agent

For more information, contact: **Alex Bolques**
Gadsden County Extension
(850) 875-7255

FRS 1-800-955-8771

Who should attend?

Grape producers, hobbyists, homeowners and backyard grape enthusiasts.

About the Center for Viticulture and Small Fruit Research

The Center for Viticulture and Small Fruit Research at Florida A&M University was established by the Florida legislature in 1978 identified as the "Florida Viticulture Policy Act" to provide leadership, undertake research, extension and development activities that will contribute to industry growth and development. It is an integral component of the College of Engineering Sciences, Technology and Agriculture.

The Institute of Food and Agricultural Sciences (IFAS) is an Equal Employment Opportunity - Affirmative Action Employer authorized to provide research, educational information and other services only to individuals and institutions that function without regard to race, color, sex, age, handicap or national origin.
U.S. DEPARTMENT OF AGRICULTURE, COOPERATIVE EXTENSION SERVICE, UNIVERSITY OF FLORIDA, IFAS, **FLORIDA A&M UNIVERSITY** COOPERATIVE EXTENSION PROGRAM, AND BOARDS OF COUNTY COMMISSIONERS COOPERATING.

Fig.1 Planting in the foundation block season 2011.

Fig. 2. Foundation block dormant season 2012 with completed screen facilities.

Final Performance Report

Florida Tomato Integrated Marketing Program
Grant Contract #016794
2010 Funding Year

Project Summary

The Florida Tomato Committee (FTC) proposed to use Specialty Crop Block Grant Program funds to help reverse sales erosion of Florida tomatoes. With FTC's promotional best practices and consumer and retail research in hand, supported by funds from an earlier grant (FDACS Contract #015557), the FTC worked to maximize the success of its retail merchandising program through customized promotions with a strong educational component and a focus on increasing retail sales of Florida tomatoes. FTC also leveraged new media capabilities in order to support news stories that positively impact the fresh Florida tomato industry. By leveraging electronic media and website opportunities, the FTC developed a platform that can be used for meaningful exchange and outreach with retail, foodservice, industry and consumer audiences, while also initiating positive news coverage and experiences directly with the consumer.

Project Approach
Retail/Promo Allowance Component

We concluded the retail campaign with a full schedule of promotions from 2012 spring season due to steady promotable Florida tomato shipping volumes and an aggressive push from merchandisers and FTC staff. The FTC worked to spur tomato sales movement through communications and promotions with retailers to shoppers through various activities including customized sales contests, in-store radio, a coupon incentive program, several major chain-wide cooking demonstrations, demo sampling programs, bottle neckers with recipes, display contests, as well as advertising circulars, social media, store branded brochures, newsletters and magazine support. The 2012 season saw an early season push with the help of Committee merchandisers and the FDACS staff and then a later season program roll-out to coincide with anticipated spring supplies. The Committee conducted retail promotions with 23 major retailers in the eastern U.S. – 10 in the northeast and 11 in the mid and southeast. Several retailers participated in late winter promotions and then again in spring promotions. And, for the first time, the Committee partnered with the Military Commissary Group to promote Florida tomatoes in 100 of their commissaries on behalf of the Defense Commissary Agency.

We have movement figures from retailers showing a range of increases from 7% to 82%. In the case of a new type of test promotion with coupon kiosks, we received some interesting information:

- In 13 days, we sold 17,116 lbs. units with an overall redemption rate of 9.6%! Of special note, all buyers purchased 21% more lbs. than the offers required, meaning that the entire program sold an additional 3594 lbs. for a total of 20,710 lbs. moved in the 13

days to these targeted HH's. This is a 75% increase in lbs. moved-over our initial program projections.

- Still further, in a direct comparison between the participating Entry Marketing stores 2011 volume vs 2012, volume was up 22% per Food Lion T-Log data comparison (year over year).

Not only was this a successful promotion, but we were able to glean some interesting insight into our tomato customer with the loyalty card information.

In order for any promotional support to be provided to the retail partner, they had to supply proof of promotional activity. This evidence was provided by retailers by means of ad tear sheets, cooking videos online, radio call-out sound checks, and official retail announcements and/or movement numbers.

<u>Media Tools Component</u>

FTC aimed to change the negative trend in news coverage of Florida tomatoes in recent years by being a catalyst to positive stories, engaging a monthly tomato newsletter for consumers, various contests and angles that help the tomato industry to take charge of its media relations and direct more positive news stories and activities in the media. With new creative for media resources inspired from the Florida tomato photography shoot with Visual Cuisines, FTC brought a fresh new look, capability, information and tools to its new resources kit for media, website and other communication pieces.

With Meltwater Media services the FTC was able to get an idea of how the positive/negative stories trended from the beginning of the season, when outreach kicked into gear, compared to the last few months of the season. Our measurable objectives included increasing positive Florida tomato news stories by 20% for 2011 compared to year prior and increase positive clips and coverage 30% in 2012. We used Meltwater News to evaluate the positive/negative sentiment of our Florida tomato articles via seasonal comparison. Unfortunately, Meltwater was not able to assign a rating to articles collected in 2010, before the FTC engaged the service as they were not tracked for sentiment, but the following ratings do show an encouraging trend. The budget did not include money to use Meltwater service in 2013. Obviously, the following can be observed as just an indication of a trend in news stories about Florida tomatoes, and the FTC will need to continue to provide media with positive stories about Florida tomatoes.

In spring of 2013, the FTC launched a blogger relations campaign to help gain interest and synergy with our social media partners and in the first week of campaign, we received 60 positive social postings. This campaign, The National Fresh Florida Tomato Month Celebration, brought the FTC together with nine east coast food bloggers. The bloggers were forwarded media resources as well as Florida tomatoes and asked to create recipes using the Florida tomato. The recipes were shared by the writers on their blogs, but also on Facebook, Twitter and in FTC's newsletters. The results were a resounding success as the blogger postings gave the Committee's Facebook and Twitter posts an all-time high in viewers reached. The recipes can be found on the recipe page at floridatomatoes.org and in printed and electronic brochure. With all of the negativity surrounding our industry spring 2013, this has proven to be a very positive undertaking. Articles posted later and stats regarding that effort.

FLORIDA TOMATO STORIES IN THE NEWS

Spring season 2011:
Negative: 35 articles
Neutral: 539 articles
Positive: 126 articles
Rating: +55 (scale rating is from -100 to +100)

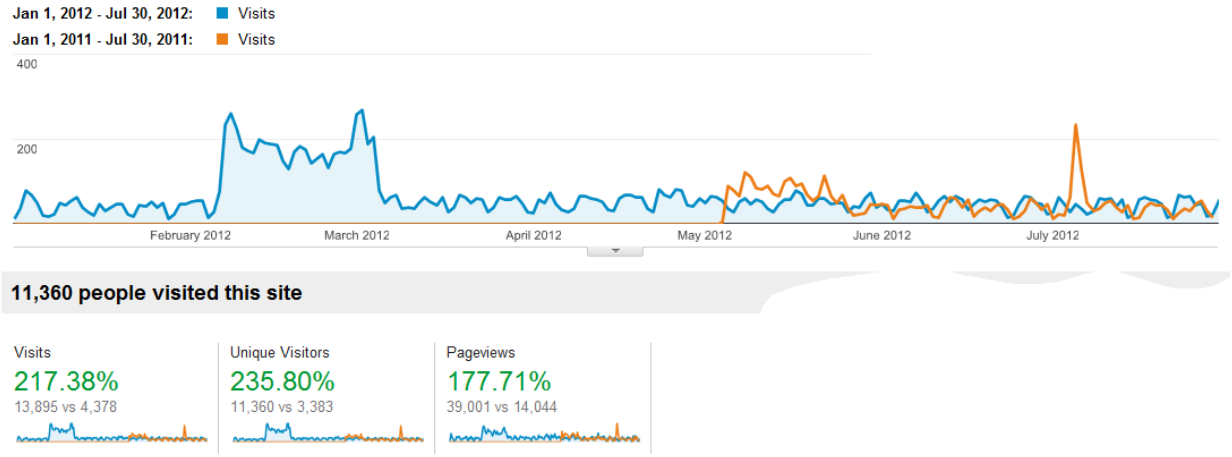
Spring season 2012:
Negative: 55 articles
Neutral: 759 articles
Positive: 219 articles
Rating: +60 (scale rating is from -100 to +100)

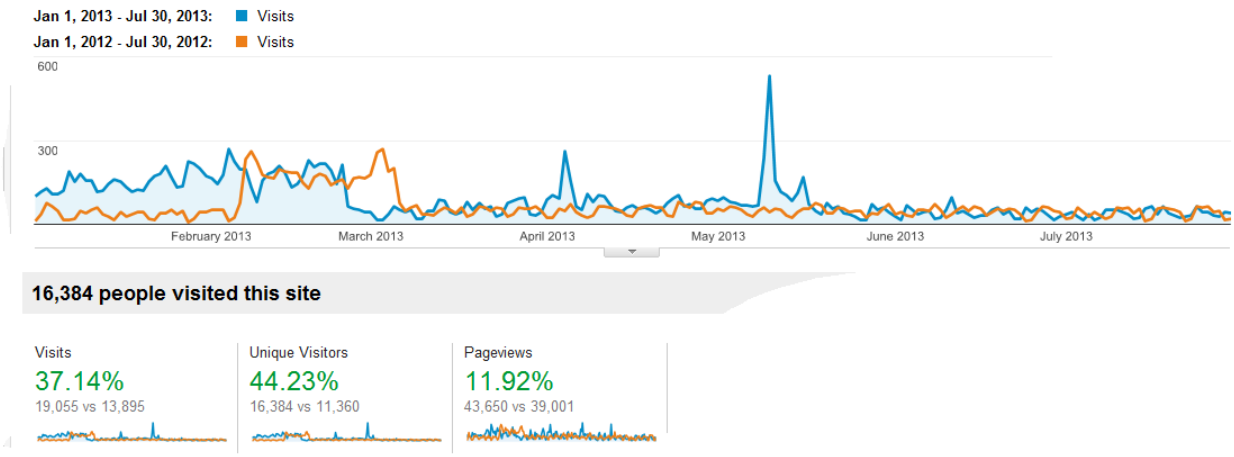
In the comparison above, there are more positive articles (about 85 percent) about the Florida tomato industry as time progressed and a surprising increase in "neutral" articles.

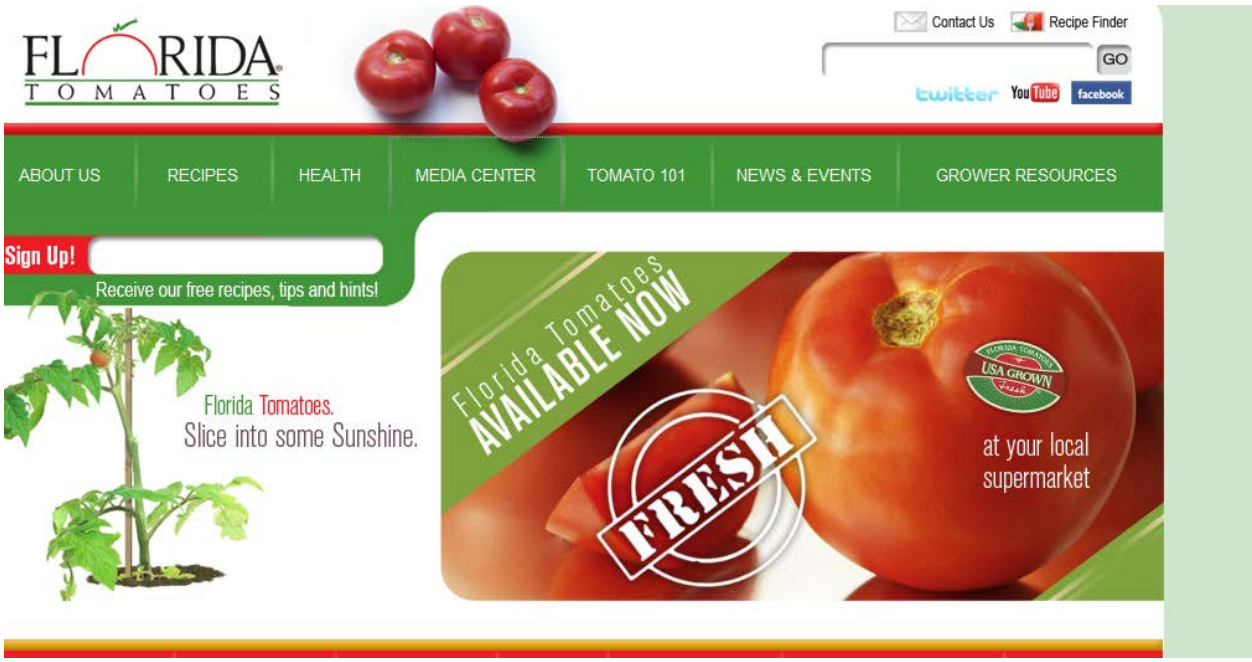
FTC also started a seasonal, monthly tomato newsletter for audiences including media, consumers and trade such as retail consumer affairs directors that coordinate nutrition and

food stories for their shoppers via website and mailer magazines. We have continued and built this newsletter so that it is thriving and will continue to direct more positive news stories and activities in the media and retail audiences. Newsletter subscriptions to the FTC's monthly "Tomato Dish" increased by 65 percent in the last year. The Tomato Dish issues included over 50 delicious recipes, tips for tomato use and preparation and links to studies and information regarding the health benefits and disease-fighting properties of the tomato.

FTC will continue to place great emphasis on its website as a communications platform for outreach and resource for media and to consumers and trade with some success. FTC finalized a complete redesign of its website with new capability and additions including The Florida Chef section with monthly recipe and video; media section with downloadable tools and resources for story development; retail section with downloadable retail tool kits, POP, logos and promotional best practices; foodservice focus and overall improved functionality for media, consumer and industry audiences. FTC also incorporated a growers' resource area where industry members can access FTC's research reports and datasets collected by the FTC. Some of FTC's dataset files are too large for some industry members to receive via email making this a critical resource for industry to access. The new site also allowed a signup and database management of a monthly newsletter that contains seasonal stories and articles to enhance the for site visitors. The FTC's measurable goal was to increase hits by 25% in 2011 and increase hits by 30% in second year. We actually launched the site in 2011, and compared season over season 2011 to 2012 and again to 2013. We progressively increased visits to the site, each year—ending with a 37% increase in visits for 2013.







FTC also launched a youtube site and engaged a designer to create a tomato caprese cooking video to showcase Florida Chef Justin Timineri's talents. In addition, FTC also has a Twitter and Facebook that is used to highlight health and wellness articles regarding fresh tomatoes and promote Florida fruits and vegetables. The FTC's presence in social media and website newsfeed has grown increasingly popular, experiencing a boon this past year over previous year. Followers on Twitter have more than doubled and the number of Facebook Fans or "likes" increased by 60 percent.

In the spring 2013, we implemented some changes recommended to us through a web assessment that made our navigation easier and freshened the content. We also added a plug-in to our facebook and improved many of the sections including the recipe page so that it is organized for visitors who are looking for a particular recipe or serving idea.

Recipe Cards for Retail Component

FTC partnered with Florida Chef Justin to create some high quality, eye-catching recipe tear-off pads. These recipe pads continue to be frequently requested by industry and retail partners and are still available as part of our customized retail promotions with supermarkets. During the season, we promoted the availability of these recipe cards for retailers as a merchandising tool in a series of trade interviews.

FTC's Avocado and Salsa recipe pads are an excellent Cinco de Mayo tie-in.

Consumer Recipe Contest on FTC Website:
This contest was promoted through media relations targeting consumer media. The entry count far surpassed our expectations. Most of the recipes were worthwhile, but there were several that did not use fresh tomatoes or were badly photographed and were disqualified. There is continuing/increasing interest in doing this contest again. The contest provided a good story angle that was highlighted primarily with social media. FTC will likely do this contest again but on a quarterly level.

Foodservice Promotion – "Florida Tomato Foodie Awards":
The first winner was Universal Orlando's Joe Alfano. We were very excited for this winning entry. The following content was featured in a news release that found its way into the produce news trades, Produce News and the Packer and was featured on the Florida Tomato Website:

Orlando Chef Wins First-Ever Florida Tomato Foodie Award

4/29/2011 - MAITLAND, FL – Chef Joe Alfano, of Universal Orlando CityWalk, is the winner of the very first Florida Tomato Foodie Award, a tomato feature contest that celebrates chefs who are really into Florida tomatoes. The winning feature is Alfano's "Florida Tomato Terrine with Spring Mix and Grilled Ricotta Salata," made with a trio of Florida tomatoes - pear, yellow and field-grown red. It is presented with fresh spring mix greens, grilled ricotta salata, and basil vinaigrette.

The winning entry was selected by Florida Chef Justin Timineri, executive chef and culinary ambassador of the Florida Department of Agriculture and Consumer Services and the Florida Tomato Committee, who sponsors the contest.

With true Florida style and taste, Chef Joe Alfano created an amazing menu feature showcasing Florida tomatoes. "I am so pleased to see talented chefs like Joe Alfano adding their creativity and expertise to the sublime Florida tomato," says Florida Chef Justin Timineri. "Chef Joe Alfano has raised the bar even higher in a search for recipes that showcase the Florida tomato!"

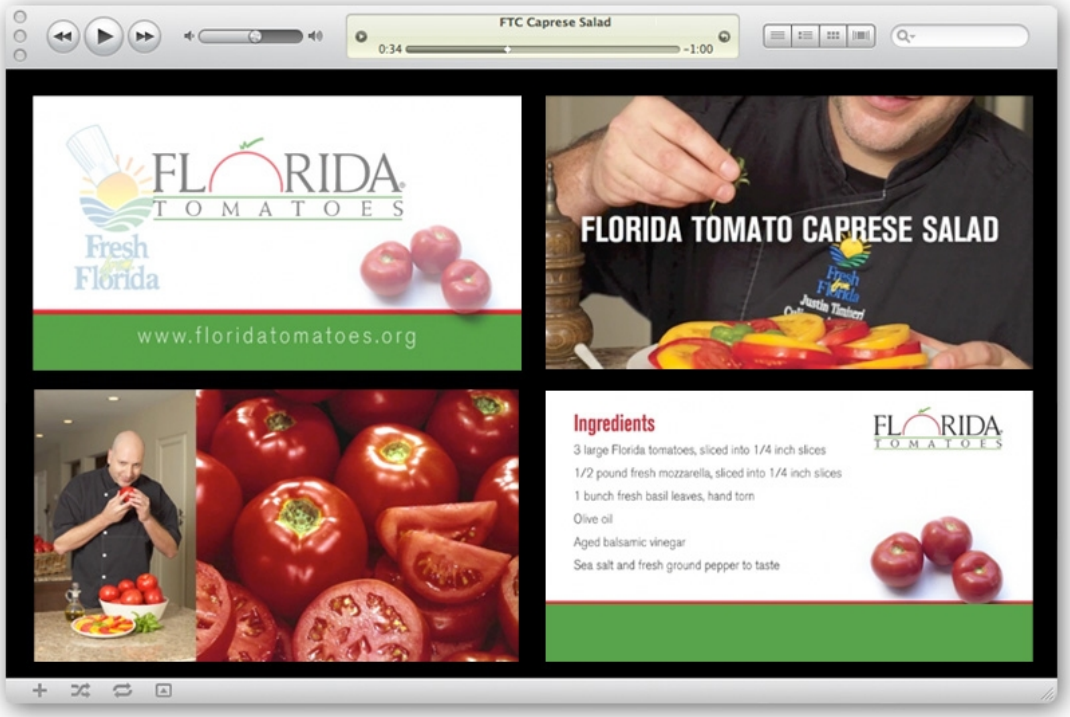
Although growing up in the Northeast, Alfano has been a chef with Universal Orlando Resort for 22 years, and is currently the Chef of the resort's 30-acre entertainment complex, CityWalk, which is home to multiple restaurants, shops and nighttime entertainment venues. "My Sicilian grandmother loved Florida grown tomatoes, so within our family, it was a must that if you visited Florida, you had to bring back tomatoes to Nana in Boston," says Chef Alfano. "Since then, Florida tomatoes have always been featured in the menus I design."

"In speaking with Chef Alfano, I discovered this winning entry to be one of many fresh Florida tomato dishes Chef Alfano enjoys featuring at the events he caters and his guests love it," said Samantha Winters, director of education, for the Florida Tomato Committee. ####

Unfortunately, although we forwarded releases, flyers and information regarding this contest to the trades, to industry members and food service operators including Sysco and U.S. Foodservice and chefs including Chef Justin Timineri for publicity, networking and announcement of this contest, the entries never came. This was surprising as I personally talked to several managers at foodservice operating chains who committed to nominating entries but they never sent them. This was disappointing. The expectation was that this would draw a lot of foodservice traffic. As we did not gain any entries here, we decided to move most of the funds allotted here to the promotional allowance component with an approved amendment. We did leave enough funds in here for one winner in case we gain some unexpected interest. I was copied on an announcement recently sent by a foodservice operator out of Tampa on this contest, but no submissions were received.

Sponsorship, Travel and Supplies for FDACS' Chef Justin Component

We worked with Chef Justin to develop 4-6 fresh Florida tomato recipes that were photographed and promoted to media and on FTC web site. FTC also joined the Florida Chef on the show, How to Do Florida.



FTC purchased tomatoes for the event. FTC also developed a video vignette of Florida Chef Justin preparing a Florida Tomato Caprese salad (above). It is on the FTC's new youtube site. Justin also filmed a How to Do Florida video where he prepared Florida Tomato Black Beancakes.

Beneficiaries

Over 80 growers of fresh Florida tomatoes are directly impacted by the loss of retail share. These growers collectively affect several thousand employees and around 955 million pounds of fresh Florida tomatoes annually. The objective of this effort was to create a mechanism to communicate directly with FTC's audiences—industry, trade, consumers and media. Through the grant program, the FTC created a platform and means for improved communication critical for improving the sales, handling, information available and the promotion/sales of Florida tomatoes. The partnerships the FTC developed with retail and the tools and resources for industry, consumers and media will continue to be leveraged by the FTC.Each promotion initiative component accomplished in this program will continue to be leveraged to gain support to moving more Florida tomatoes.

Lessons Learned

Going forward, FTC will be using its social media presence increasingly to communicate the availability and status of Florida tomato crops, food safety and handling/storage and nutrition/health information as well as any rapid response conditions. We were also reminded of the importance in key partnerships such as our alliance with the FDACS for retail and other promotional help, when, in early spring 2012, we had conditions in Florida where the bulk of early spring production was coming off all at once and the FDACS helped us secure a quick set of promotional opportunities to move Florida tomatoes. The ability to communicate quickly with your audiences and partners is imperative to success in these situations.

As a result of this program, we identified areas for further pursuit including the coupon program. We were able to glean some interesting insight into our tomato customer with the loyalty card information promotion that we will be applying to future couponing programs. The ability to impact sales at the point of purchase and directly influence the purchase of your specific product is a very compelling argument for more promotions of this nature and will be pursued in future promotions.

Contact Person

Samantha Daves
Phone: 407-660-1949
Email: Samantha@floridatomatoes.org

Additional Information

Each research and promotion initiative component accomplished in this program will continue to be leveraged to gain retail support to moving more Florida tomatoes. The information in this program will be used in an ongoing basis, for instance, FTC developed a website in 2011, that will be used in subsequent seasons for providing information to the consumer and trade audiences. The website was updated in 2013, but still maintains the branding appearance and the tools and resources from the original; allowing us to build on a steady foundation.

Additional Information: photos, blogging campaign

- FTC worked with nine East Coast food bloggers to develop recipes using a sampling of Florida tomatoes
- Received nine recipes, including:
    - Fresh Florida Tomato & Veggie Crepes
    - Tomato Rice Salad Stack
    - Tomato, Arugula, & Quinoa Salad with Goat Cheese and Rosemary Basil Pesto
    - Herb roasted Shrimp and Tomatoes with Orzo
    - Mediterranean Quinoa Stuffed Tomatoes
    - Cajun Jambalaya Pasta
    - Broiled Polenta Bruschetta
    - Seafood Pico de Gallo
    - Tomato & Ricotta Salad Stuffed Portabellas
- Bloggers also shared their own individual experiences creating the recipe and working with Florida tomatoes:

    - Cupcakes and Kale Chips
    - Live Laugh Eat
    - The Wannabe Foodie
    - Sweetbites Blog
    - Simple Craves & Olive Oil
    - Jersey Girl Cooks
    - That's So Yummy
    - famfriendsfood
    - Running to the Kitchen
- FTC website was continuously updated to include the new recipes, as well as graphics promoting them
- More than 60 Tweets, Facebook posts and Instagram photos mentioning Florida tomatoes to-date (samples below)
- Media outreach will start next week and will include trade publications, as well as publications local to each blogger participant

Blogger Quotes

Brianne, Cupcakes & Kale Chips

> *"Then I was even more excited when a case that included a sampling of Florida tomatoes from various growers throughout Florida showed up on my doorstep. Tomatoes that had been picked ripe and fresh from the field … The ultimate test – sliced onto a plate and eaten with jut a bit of salt and pepper. Perfection – juicy and fruity, firm, but yielding, with not a bit of mushy mealiness."*

Gina, Running in the Kitchen

> *"So you can probably imagine my reaction when asked to partner with Florida Tomatoes to come up with a recipe highlighting them…Um, yes please."*

Lisa, Jersey Girl Cooks

> *"If you read my blog, you know I am a tomato fanatic … now I am enjoying Florida tomatoes as April is National Fresh Florida Tomato Month. The Florida Tomato Committee sent me a box of beautiful red juicy tomatoes and we feasted on them for a week."*

A comment on Jersey Girl Cook's blog post

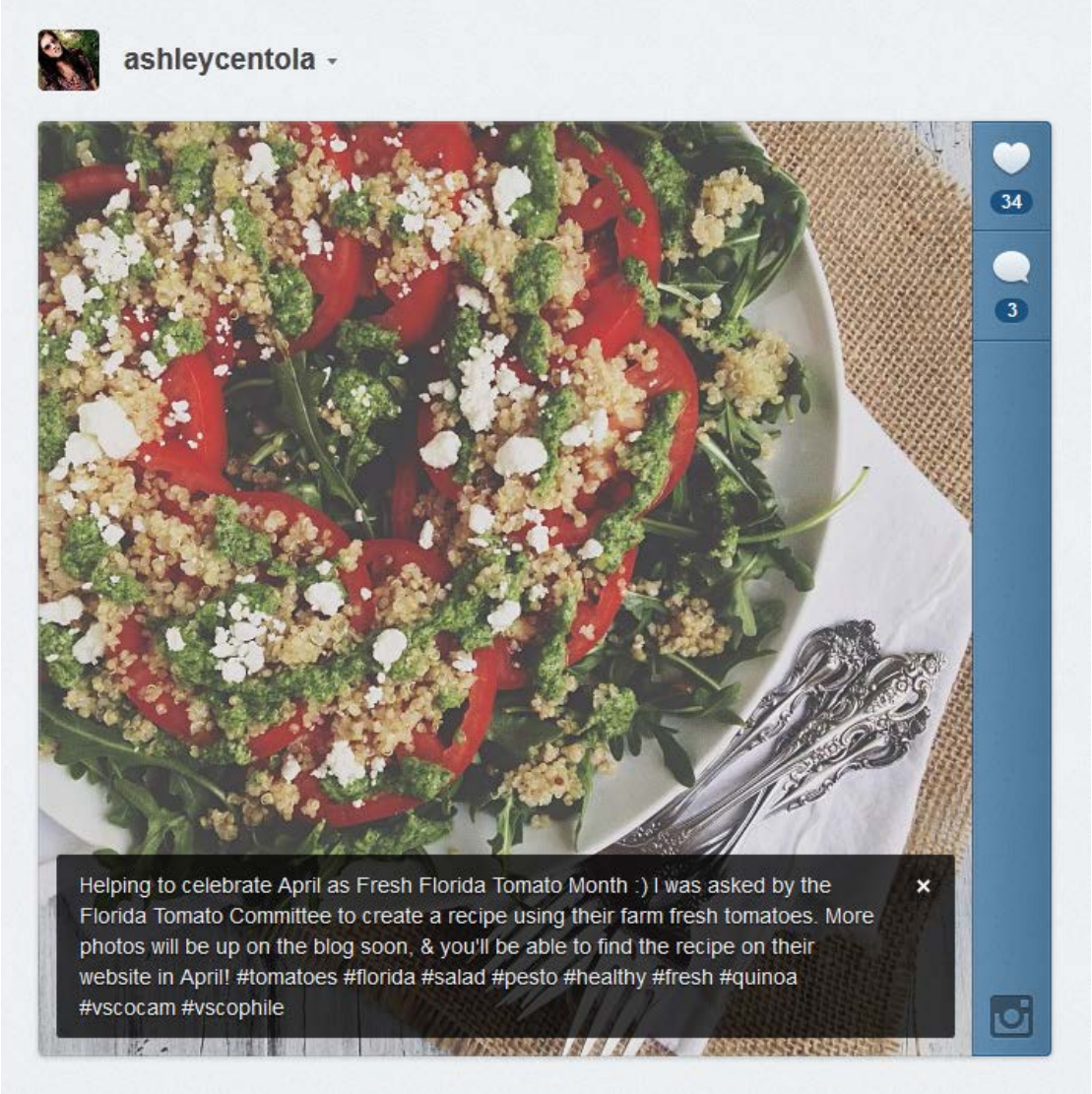
Kate April 2, 2013 at 5:11 pm

Funny, I usually connect Florida with oranges, not tomatoes!

REPLY

Photos

Instagram


ashleycentola
34
3
Helping to celebrate April as Fresh Florida Tomato Month :) I was asked by the Florida Tomato Committee to create a recipe using their farm fresh tomatoes. More photos will be up on the blog soon, & you'll be able to find the recipe on their website in April! #tomatoes #florida #salad #pesto #healthy #fresh #quinoa #vscocam #vscophile

Facebook

Family, Friends and Food
March 10
Playing with these beautiful Florida tomatoes from the Florida Tomato Committee this week! What's your favorite way to enjoy fresh tomatoes?
Like · Comment · Share
1
Shelly Bridges Evans With fresh mozzarella, basil & basalmic glaze
March 10 at 1:18pm via mobile · Like · 2
Michele Kreitman Shipitofsky sliced with a little salt
March 10 at 1:20pm · Like · 1
Family, Friends and Food Both are favorites of mine, too! I'm working on creating a recipe using them over the next few days so, we'll see what I come up with that showcases their flavor the best!
March 10 at 1:30pm · Like
Katrina Scott Smith Caprese salad! Tomatoes, Fresh mozz, basil and balsamic!
March 11 at 9:38am · Like · 1

Twitter

Alicia
@thewannabefoodi

Follow

Fresh Florida Tomato and Veggie Crepes via @FloridaTomatoes #florida #tomatoes #recipe #crepes #YUMMY buff.ly/16vPEu2

Reply Retweet Favorite More

5:37 AM - 4 Apr 13

Monica
@Sweetbitesblog

Follow

Lets celebrate FL tomato month with this salad - goo.gl/NeI68 you can thank me later.

Reply Retweet Favorite More

Project (10): Florida Watermelon Association - Florida Watermelon Promotion Campaign

Funding Year: 2010
Funding Amount: $80,000.00
Reporting Period: Final

Project Summary

The project's purpose was to inform the general public of the health benefits of eating watermelon, and to highlight the economic benefits of supporting local farm family agriculture. Production of watermelons within the state of Florida remained between 7,500,000 cwt and 8,500,000 cwt annually between the 2005 and 2012 seasons. However, price had dropped steadily since 2005, from a high of $18.80/cwt in 2006 to a low of $14.80/cwt in 2010. This meant a 20% loss is cash receipts over that period, and made it necessary to drive demand in order to increase receipts.

Watermelon crops in Florida generate $ 152 million in revenues each year for the state of Florida. Additionally, the inputs of the crop such as fertilizer, equipment, fuel, maintenance, etc. have considerable economic impact in the communities where the crop is grown. In these difficult economic times, it is imperative that the public is made aware of the statewide benefits from the production of Florida watermelons, along with the health benefits watermelons offer.

Watermelons are a seasonal and perishable product, and must be sold at their peak to provide the best quality and taste. Promotions during the early and peak season also help growers to sell their crop as its best price, thereby bringing the most dollars back to the farm and to the community which depends economically on the Florida farmer.

This project allowed us the opportunity to develop ads and videos which were displayed in local and regional markets, informing the public that watermelons offer both health and economic value. Our Florida Watermelon Spokesperson does an outstanding job of informing consumers of all the goodness of Florida Watermelons. With this additional budget she was able to increase the public's awareness of all that watermelons offer and thereby the revenues from the crop were increased, allowing a stronger economic foundation for the state of Florida.

Project Approach

☐ Feature ads and video were taken out in local media and trade papers promoting locally grown Florida Watermelons during the peak growing season April and May.

☐ Personal appearances of the Florida Watermelon Spokesperson at Florida schools to educate children and lunchroom administrators on the health benefits of eating Florida Watermelon.

☐ In-store promotions at local and regional retailers to promote local area watermelon growers and to inform consumers to correct way to choose a ripe watermelon.

☐ Samples of locally Florida grown watermelons were given out by the FWA Spokesperson at Florida Welcome Centers and local Relay for Life events.

☐ Personal appearances by FWA Spokesperson and samples of Florida Fresh watermelons were given at local Ronald McDonald houses, a special treat for children and their family in medical crisis.

Goals and Outcomes Achieved

☐ In April of 2011 a total of 760 radio & TV ads were aired in the following counties:

Polk, Hillsborough, Pinellas, Hernando, Citrus, Manatee, Pasco, Flagler, Marion, Lake, Sumter, Orange, Osceola, Brevard, Volusia, and Seminole these viewing areas reached a total of 2.5 million viewing households. Airing times were during the day and evening Bay 9 News and ESPN coverage of the Tampa Bay Rays and Florida Marlins games. Also completed were two 5 minute segments that aired on the Fox 4 Morning Blend program on channel WFTX of Naples and Fort Myers. This aired for a period of 4 weeks, a taped segment was also done of the Florida Watermelon Spokesperson and Promotions Coordinator showing the consumer the proper way of choosing a ripe watermelon and cutting one up correctly. This was
done while informing the consumer of the best possible way to choose a ripe watermelon and of all the health benefits that come from of eating watermelon in a regular diet . The feedback from viewers was very positive as they took the time to call the FWA office telling us how much they enjoyed seeing the program and how much they enjoyed eating Florida fresh watermelons. You can view the Bay 9 news segment on our web site at www.flfwa.com and the Fox Morning blend segment at can be viewed at their website www.fox4morningblend.com.

☐ During 2011 – 2012 a total of four Kroger grocery stores were visited and samples of watermelon were given out to inform the shoppers of the tasty and healthy side of watermelons. During these four: one to two hour long promotions an average of 250 to 300 people sampled fresh watermelons and 90% purchased one after tasting. During the time frame of these promotions the produce manager usually only orders 8 bins of forty-five count watermelons for his normal weekly produce purchase, but he reported that during these hour or so promotions that the FWA was in the

store sharing with the consumer the benefits of eating watermelons he sold 90% of his stock of watermelons, for an increase of 16% in sales. Showing us that in store promotions really do work to increase the consumer's consumption of watermelons.

☐ Longo's grocery stores in Canada were visited in June 2011 and again in June 2012 during these promotions, which is attended by over a 1000 consumer's only Florida fresh watermelons are sold during these promotions. Longo's stores also hold a watermelon eating contest for the kids during these promotions and the local newspaper and TV stations are notified for coverage for this annual event where they look forward to us visiting each year.

☐ Eight Bi-Lo's grocery stores in South Carolina were visited by the Florida Watermelon Spokesperson and special guest NASCAR driver Ross Chastain. Where local watermelons from Arcadia, Florida farmer Ralph Chastain were delivered and used during these promotions this was an added bonus to the promotions to help educate the consumer's of the sweetness and goodness of Florida Watermelons. These eight promotions reached over twenty-four hundred consumers.

☐ In May of 2011 two Food Lion grocery stores and in July 2012 two Whole Foods grocery stores were visited where the Florida Watermelon Spokesperson had a huge success informing the consumer of the healthy benefits of Florida Watermelons. These promotions informed over two thousand potential watermelon consumers of eating fresh watermelons.

☐ A total of four school promotions were done during 2011 and 2012. The National Ag in the class room was a huge success: where approximately three hundred Elementary students were given the chance to learn the nutritious value of watermelons, along with reading an entertaining story of how watermelons grow to become so sweet in the Florida sun. Each class size consisted of 20 to 22 students as each one learned how much nutrition comes from watermelons.

☐ Six Relay for Life promotions were attended by the FWA Spokesperson, these promotions support the cancer survivors' family, cancer patients and their support families to promote a healthier lifestyle while tasting sweet Florida watermelons. Just the Fourth of July event alone was attended by over two thousand walkers where fresh watermelon samples were given out to taste and to encourage adding watermelons in their new life style of healthy eating.

☐ In July of 2011 and October of 2012 the Florida Welcome Center in Jennings, Florida was visited and fresh slices of watermelons were handed out to each visitors coming into Florida from all across the United States and Canada. Each visitor was given a sweet slice of what the angels eat according to Mark Twain. Feedback from repeat visitors are telling us that after stopping by the welcome centers and tasting watermelons they have then purchased them on a regular bias.

☐ Two Ronald McDonald Houses were visited where watermelon slices were given to children and their families while they deal with life threatening health issues. This sweet diversion of Florida watermelons takes their minds to a healthier and happy place if only for a little while.

Summary of impacts:

During April and May of 2012, promotions were conducted in Longo's stores in Canada. The result of this promotion was 127 new stores in Canada promoting Florida watermelon exclusively for 2 months of our prime market window. Longo's stores bought only Florida watermelon during the months of April and

May 2012. This sales boost carried additional benefits, since it occurred in the early part of Florida's harvesting season, when prices are typically at their highest.

As a result of in-school promotions conducted under this grant, brokers who facilitate sales between Florida watermelon growers and school districts reported that 15 school districts in Florida, Georgia, and Alabama placed orders during the 2012 season, as opposed to 6 during the previous season. Anecdotally, brokers reported that the increase in orders was driven in many districts by direct demand from students, who learned from friends or family that nearby districts served watermelon in school lunches.

Beneficiaries

In all, approximately 400 growers, 12,000 attendees at "Relay for Life" events, 2,500 students, 1,500 state visitors, and 250,000 consumers benefited from our campaign to bring Florida fresh watermelon to the public's awareness as a healthy choice. Growers benefitted from prices which returned to their 7 year high point of $18.80/cwt while retaining consistent volume, which boosted 2012 cash receipts over previous years. Attendance at 5K races where promotions were conducted totaled 12,000 consumers who were exposed to our message. In-school promotions reached 2,500 children directly.

Florida Watermelon growers saw an increase in sales as a result of media advertisements. According to the National Watermelon Promotion Board movement of Florida watermelon pounds shipped in 2010 vs. 2011 have increased by 50% with 274,170.00 pounds of watermelons shipped in 2010 and 410,610.00 pounds shipped in 2011 at the same time of the year.

☐ Consumers buying Florida Watermelon now know the health benefits of eating watermelons. The radio and television campaigns conducted during the grant period in the Tampa, FL market were based upon a health-conscious message. These messages drove a significant sales boost at stores in the Tampa area during May 2012. The sales boost can be attributed either to simple positioning of the Florida watermelon brand due to increased mention in media, or to a conscious consumer decision based upon health benefits. Informal in-store consumer surveys conducted by distributors indicate that many of the additional sales were driven by a perception of Florida watermelon as being of higher quality than imports from Central America. Additionally, brokers reported that many of the additional sales came from orders from store produce buyers who had previously been purchasing imported melons. These brokers explained that produce buyers often make an initial purchase of imports based upon price alone, and once this purchasing habit is established, it is difficult to break. However, consumer demand for higher quality produce will induce these buyers to purchase locally and to establish a relationship with domestic growers. Through increased and repeated sales by customers of Florida watermelons this proves that our projected target of informing the consumers of the health benefits of watermelons has been accomplished.

☐ School children were encouraged to get their parents to purchase fresh watermelons. School personnel were made a where of the children's taste for Florida watermelons.

☐ Visitors coming into Florida from other states were educated on the nutritional

benefits' of Florida Watermelon.

☐ Participants of the relay of life runs and other events realized the importance

of eating Florida watermelon to keep you hydrated during physical endurance.

☐ Parents of sick children seen the healthy side of watermelons along with the fun side of watermelons, as kids faces lit up when receiving a visit from the Florida Watermelon Spokesperson and given a slice of Florida sweet watermelon to taste.

Lessons Learned

☐ Retail stores would not provide us with sales numbers, due to privacy and fear of their competitors learning their profit margin scale.

☐ Travel expenses were higher than estimated originally due to the distance being driven from promotion to promotion from the home base of the Florida Watermelon Spokesperson. Travel expense should have been a standard per diem and not paid by IRS mileage rates.

Contact Person

Patty Swilley
239-658-1442
patty@flfwa.com

Additional Information

☐ www.flfwa.com

☐ www.fox4morningblend.com

Project Title: **University of Florida - Increasing the supply and expanding markets to meet the consumer demand for locally grown food.**

Contract Number: 016805

Specialty Crop Block Grant Funding Year: 2011-2013

Project Summary

- **Provide a background for the initial purpose of the project, which includes the specific issue, problem, or need that was addressed by this project.**
  In the US, Florida has the highest percentage increase (27%) in number of small farms growing specialty crops. Consumers are demanding locally grown food, yet the production and distribution is not able to meet this demand. Specialty crop farmers are in need of educational information regarding production and marketing based on participation at IFAS events. In NW Florida, specialty crops have been successfully grown and marketed, however, production occurs only in the spring-summer growing seasons and a lack of local and regional markets has limited the specialty crop industry. Increasing the supply of specialty crops and expanding markets will benefit Florida and its specialty crop industry socio-economically.

- **Establish the motivation for this project by presenting the importance and timeliness of the project.**
  Partners in the northwest Florida region (West Florida Research and Education Center (WFREC) and Panhandle Fresh Marketing Association (PFMA)) made a conscious effort to identify the needs of specialty crop producers. Our analysis indicated that farmers needed to diversify, consider more profitable marketing strategies and more efficiently utilize their land. The WFREC developed an extensive educational project focusing on this region's specialty crop production. PFMA was formed in 2007 to identify marketing opportunities for specialty crop farmers (i.e., marketing, food safety, post-harvest processes, etc.). The partnership identified the next steps for growing the specialty crop industry in NW Florida.

  Prior to initiation of this project specialty crop production in NW Florida consisted of only field grown crops resulting in only a narrow window of opportunity for marketing and limited profitability for producers. By extending the growing season, farmers are able to sell more crops which increased sales opportunities, profitability, and helped meet the growing consumer demand for locally grown food. To extend the growing season and thereby make more efficient use of their land, production of specialty crops in protected culture (greenhouse, shade house, high tunnel house) systems was developed and incorporated with field grown production systems to provide more of a year-round supply for markets. Information on production (inputs, costs, yield, quality) and sales (price, markets, demand volume) was developed for business planning and to create enterprise budgets to demonstrate profitability and sustainability for specialty crop farmers.

  Specialty crop farmers in the NW region were limited to selling through traditional market outlets such as a) roadside stands, b) farmers markets (if they are available), c) U-pick operations or d) buying points where the product is typically taken out of

our region and the profit margins are low. These markets are historically limited and can support only a few specialty crop farmers. Today's consumer is asking for more locally grown food but access and convenience is lacking. A strategy was developed to better connect the specialty crop farmer with the consumer. New and/or emerging markets (retail, institutional, direct markets) were identified to provide a market for higher volumes of product to increase profitability, increase the number of specialty crop farmers, meet consumer demand, and to grow rural economies. In addition, a marketing campaign was created to increase community awareness regarding locally grown specialty crops.

- ☐ **If the project built on a previously funded project with the SCBGP or SCBGP-FB describe how this project complimented and enhanced previously completed work.**
  There were no previous projects that served as a basis for this project.

Project Approach

- ☐ **Briefly summarize activities performed and tasks performed during the grant period. Whenever possible, describe the work accomplished in both quantitative and qualitative terms. Include the significant results, accomplishments, conclusions and recommendations. Include favorable or unusual developments.**

Component 1: Increasing the supply of specialty crops.

Production data on two crops (tomatoes and peppers) for each of the four production systems (greenhouse, shadehouse, high tunnel and field) was collected. These crops were chosen because they are in high demand by local consumers. Cost and revenue for the fours systems were tracked and recorded. This information was used to create new enterprise budgets for each crop grown in high tunnel and shade systems. Current greenhouse and field production enterprise budgets were modified using project data. One of the main objectives of this project was to maximize potential markets with a consistent supply throughout the year.

- The initial work plan was implemented with the construction of two growing systems (high tunnel and shadehouse). Field and greenhouse facilities established prior to the initiation of this project were also utilized. Crops were planted, maintained, and data was collected during the two year growing cycle of the project.
- Enterprise budgets (see pg. 15) were created for growers to use in making informed decisions before investing in these systems.
- Nine field days were held during the two-year period to teach growers about the operation and implementation of each system.
- An initial base line study was conducted to determine the number of specialty crop growers in the region who were using protected agriculture systems. In 2010, 79 specialty crop growers were identified with 22 of them using protected agriculture systems on their farms. In 2012, 120 specialty crop growers were identified with 47 of them using protected agriculture systems. As a result of this project and the work completed at WFREC, there was a 52% increase in the number of specialty crop producers and among these producers, we have seen a 114% increase in the adoption of the

technologies of protected agriculture systems. See the Table on pg. 13 below for the complete listing of changes in number of specialty crop growers in the region during the duration of this project.

- Four farmers were selected to participate in a scholarship program to encourage producers to adopt new technology utilizing greenhouses, shade structures and high tunnel systems. Criteria for selection included no prior experience growing in a protected culture system, financial support to complete construction, production background that demonstrated the ability to successfully grow a crop, and willingness to share information with other specialty crop farmers. All four farmers selected attended extension activities at the WFREC and participated in the demonstration projects. Field days were held on three of the four farms and producers from each area learned about the protected production systems used by the farmer. Each farmer discussed all phases of implementing each system into their farming operation. The high tunnel structure on the fourth farm was destroyed by a tornado and could not be reconstructed in time to grow a crop and hold a field day.

Component 2: Expanding markets to meet consumer demand for specialty crops.

Increase in number of PFMA farmers: We determined a baseline of 15 growers initially participated in the PFMA marketing programs when this project was initiated. The 15 growers included a mixture of farmers who had been growing specialty crops for several years and new, beginning farmers. By the end of the 2011, the number had increased to 38 farmers who were members of PFMA. This exceeded the overall project goal of a 25% increase in the number of farmers participating in PFMA. However, due to several factors that occurred in 2012, the second year of the project ended with 5 farmers participating in PFMA. One of the major obstacles that we encountered was the requirement instituted during 2011 by most vendors that growers be food safety certified. Due to the expense and reluctance to have their facilities inspected, many producers dropped their PFMA membership. Information sessions were held to educate farmers on the food safety and insurance requirements farmers must follow in order to participate in the PFMA program. In addition, scholarships to cover part of the food safety certification expense were offered to encourage grower participation.

Food Safety Training and Certification: Food Safety became the most important marketing challenge facing growers that were marketing their crops through retail or wholesale distribution channels. Most buyers of fresh produce require their growers to meet Good Agricultural Practices (GAP) in their growing operations. Most large volume buyers mandate that growers have third party audits which require growers to make significant investments to implement GAP standards. These costs include: training programs, equipment and facility upgrades, audit costs, etc. All PFMA participating growers had to be globally certified through either Primus labs or the USDA. We offered growers a manual that we created to make food safety compliance easier for them. The manual included all logs and forms they needed. PFMA also provided a mock audit where a tour of the farm was made and every detail of the audit was discussed with the grower to help them understand that it was a relatively simple process. PFMA was also present during the audit to answer any questions and to help the farmer feel at ease. The farmers that participated indicated that the manual was

very helpful during the audit process and greatly reduced the stress of the audit. In order to encourage grower participation in the audit process and ultimately in PFMA, funding from the grant was used to reimburse growers for the cost of the audit. In 2012 four audits were covered by the grant and in 2013 two audits were paid from the grant.

In addition to PFMA efforts, WFREC and area extension personnel provided 13 food safety trainings that were made available throughout the panhandle. These trainings included:

How to Build a Food Safety Manual
Pensacola (2) August 2011 – 35 participants
Chipley (1) – March 2012- 20 participants
Jay (3) 2012-2013- 40 participants

General Food Safety Presentations
Small Farms Conference (2) – 60 participants
Individual Farm Consultations – 5 farms in the panhandle

By the time the training sessions were completed and more growers were obtaining certification, the grant was coming to a close. As a result, few growers were able to take advantage of PFMA prior to the grant ending and sales through PFMA were far below the potential for the area.

Virtual Market: A Virtual Market was created in 2011 by PFMA to sell locally grown food directly to the consumer. Information about the Virtual Market was placed on the PFMA website as well as incorporated into news releases. This virtual market allowed farmers to indicate type, quantity and price of produce available on a weekly schedule and for patrons to buy online the produce available that week. On Friday of each week farmers delivered the produce to a collection point and on Saturdays the produce was delivered to five prearranged drop off points for patrons to pick up their weekly purchase. The virtual market was operated in the spring and fall seasons of 2011. In the spring there were 203 memberships purchased and 164 for the fall season. All hard delivery costs were calculated and it was determined that if a minimum of 125 memberships were purchased, these costs would be covered. Of these memberships all were individual consumers with the exception of the Santa Rosa Medical Center which was used as a test for commercial consumers.

From an administrative perspective the second season was much more efficient. The first season we based the online shopping experience with Google. The second season we utilized Amazon which provided us with better detail and was simpler for the consumer as more members had Amazon accounts than Google.

Unfortunately, the costs of the Virtual Market could not be covered by the number of memberships purchased and growers lost interest in the VM due to lack of consumer participation and relatively small volume of sales. As a result, the Virtual Market was discontinued during 2012. PFMA made the determination that working with retailers would provide a more robust specialty crops market and would allow growers to sell higher volumes of produce.

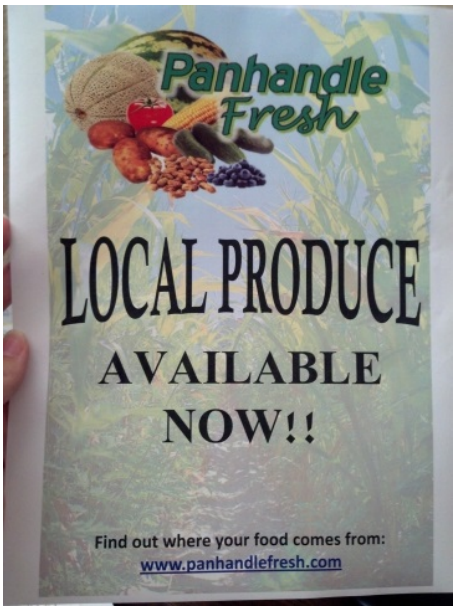
Distribution Center: During 2012 PFMA established its own distribution center in Jay, FL. Two refrigeration trailers with a loading dock and small building are located at the site. Participating farmers have access to the trailers to keep their produce cool before it is transported to the retail stores.

PFMA established an exclusive relationship with Walmart and worked directly with 18 to 20 stores in the area. These stores were very supportive of the locally grown produce initiative. Items that could be grown in large quantities in this region were selected for offer to the stores. PFMA also developed store displays (see examples on pgs. 6-8) that tell a little about both the farmer and their operation to educate both the employees and the end consumer about locally grown produce.

PFMA also worked with other retail outlets such as Sysco Gulf Coast and Fresh Market in Pensacola, FL to help smaller growers who cannot meet the requirements of the larger retailers like Walmart.

Development of a consumer education program: PFMA partnered with one of our PFMA farmers to provide four in-store presentations in 2011. Peanuts and various peanut recipes were used to promote PFMA and buying local. In 2012 PFMA partnered with Walmart, the Fresh Market, and Sysco Gulf Coast to provide displays (see pgs. 6-8) and flyers to educate consumers about the benefits of buying local produce. Recipe displays were used in the stores to help the consumer know how to cook produce. Sysco also sent flyers and window clings to the restaurants and stores who purchased the local produce so they can display that at least 10% of their produce was purchased locally.

Store and Billboard Displays


Panhandle Fresh
LOCAL PRODUCE
AVAILABLE NOW!!
Find out where your food comes from:
www.panhandlefresh.com

Local Produce Available Now!
Panhandle Fresh

Local Produce
Peaches
Cucumber
Green Pepper
Sweet Onion

Panhandle Fresh
Panhandle Fresh
Marketing Association
Visit us
www.panhandlefresh.com

Ask for LOCAL Produce.
Panhandle Fresh
PanhandleFresh.com

Ask for
LOCAL
Produce
Panhandle Fresh
PanhandleFresh.com
Bill Salter

- **Present the significant contributions and role of project partners in the project.**

WFREC - provided leadership for the production aspects of this project. The WFREC provide three field support staff members along with equipment (tractors, field implements, irrigation, etc.) in addition to the Specialty Crop Technician funded by this grant to complete this project. The WFREC also utilized its existing greenhouse facilities and land for this project.

We demonstrated that the supply of locally grown specialty crops can be extended by using protected culture structures in conjunction with field production. Based on field days, specialty crop farmers have gained in knowledge (fertilizer, irrigation, pest problems, construction costs, disease management, etc.) about specialty crop production and a majority of the participants plan to implement what they have learned on their farm. The greatest gains will come from farmers using protected structures to grow specialty crops and the added acreage for field production. Additionally, we continue to be a trusted source for information among specialty crop farmers in NW Florida.

PFMA- provided leadership for the marketing component of this project. Though many farmers had the skill to grow crops they lacked marketing knowledge. PFMA provided the expertise to develop and promote marketing opportunities for specialty crops in the area. PFMA was a logical first step for many farmers as they look to transition to specialty crops and need new market venues. PFMA provided information about packaging, food safety and labeling required to sell their products to new markets. PFMA also developed programs and public relations campaigns through in-store demonstrations, and county Extension programs to educate consumers on buying local.

Goals and Outcomes Achieved

- **Supply the activities that were completed in order to achieve the performance goals and measurable outcomes for the project.**

This will be a short summary of the activities completed for this project. Detailed descriptions of these activities are listed elsewhere in this report.

Component 1: Increasing the supply of specialty crops.
Production demonstrations, field days, in-service training, conferences, on-farm visits, and one-on-one visits were utilized to disseminate information on specialty crop production. Increased production and supply of specialty crops resulted from more farmers growing specialty crops. One target was to see a 20% increase in the adoption of technology associated with protected culture and/or field grown production systems by specialty crop farmers in NW Florida. Adoption of technology was measured by surveying farmers at extension activities, surveying county agents and area agribusinesses. Construction of new protected culture structures represents adoption of the technology. Data collected shows a 114% increase in technology adoption. This is a direct result of field days, farm visits, and training events provided by WRFEC.

Component 2: Expanding markets to meet consumer demand for specialty crops.
Programs were developed with retailers such as Walmart to promote locally grown produce through in-store displays and in-store posters, news releases, and billboards

(see examples on pgs. 6-8). We also worked on food safety issues and promoted having a food safety audit to increase the available retails markets for selling specialty crops. A distribution system was also developed for getting produce from growers to retailers. These efforts were aimed at increasing the number of retailers and wholesalers willing to work with PFMA.

- ☐ **If outcome measures were long term, summarize the progress that has been made towards achievement.** Goals were all short-term.
- ☐ **Provide a comparison of actual accomplishments with the goals established for the reporting period.**

Component 1: Increasing the supply of specialty crops.

1. **Increased production and supply of specialty crops:**
    a. **Target of 20% increase in number of specialty crop growers:** Our survey results are listed in the Table on pg. 13. We observed a 57% increase in the number of specialty crop growers during the two years of this project.
    b. **Increase adoption of protected culture technology by new and established farmers:** The survey results listed on pg. 13 showed a 114% increase in the adoption of protected culture technology. This increase was the result of on-farm demonstrations, field days, and one-on-one visits at WFREC.
    c. **Construction of new protected culture structures determined by monitoring USDA, NRCS and EQIP grant programs:** Data from Escambia, Santa Rosa, Okaloosa and Walton counties showed a total of 7 contracts in 2011 and 15 in 2012 for construction of high tunnel structures. Funding was provided by the NRCS EQIP program. No baseline data was available because this new program was first offered in 2011.

2. **Increased supply will result from new specialty crop farmers**.
    a. **The target was to see a 20% increase in new specialty crop farmers by 2012:** A survey in 2012 showed a 52% increase in the number of specialty crop farmers (pg. 13). The majority of this increase came from new and beginning farmers that were recruited through field day events.
    b. **Four farmers will be recruited through the on-farm specialty crop scholarship program which will provide partial funding for construction of high tunnel or shadehouse structures with the expectation that each grower will host a filed tour:**
        i. An on-farm field day was held at the Kent Decker Farm on January 14, 2013. Over 15 growers were in attendance. Kent Decker, a scholarship recipient, showcased his high tunnel to area growers. He discussed all the aspects of construction as well as crop selection and production.
        ii. An on-farm field day was held on January 25, 2013 at the Charles Grant Farm with 18 growers in attendance. Farmers, along with area extension agents, were trained on growing greenhouse tomatoes. Mr. Grant discussed construction of the facility, crop selection, crop care, pest management, and marketing ideas to the group and talked about his plans for expansion

iii. An on farm field day was held on January 21, 2013 at the Luke Langford farm. Growers and Extension agents were in attendance to learn about high tunnel production of tomatoes and cucumbers. Mr. Langford talked about the construction and crop production methods of each crop. Attendees expressed interest in implementing high tunnels in their operations.

iv. The high tunnel at the fourth site was destroyed by a tornado and by the time it was reconstructed it was too late to utilize the structure for the 2012-2013 high tunnel season.

3. **Increased supply will be reflected in higher sales in PFMA. The target is a 60% increase in sales by 2012 through PFMA.** This goal was not accomplished. The food safety audit requirement of most vendors and extreme weather during the first growing season resulted in sales being far below the goal. Watermelons had the highest sales of any product in PFMA and the lack of rain during the beginning of the 2011 spring season negatively impacted melon production for the larger buyers. Sales for the 2012 production year were less the $100,000.

4. **Higher profitability and sustainability will result from farmers using enterprise budgets and business analysis for production and marketing. The target is to provide farmers with the economic feasibility for all four production systems and the risk analysis associated with each of these systems:** The economic analysis on which this training was to be based has just recently been completed (see pg. 15). The information was made available to those contemplating one of the protected culture systems so they can make an informed decision about which system is best for their situation.

<u>Component 2</u>: Expanding markets to meet consumer demand for specialty crops.

1. **Increase the markets available to PFMA:** During the first year of the project PFMA created a virtual market (PFMkt) with an estimated 200 consumer member participating in the market. However, by the end of the second year of the project the decision was made to discontinue the VM due to time and labor constraints and focus on retail outlets. A working relationship was developed with 21 Walmart stores from Chipley, FL to Pensacola, FL. A strong relationship was also developed with the Fresh Market stores in Pensacola, FL and Destin, FL. Panhandle Fresh also created partnerships with local food distributors including Sysco Gulf Coast, City Produce, and FloraBama Farms who service restaurants from Gulf Port, MS to Greenville, AL to Tallahassee, FL.

2. **Develop a distribution System:** The system developed was for farmers to deliver to the stores with which PFMA had a vendor account. This is the best way we have found for both parties. We have cut delivery distance because we deliver directly to the stores and the farmers receive enough of a premium to cover this expense on their part. PFMA does not have the logistical or the capital resources to deliver for the farms.

3. **Increase the number of PFMA farmers by 25%:** PFMA initially exceeded the goal of increasing the number of farmers participating in PFMA. In 2011 PFMA expanded from 15 to 38 growers (153% increase). However, by the beginning of 2012 most of the retail outlets were requiring Food Safety Certification before they would accept produce from PFMA farmers. Due to the cost of required inspections and reluctance of farmers to have their facilities inspected by Food Safety Compliance Certification organizations, the number of growers participating in PFMA dropped sharply. At the beginning of 2012 there 5 farmers certified to sell to the PFMA vendors. At the beginning of 2013 there were 3 additional farmers that had completed their food safety audit. PFMA efforts to assist growers in completing a food safety audit are describe elsewhere in this report.

4. **Increase PFMA sales to $500,000 per year:** This goal was not accomplished. The food safety audit requirement of most vendors and extreme weather during the first growing season resulted in sales being far below the goal. Watermelons had the highest sales of any product in PFMA and the lack of rain during the beginning of the 2011 spring season negatively impacted melon production for the larger buyers. Sales for the 2012 production year were less the $100,000.

5. **Develop an education program including financial and business planning complete with data on market requirements, historic pricing, etc.:** The economic analysis on which this training was to be based has just recently been completed (see pg.15). The information will be made available to those contemplating one of the protected culture systems so they can make an informed decision about which system is best for their situation.

6. **Develop a Consumer Education and Awareness program:**
    a. **At least 6 in-store campaigns to increase consumer awareness:** Four of the six in-store campaigns were accomplished in 2011 (See examples pgs. 6-8). In 2012 all of the Walmart and Fresh Market stores (23 total) had in-store advertisements with banners and biographies of the PFMA farmers growing the produce so the consumer knows where their comes and how it is handled. Flyers were also produced for all the restaurants that participated in the locally grown program.
    b. **At least 5 restaurant partners with menus including locate produce:** Restaurant partners were reached through Sysco Gulf Coast produce distributor. This gave PFMA the ability to use the distribution system to get product to more than the 5 restaurants set as a goal.
    c. **Enhance website:** The PFMA website was updated several times during the project. Farmer stories were added and photos of local produce along with recipes associated with what's in season today. The website also provided information so that consumers can learn about the benefits of buying local produce. A closer relationship with the end consumer was developed through the use of social media such as FaceBook.

- **Clearly convey completion of achieving outcomes by illustrating baseline data that has been gathered to date and showing the progress toward achieving set targets.**

Component 1: Increasing the supply of specialty crops.

In 2010 base line data was collected to determine the number of specialty crop farmers along with the technology that was being used on their farms. In the first quarter of 2013, a study was conducted to determine if an increase in the number of farmers as well as the adoption of technology was seen. The table below represents a significant increase in the numbers of specialty crop farmers as well as an overwhelming increase in the adoption of new technologies.

Impact of Project on Number of Growers Utilizing Protected Culture.

	2010		2011		2012	
County	# Growers	# Using Protected Culture	# Growers	# Using Protected Culture	# Growers	# Using Protected Culture
Escambia	8	3	13	7	19	15
Okaloosa	8	3	9	3	18	5
Walton	26	5	33	7	39	12
Washington	10	2	14	4	15	7
Santa Rosa	27	9	30	9	29	8
Total	79	22	99	30	120	47
Percentage Increase Year over Year			25%	36%	21%	57%
Percentage Increase 2010-2012					52%	114%

<u>Component 2</u>: Expanding markets to meet consumer demand for specialty crops.
Increase in number of PFMA farmers: We determined a baseline of 15 growers initially participated in the PFMA marketing programs when this project was initiated. This was a mixture of farmers who had been growing specialty crops for several years and new, beginning farmers. By the end of the 2011, the number had increased to 38 farmers who were members of PFMA. This exceeded the overall project goal of a 25% increase in the number of farmers participating in PFMA. However, due to several factors that occurred in 2012, the second year of the project ended with 5 farmers. One of the major obstacles that we encountered was the requirement instituted during 2011 by most vendors that growers be food safety certified. Due to the expense and reluctance to have their facilities inspected, many producers dropped their PFMA membership. Information sessions we held to educate farmers on the food safety and insurance requirements farmers must follow in order to participate in the PFMA program. In addition, scholarships to cover part of the food safety certification expense were offered to encourage grower participation.

<u>Beneficiaries</u>

- **Provide a description of the groups and other operations that benefited from the completion of this project's accomplishments.**

  The purpose of this project was to increase the supply of locally grown food. Farmers, buyers, and consumers all benefit with an increased supply of local produce. During the past few years, increased consumer demand has encouraged producer to increase production of specialty crops. We have seen a 57% increase in the number of growers during this project. By utilizing the education from field days and advanced technologies, new growers of specialty crops can be more profitable while increasing the supply of specialty crops. This project has helped growers make informed decisions about production practices that are sustainable for the future. By increasing the number of profitable growers and avenues for them to market their products, more specialty crops will be available locally for the customers.

- **Clearly state the quantitative data that concerns the beneficiaries affected by the project's accomplishments and/or the potential economic impact of the project.**

Economic Analysis of Tomato Production in Four Different Technologies

Data

Production data for four different technologies for commercial tomato production were collected from experimental production plots in Jay, FL (WFREC) for purposes of assessing their relative economic viabilities. The four technologies included three field-grown methodologies (field, shade-house, and high tunnel) and one greenhouse methodology. Trial data included the production expenses, labor hours, harvested quantity, and yield information. Seasonal production expenses are divided into two categories: structure cost (greenhouse, shade-house, and high tunnel) and variable production expenses. Labor hours for a season are divided into four categories: land preparation, crop care, harvest, and cleanup. Harvested quantities for each technology are provided with a harvest date and wholesale market price where available. Because of severe weather conditions and unrepresentative harvest results, yields were approximated by using seed number and production notes provided by experimental plot researchers.

Two different sources of tomato statistics are utilized in the analysis: USDA-ERS annual data from 1990 to 2012 and; USDA-AMS monthly data from January 2004 to December 2012. Time series tomato price/yield data sets are used to assess price/yield correlation and volatility. Specifically, USDA-ERS data are used to analyze price/yield correlation of field-grown methodologies. The USDA-ERS dataset is also used for price analysis of all four technologies. The USDA-AMS data are used to adjust price volatility distinguishing greenhouse and field-grown methodologies and to calculate the greenhouse price premium.

In addition to the experimental data, the greenhouse tomato production expenses rely on enterprise budget information from the University of Florida's Small Farm and Alternative Enterprises project team (Smith et al. 2006). The data are updated as of 2013 by UF extension agents. Field-grown tomato production expenses are derived from a combination of experimental data from the Jay, Florida research center and UF/FRED published data (Smith and VanSickle 2009). All the data are adjusted to match experimental production plot areas of 30'x 66' which is equivalent to one twentieth of an acre. Experimental production plot data from the FDACS Block Grant are then used to generate a base model to be used in a stochastic simulation testing.

Financial Model

A number of assumptions were used for generating the financials in this analysis. These assumptions are:

- The models are derived on per plant production basis.
- After-tax discount rates are assumed to be 10% for each model.
- The firms are assumed to be started by equity holders and liquidated at the end of ten years.
- The Net Present Value (NPV) of the cash flows from the different production technologies are calculated over ten year period by using a discounted cash flow methodology.

- To prevent firms from running out of cash during the financial year, starting cash is added manually to the balance sheet
- Firms are given working capital loans for 90% of the annual variable production at an interest rate of 5%.
- 80% of the equipment costs for shade-house, high tunnel and greenhouse tomatoes are funded with a seven year loan at 8% interest.
- Applied straight-line depreciation is applied for all equipment.

Production Expenses and Financial Sheets

Table 1. Greenhouse production expenses

Cost of Goods Sold	**Unit**	**Quantity**	**Price**	**Total Cost**
Materials				
Perlite	Units	15.00	12.69	190.35
Calcium Nitrate	Units	2.00	18.50	37.00
Fertilizer	Units	5.00	33.00	165.00
Tomato Seed	Units	250.00	0.36	90.00
Plant Clips	Units	0.25	92.50	23.13
Biologicals	Units	4.00	85.34	341.36
Chemicals	Units	1.00	27.80	27.80
Total Materials				**$ 874.64**
Energy				
Utilities	KwH	3,892.00	0.19	757.31
Propane	Units	1.00	750.00	750.00
Total Energy				**$ 1,507.31**
Labor				
General Farm Labor	Hrs	64.50	7.79	502.46
Tractor Driver Labor	Hrs	-	-	-
Total Energy				**$ 502.46**
Sales, General & Administrative				
General & Administrative				
Analytical services& repairs	Units	1.00	150.00	150.00
Land Rent	Units	1.00	25.00	25.00
Overhead and Management	Units	1.00	181.64	181.64
Taxes & Insurance *	%	18,037.40	1.37%	247.11
Total G&A				**$ 603.75**
Sales & Marketing				
Pick, Pack and Haul	Box	182.10	2.60	473.46
Sell	Box	182.10	0.15	27.32
Containers	Box	182.10	0.75	136.58
Organization Fees	Box	182.10	0.09	16.39
				$ 653.74
Total Annual Production Costs				***$ 4,141.89***

* The taxes and insurance are taken as the 1.37% of the total structure cost.

Source: Enterprise budget information for greenhouse is constructed by authors by using experimental plot data and the University of Florida's Small Farm and Alternative Enterprises project report (Smith et al. 2006).

Table 2. Field-grown, shade-house and high tunnel production expenses

Cost of Goods Sold	**Unit**	**Quantity**	**Price**	**Total Cost**
Materials				
Plastic mulch	Units	360.00	0.03	10.08
Drip tape	Units	360.00	0.02	7.56
Irrigation Supplies	Units	1.00	50.00	50.00
Injector	Units	1.00	88.99	88.99
Transplants	Units	144.00	0.09	12.96
Fertilizer	Units	3.00	13.50	40.50
Stakes	Units	50.00	0.60	30.00
Twine	Units	1.00	5.75	5.75
Chemicals	Units	2.00	15.00	30.00
Compost	Units	1.00	226.85	226.85
Tractors and Equipment	Units	1.00	106.20	106.20
Total Materials				**$ 608.89**
Energy				
Total Energy				**$ -**
Labor				
General Farm Labor	Hrs	17.50	7.79	136.33
Tractor Driver Labor	Hrs	1.00	10.71	10.71
Total Energy				**$ 147.04**
Sales, General & Administrative				
General & Administrative				
Land Rent	Units	1.00	25.00	25.00
Overhead and Management	Units	1.00	181.64	181.64
Taxes & Insurance *	%	185.00	1.37%	2.53
Total G&A				**$ 209.18**
Sales & Marketing				
Pick, Pack and Haul	Box	62.73	2.60	163.10
Sell	Box	62.73	0.15	9.41
Containers	Box	62.73	0.75	47.05
Organization Fees	Box	62.73	0.09	5.65
				$ 225.21
Total Annual Production Costs				***$ 1,190.31***

* The taxes and insurance are taken as the 1.37% of the total structure cost. Thus, this cost item is $75.14 for high tunnel production and $49.11 for shade-house production.

Source: Enterprise budget information for field-grown technologies is constructed by authors by using experimental plot data and Florida research center and UF/FRED published data (Smith and VanSickle 2009).

Table 3. Cost Summary for all the Production Technologies

Production Technology	Total Variable Expenses	Construction Cost	Durable Cost	Total Structure Expenses
Greenhouse	$ 4,141.89	$ 13,532	$ 4,505	$ 18,037
High Tunnel	$ 5,300	$ 5,300	$ 185	$ 5,485
Shade-house	$ 3,400	$ 3,400	$ 185	$ 3,585
Field	$ 1,190.31	$ 0	$ 185	$ 185

Source: Calculated by authors.

Table 4. Financial Analysis Summary for Greenhouse Production

(in 000's)	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	Terminal Value
Number of plants	250	250	250	250	250	250	250	250	250	250	
Production per plant	18.2 lbs	18.2 lbs	18.2 lbs	18.2 lbs	18.2 lbs	18.2 lbs	18.2 lbs	18.2 lbs	18.2 lbs	18.2 lbs	
Unit price (Forecast)	$1.48 /lb	$1.40 /lb	$1.59 /lb	$1.64 /lb	$1.72 /lb	$1.74 /lb	$1.51 /lb	$1.77 /lb	$1.65 /lb	$1.69 /lb	
Revenues	6,735	6,358	7,254	7,470	7,827	7,924	6,877	8,068	7,495	7,680	7,680
Net Income	(216)	(464)	429	704	1,094	1,299	656	1,703	1,273	1,412	1,412
Beginning Capital	3,938	3,722	3,258	3,687	4,391	5,485	6,784	7,440	9,143	10,417	11,829
WACC	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EVA	(610)	(836)	103	335	655	751	(22)	959	359	371	229
Discounted Cash Flow	(610)	(760)	85	252	447	466	(12)	492	167	157	
Investment Value		**1,079**									
Beginning Economic Capital		**3,722**									
Enterprise Value		**5,017**									

Table 5. Financial Analysis Summary for Field Production

(in 000's)	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	Terminal Value
Number of plants	144	144	144	144	144	144	144	144	144	144	
Production per plant (Forecast)	14.4 lbs	11.6 lbs	9.5 lbs	14.7 lbs	8.6 lbs	14.7 lbs	12.0 lbs	13.1 lbs	6.0 lbs	14.3 lbs	
Unit price (Forecast)	$1.04 /lb	$0.91 /lb	$1.06 /lb	$0.79 /lb	$0.98 /lb	$0.87 /lb	$0.97 /lb	$0.72 /lb	$1.10 /lb	$0.65 /lb	
Revenues	2,144	1,518	1,454	1,674	1,209	1,844	1,686	1,362	945	1,327	1,327
Net Income	632	161	113	279	(93)	406	287	45	(357)	19	19
Beginning Capital	264	896	1,057	1,171	1,450	1,356	1,763	2,050	2,095	1,738	1,756
WACC	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EVA	605	72	8	162	(238)	271	111	(160)	(567)	(155)	(157)
Discounted Cash Flow	605	65	7	122	(163)	168	63	(82)	(265)	(66)	
Investment Value		**481**									
Beginning Economic Capital		**896**									
Enterprise Value		**745**									

Table 6. Financial Analysis Summary for Shade-house Production

(in 000's)	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	Terminal Value
Number of plants	144	144	144	144	144	144	144	144	144	144	
Production per plant (Forecast)	13.4 lbs	14.5 lbs	10.2 lbs	10.6 lbs	10.8 lbs	13.7 lbs	10.3 lbs	12.7 lbs	12.9 lbs	14.0 lbs	
Unit price (Forecast)	$1.19 /lb	$1.54 /lb	$1.64 /lb	$1.52 /lb	$1.42 /lb	$1.28 /lb	$1.36 /lb	$1.46 /lb	$1.61 /lb	$1.51 /lb	
Revenues	2,293	3,203	2,400	2,324	2,220	2,515	2,021	2,681	2,992	3,053	3,053
Net Income	171	873	292	258	204	451	109	635	868	913	913
Beginning Capital	4,256	4,427	5,300	5,592	5,850	6,054	6,505	6,614	7,249	8,117	9,031
WACC	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EVA	(254)	431	(238)	(302)	(381)	(154)	(542)	(27)	143	102	10
Discounted Cash Flow	(254)	392	(197)	(227)	(260)	(96)	(306)	(14)	67	43	
Investment Value		(426)									
Beginning Economic Capital		**4,427**									
Enterprise Value		3,830									

Table 7. Financial Analysis Summary for High-tunnel Production

(in 000's)	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	Terminal Value
Number of plants	144	144	144	144	144	144	144	144	144	144	
Production per plant (Forecast)	8.5 lbs	10.1 lbs	9.4 lbs	8.1 lbs	13.6 lbs	11.4 lbs	14.0 lbs	11.7 lbs	13.5 lbs	12.4 lbs	
Unit price (Forecast)	$1.60 /lb	$1.88 /lb	$1.75 /lb	$1.89 /lb	$1.44 /lb	$2.16 /lb	$2.06 /lb	$1.60 /lb	$0.79 /lb	$1.79 /lb	
Revenues	1,958	2,727	2,377	2,187	2,808	3,563	4,152	2,687	1,534	3,205	3,205
Net Income	(451)	268	38	(95)	432	1,039	1,523	472	(524)	860	860
Beginning Capital	2,462	2,010	2,279	2,316	2,221	2,654	3,692	5,216	5,688	5,164	6,024
WACC	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EVA	(697)	67	(190)	(326)	210	774	1,154	(50)	(1,093)	344	258
Discounted Cash Flow	(697)	61	(157)	(245)	143	481	651	(26)	(510)	146	
Investment Value		**93**									
Beginning Economic Capital		**2,010**									
Enterprise Value		**2,555**									

Simulation and Risk analysis

The financial analyses for all the production technologies are simulated by using Simetar© (Simulation and Econometrics to Analyze Risk) software. The information provided by experimental plot researchers and historical tomato price and yield data for Florida is used to develop the model. The assumptions used to model risk in production technologies are:

Production and Market Assumptions:

Field

- The correlation between annual price and yield is used in price and yield forecast.
- Field tomato prices are adjusted to the USDA-AMS terminal point prices.
- The yield variation is increased to reflect an individual farmer's production risk profile.

Shade-house

Field tomato production assumptions are used and modified as follows:

- Prices are assumed to be protected culture prices instead of field.
- The market risk profile for early summer is reflected in prices.

High Tunnel

Field tomato production assumptions are used and modified as follows:

- Prices are assumed to be protected culture prices instead of field.
- The market risk profile for early spring is reflected in prices.

Greenhouse

- The USDA database for tomato statistics is used for price forecasting.
- A 56 cent premium over USDA-AMS data tomato prices is applied to represent the greenhouse price premium over field tomatoes.
- Greenhouse tomato prices are adjusted to the USDA-AMS terminal point prices.
- Greenhouse price volatility is modeled to match greenhouse price data.

The investment values of each production technology are simulated 500 times by using Latin hypercube sampling analysis. The simulations are compared by drawing their probability density functions (PDFs) and cumulative density functions (CDFs). Figure 1 shows the probability density functions of simulated investment values for all four production technologies. The investment value is the highest for greenhouse production, which is followed by field, high tunnel and shade-house, respectively. Since the greenhouse production graph is the steepest and the tails of the graph are shorter than the other technologies, it is also the least risky option. In contrast, high tunnel production is the most risky production technology. Table 8 summarizes the simulation results.

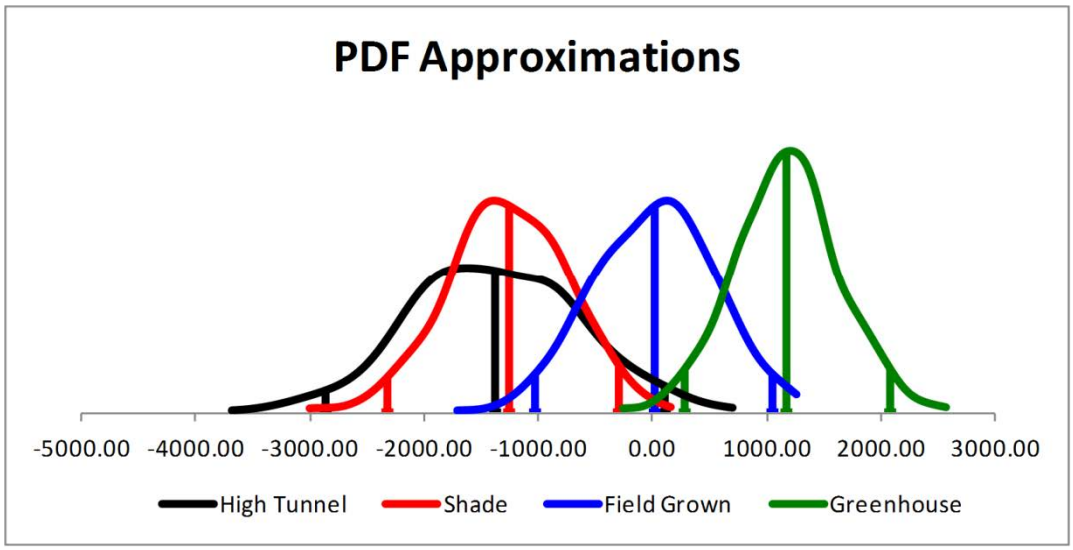


Figure 1. Probability density functions of simulated investment values

Table 8. The simulation summary

Production Technology	Greenhouse	Field	High Tunnel	Shade-house
Average Investment Values	1,176.07	21.78	-1,383.12	-1,264.76
Standard Deviation	457.43	522.27	738.37	526.83
Maximum Value	2,574.24	1,264.64	700.96	162.54
Minimum Value	-262.42	-1,704.45	-3,688.08	-2,999.56

Cumulative density functions of simulated investment values are given in the Figure 2.

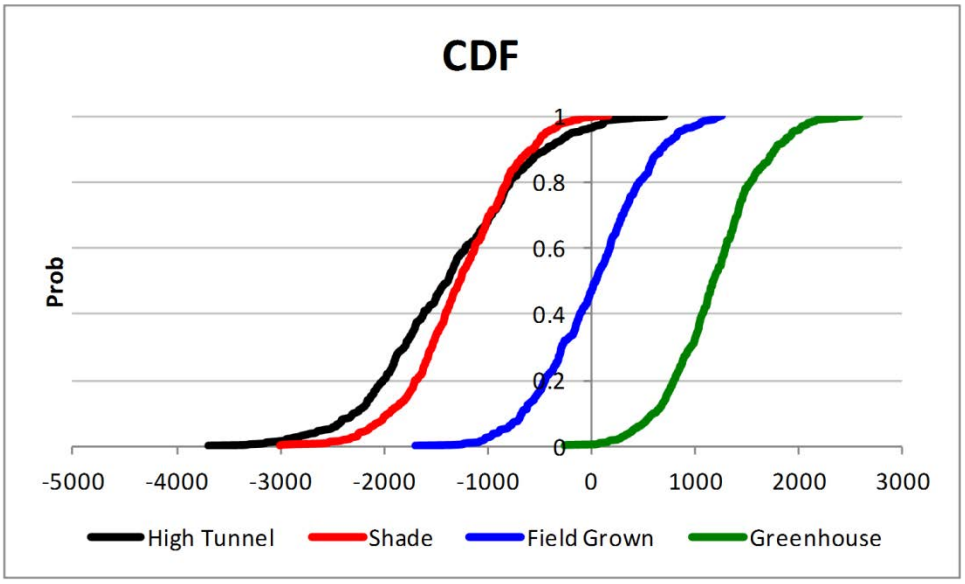


Figure 2. Cumulative density functions of simulated investment values

We use the CDF for stochastic dominance analysis which analyzes the preferred production technology taking into account risk aversion. The results show the most preferred production technology is greenhouse followed by field, high tunnel and shade-house, respectively. Moreover, shade-house is preferred more than shade-house when the risk aversion increases.

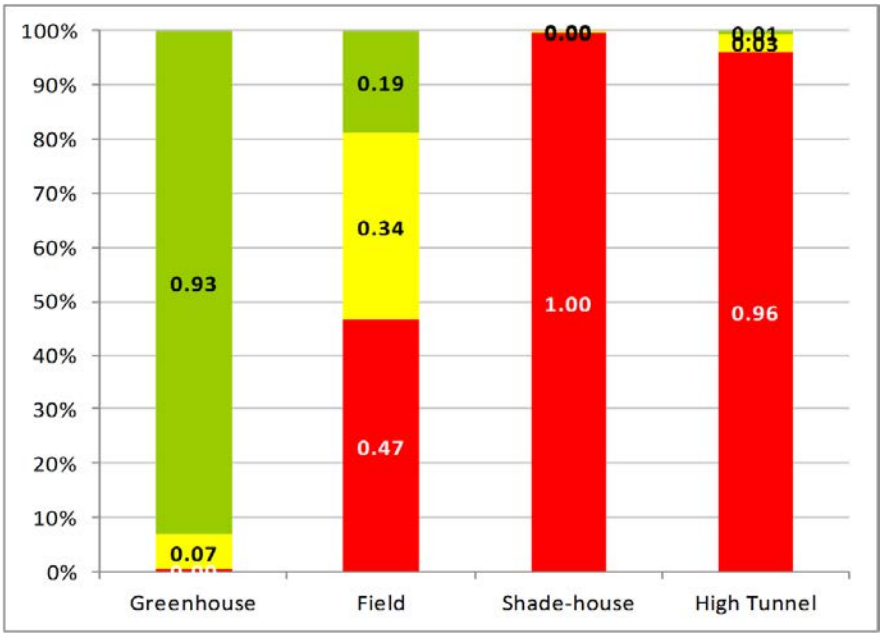


Figure 3. Probabilities of investment values less than $0.00 and greater than $500.00.

Lessoned Learned

- ☐ **Offer insights into the lessons learned by the project staff as a result of completing this project. This section is meant to illustrate the positive and negative results and conclusions for the project.**

  Tomatoes and peppers can be successfully grown in the various protected culture systems that were evaluated. This can result in near year-round production of these crops.

  Tomatoes grown under shade, however, can be risky. In year 1, no yield was collected due to the complete system crash. This was due to adverse weather conditions that caused the plants to be completely unmanageable. More research needs to be done to determine the best management for tomatoes grown in shade systems. This may include more variety testing, various degrees of shading and transplant timing.

  Weather conditions were a factor in several of the systems in addition to the shade system. Inclement and extreme weather events (tornadoes, hurricanes, heavy rainfall events) can contribute to lower than expected yields. A grower must evaluate risks associated with the variables that are due to weather before making a commitment to implementing these systems.

- ☐ **Provide unexpected outcomes or results that were an effect of implementing this project.**

  The virtual market was unsuccessful due to the time and labor required to provide this service. We discovered that it requires a rather large number of subscribers to make this type of venture successful.

  The food safety requirements mandated by most vendors caused a serious problem for marketing of specialty crops by growers in this region. The required certification was not expected nor was the resistance by growers to obtaining certification. These factors had a significant negative impact on specialty crop marketing.

- ☐ **If goals or outcome measures were not achieved, identify and share the lessons learned to help others expedite problem-solving.**

  Field Day at Grower Site: The Levi Findley field day was cancelled two days before the event due to a tornado completely destroying his high tunnel. Time constraints in the rebuilding phase did not allow sufficient time to implement a new crop in the same season. A new time was not rescheduled.

  Increase in number of PFMA farmers: We determined a baseline of 15 growers initially participated in the PFMA marketing programs when this project was initiated. This was a mixture of farmers who had been growing specialty crops for several years and new, beginning farmers. By the end of the 2011, the number had increased to 38 farmers who were members of PFMA. This exceeded the overall project goal of a 25%

increase in the number of farmers participating in PFMA. However, due to several factors that occurred in 2012, the second year of the project ended with 5 farmers. One of the major obstacles that we encountered was the requirement instituted during 2011 by most vendors that growers be food safety certified. Due to the expense and reluctance to have their facilities inspected, many producers dropped their PFMA membership. Information sessions we held to educate farmers on the food safety and insurance requirements farmers must follow in order to participate in the PFMA program. In addition, scholarships to cover part of the food safety certification expense were offered to encourage grower participation.

Contact Person

- ☐ **Name the Contact Person for the Project**: Barry J. Brecke
  - **Telephone Number**: 850-983-7103
  - **Email Address:** bjbe@ufl.edu

Additional Information

- ☐ **Provide additional information available (i.e. publications, websites, photographs) that is not applicable to any of the prior sections.**

  One of the challenges that specialty crop growers faced was finding a low cost solution to post harvest handling requirements that most specialty crop buyers now stipulate. The WFREC designed and constructed an affordable and effective option for growers to use. The "Mobile Cooling Trailer" was built to be a tool to provide a hands-on training in post-harvest handling. This unit was displayed at field days and growers were provided detailed instructions on how to implement it on their farms. An EDIS document is now being generated so farmers across the states can access it. The EDIS publication provides detailed information on the construction of the Cooling Trailer along with estimated costs for the various components.

Mobile Cooling Trailer

Financial Report is provided in a separate attachment.

1533 Park Center Drive, Orlando, FL 32835
407-295-7995/FAX: 407-295-1619 www.fngla.org
Contact: Linda Reindl, Director of Education, lreindl@fngla.org or 407/832-8279 (Cell)

- **Project Title:** Florida Nursery, Growers and Landscape *Research, Education and Marketing Programs to Sustain Florida's Nursery and Landscape Industry*
    - Component #1 - Consumer Marketing & Outreach
    - Component #2 – Business To Business Marketing
    - Component #3 – Certification Marketing and Outreach
    - Component #4 – Industry Education

- **Contract Number:** FDACS CONTRACT #016865
- **Specialty Crop Block Grant Funding Year:** 2010
- **Reporting Period:** Final Report

The 2010 FNGLA grant proposal sought to enhance the competitiveness of industry members and help them secure their businesses against the enormous financial risk that continues to challenge Florida's economy, even as the economic recovery process begins.

Through marketing, education, and certification, FNGLA utilized its vibrant network of professionals to help reshape the future of Florida's nursery and landscape industry and sustain the industry's business success.

Component (1) Consumer Marketing & Outreach

Project Summary:
The overall purpose of the consumer relations campaign was to build public awareness of Florida's nursery and landscape industry, impact residents' lives and reduce the information deficit among Florida's homeowners and gardening consumers. With many of Florida's nursery and landscape businesses fighting to sustain themselves, this project linked the public with information related to their yards and gardening trends, and spurred consumers to invest in their home landscapes for enjoyment as well as increased property value. This project Builds and expands upon a SCBGP grant from 2009, and is timely due to the continued tightening of Floridians' disposable income.

Project Approach:
In order to maximize effectiveness with a diverse audience group, FNGLA utilized a multi-pronged approach. It included traditional printed and digital information, and targeted distinct consumer groups and groups who have direct contact with Florida's gardening/potential gardening audience.

This effort partnered FNGLA with the Garden Writers Association; University of Florida-

IFAS (Institute of Food & Agricultural Sciences); National Foliage Foundation; Green Plants for Green Buildings; Walt Disney World, Epcot Horticulture; and, the US Green Building Council (USGBC).

Goals & Outcomes Achieved:

Garden Writers Conference Participation, August 25 -30, Indianapolis, IN

FNGLA has built a solid foundation with many of the nation's garden writers. The Garden Writer Association's membership has more direct contact with the gardening public than any other group. Garden Writer Conference participation was intended to maintain our presence while increasing writer's knowledge of Florida plants. The annual conference took place in Indianapolis, August 25 – 30. 439 writers attended. The events allowed FNGLA's two delegates access to this writer base. 94 were identified as "tropical plant" targets which enabled FNGLA writer/media database with whom we communicate regularly to expand to 537 of our nation's garden writers. A regional meeting takes place at the event where much visibility for Florida is gained. Please note that not all garden writers are plausible targets, only those whose geographic area or areas of expertise covers Florida's plants. And, while we intended to track coverage of Florida plant articles, the task is really not manageable for the same reason: too many Florida plants to accurately track.

Thank to the contacts made at this conference, an invitation was extended by FNGLA to the GWA national board to meet in Florida in conjunction with the TPIE show. GWA accepted. This allowed the group's key leaders to be exposed to Florida's array of plant material and businesses. And the relationship continues to grow as FNGLA plans to submit South Florida as a venue for an upcoming national garden writer's symposium. This is key qualitiative contact.

School Gardening/ VOUCHERS

To promote gardening to the next generation of Florida consumers, FNGLA administered an Arbor Day promotion celebration. Partnering with the Florida Department of Education, contact was made with 2,317 schools/fourth grader teachers contacted (while funding lasted). $50 vouchers were again offered. Utilizing roll-over funds from the 2010 program year (as part of the 2009 awarded SCBG grant), 110 vouchers with a face value of $5,500 was distributed. Total student impact is estimated at over 16,000 Florida school children.

Scientific research shows that exposing children to fundamental principles at a young age establishes base knowledge. With this effort, 16,000 children now have established base knowledge. The teacher exit surveys show appreciation for the program, as well as an increase in student awareness of the value of gardening, trees and nature in general.

All teachers/schools had access to FNGLA Arbor Day materials as downloadable PDF's: Materials available meet the Sunshine State Standards set forth by the State of Florida: **What Is Arbor Day?** (.pdf); **Arbor Day in the classroom** (.pdf); **J. Sterling Morton** (.pdf); **Classroom Curriculum** (.pdf) **Tree Facts** (.pdf); **Planning Your Arbor Day Celebration** (.pdf); **Tree Planting Cue Card** (.pdf); **Sample Press Release for local media coverage** (.doc).

Brochure Development

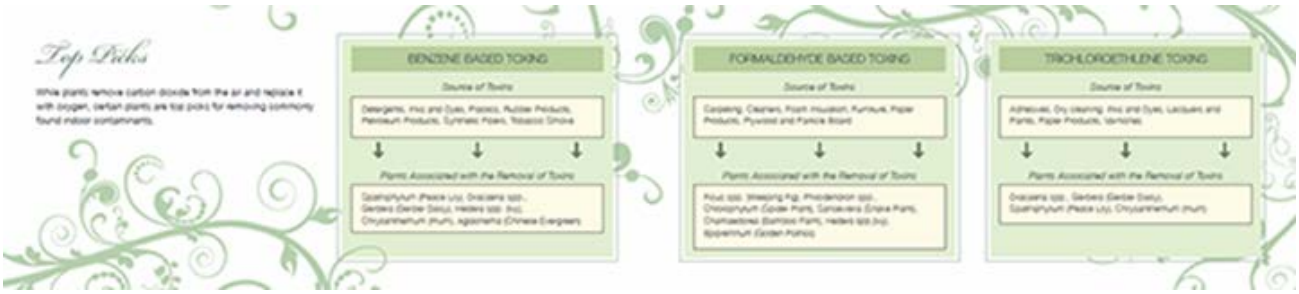
The 2012 Florida Garden Select promotional pieces promoted the program and the year's plant selections. Targets included Florida's gardening consumers and we got exposure to this audience via 80 University of Florida extension agents, their county offices, and, FNGLA's 17 chapters. Additionally, we targeted FNGLA's Garden Center retailers, 34 businesses to which both pieces are applicable and for which the smaller version was specifically designed. 10,000 large pieces and 20,000 smaller "pocket" pieces were printed. Pieces were distributed as follows by the close of 2012:

Large Brochures:
7,500: UF Extension Agents/Offices
2,500: FNGLA Chapters

Small Brochures:
5,000: UF Extension Agents/Offices
5,000: FNGLA Chapters
10,000: FNGLA's Garden Center Retailers

The "Think Green, Live Green" piece, initially developed in 2007, has been a huge success for Florida's nursery and landscape industry. While FNGLA has continued to reprint (as funds allowed), funds had been depleted, so SCBG funds were essential to keep this piece meeting industry and consumer demand.

The center spread houses the crux of the piece: which plants to use where in an inside environment to remove toxins. With 80% of the nation's houseplants originating in Florida, this effort greatly benefited the interior foliage growers concentrated in Apopka and Miami/Homestead areas.



Production on this piece was delayed, and carried over to the project's extension period of early 2012. 40,000 pieces were reprinted. These pieces were disseminated at many events where FNGLA had a presence and throughout the Association's 17 chapters and their events. The events and estiamted quanitities are:

- 1,000: Tropical Plant Industry Exhibition (TPIE) (January)
- 500: Jacksonville Horticulture Tradeshow (February)
- 700: Tampa Spring Expo (February)
- 500: OFA Short Course (& tradeshow event) (June)
- 200: American institute of Floral Designers Conference (July)
- 400: Garden Writers National Conference, Region Meeting (August)
- 160: America in Bloom Symposium (September)
- 1,000: The Landscape Show (September)

The piece was designed to allow FNGLA members to "stamp" their business name on the back among the groups involved (FNGLA, UF and the National Foliage Foundation) and fit nicely into a billing envelope. Requests for this piece, which, in turn, help to sell Florida houseplants, are received at least weekly at the FNGLA offices.

The Florida Gardening website promotional piece was a die-cut piece to grab consumer's attention. 10,000 "daisy" pieces were printed and almost all were distributed as part of the FNGLA garden at the Epcot International Flower & Garden

Festival (also covered with this project). The target was general consumers so as to drive traffic to the FNGLA consumer website: www.floridagardening.org.

Epcot Garden

"The Art of Living Green" was the theme of the FNGLA Garden at the 2011 Epcot International Flower & Garden Festival (carried over from 2010) Epcot's planners and festival management were pleased with the educational elements FNGLA had brought to the event feeling the mix was a winning combination worthy of repeating. We opted to include several varieties of herbs and strawberries on the wall to showcase the edible interest. Using Epcot-provided volunteers, garden visitors were counted in the 2200 square foot garden on specific days and the data was extrapolated to determine the garden saw approximately 150,000 visitors.

Walt Disney World's landscape architects developed the 2011 planting plan. FNGLA's request was to retain the educational attraction to the area: a focus on sustainability featuring the nine University of Florida developed Florida-friendly landscape principles: (1) Right plant, Right place; (2) Water efficiently; (3) Fertilize Appropriately; (4) Mulch; (5) Attract Wildlife; (6) Manage Yard Pests Responsibly; and (7) Recycle. Volunteers from FNGLA membership and Certified Professional base were recruited. The garden was hosted by these folks at a minimum of four volunteers daily each Thursday, Friday, Saturday and Sunday for the duration of the 10 ½ week festival, totaling over 160 industry volunteers.

Consumer Website Maintenance

The consumer website effort suffered delays after the subcontractor was selected. Personnel at the subcontractor turned over 4 different project managers and with design work and coding, the site's timeliness for final launch suffered at virtually every phase of construction. An initial version of the site launched September 2010 with the official launch following in February 2011. Functionality was addressed. Meanwhile, the site's popularity grew. Since the site's launch, the site has experienced 19,258 visitors. 15,560 were unique and the site had 42,672 page views. Just under 16,000 of the site's visitors were Floridians. The average stay on the site was 02:17. The highest single day in the site's history hit in relation to the Epcot International Flower & Garden Festival: June 1, 2012, 89 visitors (All stats, Google Analytics.)

Unfortunately, the calendar was not launched until the end of 2012, so statistical data is not available. Feedback on the site and the need to move the site's administration to "in-house, FNGLA" meant a visual revamp. One may access the site's latest look and functionality at www.floridagardening.org.

Green Initiatives

An information gap existed between the construction industry at large and its early adopting "green thinkers." While the US Green Building Council administers the highly-

thought-of LEED accredidation process, there is a recognized need for a shift in the process where builders continue to build low-toxic, healthly buildings, but focus just as much energy into the building once consutruction has ended and the building is being utilized by its tenants. From FNGLA's perspetive, the USGBC points system should consider local and low-water use landscapes and water systems, as well as houseplants within the building to remove toxins as an integral part of a healthy building.

Participation in the 2011 conference enabled FNGLA's delegates to carry this message touting the benefits of plants. The event, Greenbuild, attracted a reported 23,000 attendees to the two-day tradeshow event held October 5 & 6 in Toronto. FNGLA partnered with the National Foliage Foundation and Green Plants for Green Buildings to send one united industry message. Most attendees were from the US and most were decision-makers in their arcitectural firms where the decisions are made to include atriums and add specifications to the building plans. 3,000 printed promotional "EcoLOGICALLY Plants" pieces were designed specifically targeting the audience and cell phone wipes (4,700) were created to keep plants on the builders' and developers' minds.

Florida Garden Select

FLORIDA Garden SELECT
Florida Grown, Nationally Known

The Florida Garden Select program was created to guide Florida's gardening public, from novice to enthusiast, to stellar varieties of plants suited for Florida's climate. Chosen by industry gardening experts, new plants are announced to consumers each January. Flyers are distributed to Extension offices throughout the state and to FNGLA Garden Center retailers. A spring media push brings the plant details to newspapers across the state. Additionally, FNGLA promotes the plants heavily to consumer audiences and to audiences who are larger influence on gardening consumers.

To better understand Florida consumers' plant selection criteria and preferences for brands and communications materials, FNGLA contracted with The Center for Public Issues Education (an entity of the University of Florida) to serve as an outside agent in conducting research and focus groups. The objectives of this research were to: (1) use research to determine whether the Florida Garden Select brand and its slogan "Florida Grown, Nationally Known" is a message that resonates with the intended consumers of Florida Garden Select plants; (2) determine to what types of messages consumers respond in relation to purchasing plants; explore consumers' perceptions of plants, gardens, and landscapes; 3) determine consumer attitudes and perceptions of the consumer education website "Florida Gardening" and select print materials; and, 4) to utilize results from the focus group data to equip FNGLA to create a marketing plan similar to that of "Fresh from Florida." The moderators guide and a plan for conducting three focus group sessions was determined. Two sessions were held at three statewide locations (Jacksonville, Orlando, and Miami) to capture an appropriate sample size that was also geographically and demographically diverse.

Access the complete survey report:
http://www.fngla.org/news/archive/2011/downloads/FGS_CenterPIEReport.pdf

Florida Garden Select is a main element of the promotions:

- Jacksonville Horticulture Trade Show (February)
- OFA/Ohio Short Course (& tradeshow event) (June)
- American Institute of Floral Designers Conference (July)
- IGC Show (Independent Garden Center Show) (August)
- Garden Writers National Conference, Region Meeting (August)
- America in Bloom Symposium (September)
- The Landscape Show (September)

Beneficiaries:
Specific beneficiaries include FNGLA members, FNGLA Certified Professionals, future nursery and landscape career professionals, gardening consumers, and specific targeted groups of inter-industry professionals whose business paths directly relate to end-consumers. Florida is home to 60+ farms producing horticultural products and representing over $9 billion on farm income. Through FNGLA's website, printed materials, and marketing efforts, all horticulture producers stand to benefit.

An end result of this effort is the industry is now better equipped to provide information to Florida's gardening public thanks to the information gained and on-going resources which remain accessible.

Lessons Learned:
We learned it is possible to move the needle on industry and consumer knowledge with cogent positioning and a strategic plan. We also learned consumers vantage points are not always as we perceive. The research was well worth the investment as the lessons learned will stay with the FNGLA leaders involved and staff for many years. And, we also learned that sometimes timelines need to be adjsuted to allow for changes.

Contact Person:
Jennifer Nelis, FNGLA Director of Public Relations & Marketing
407.295.7994
jnelis@fngla.org

Component (2) Business to Business Marketing

Component (2) Summary:

FNGLA's two major trade shows, The Landscape Show (TLS) and the Tropical Plant Industry Exhibition (TPIE) are cornerstones to the Florida horticulture industry. A majority of exhibitors make their contacts for their entire season at these shows. To enhance both the exhibitor experience as well as to increase attendance for buyers, FNGLA is has created a rich-media enhanced web site for each show.

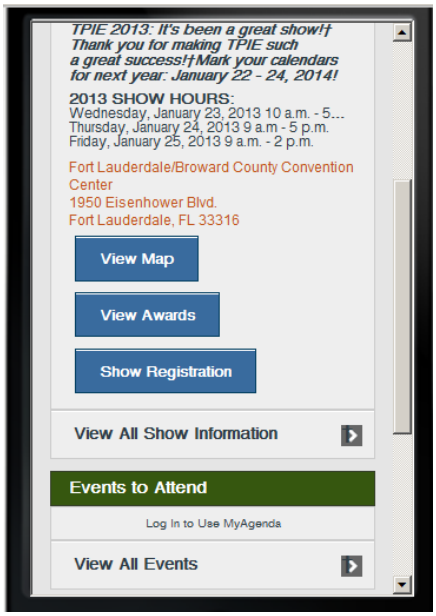
Project Approach

The purpose of this component was to implement a dynamic communication and marketing tool to increase and bring diversity to the nursery and landscape industry producers and product users. The Landscape Show and the Tropical Plant Industry Exhibition (TPIE) are the largest and most used marketplaces for buyers and sellers of Florida's $15.8 billion industry to meet and conduct business. Due to the significant downturn in both national and regional economies, the industry has suffered shrinking sales and loss of customer base. The rich-media websites now in place provide a non-traditional tool to reach non-traditional audiences, including younger and more diverse producers and product buyers who have not been reached through traditional media.

Project Goals/Outcomes Achieved

This component included re-designing and re-launching the industry trade show web sites for The Landscape Show (Fall 2011) and TPIE (January 2012) to include more rich,

interactive media; including video and photos, a mobile-friendly site, interactive tools for exhibitors, and more. To enhance both the exhibitor experience as well as to increase attendance for buyers, FNGLA created a mobile website for each tradeshow.

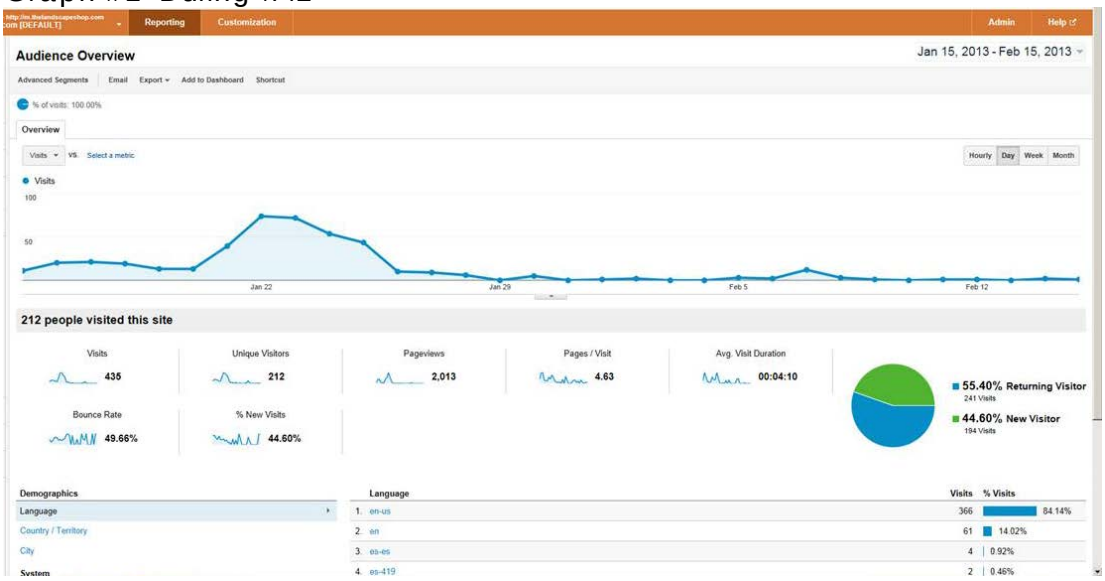


The following diagram is an example of the mobile application created to help tradeshow attendees navigate and strategically plant their time at the show. The better prepared our attendees are the more time there is to communicate with exhibitors, resulting in more sales.

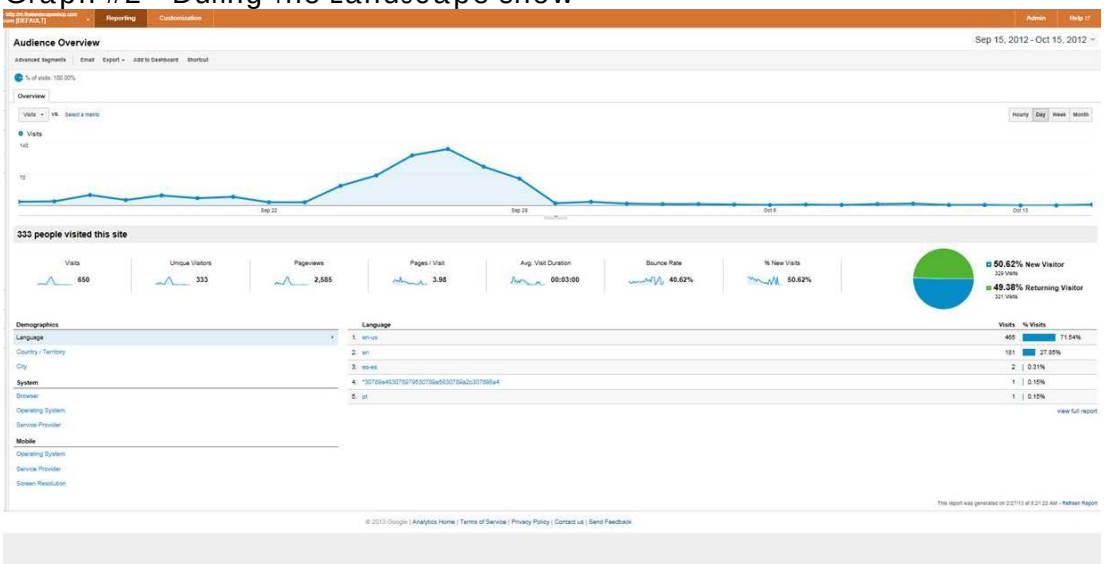
A variety of means to track and gauge the web site's efforts. The web sites will utilize analytic programs to measure traffic to the site and provide details on the heaviest utilized areas. Graph #1 and #2 reflect tracking of the mobile apps during each tradeshow. Google Analytics was used to track the traffic on the mobile site and apps. This is a new resource for attendees and the initial 212 unique visitors during TPIE was consider a good exposure to the site as shown on Graph #1 and 333 during the Landscape Show. This is expected to increase over time due to more exposure and visits to the site. It is worthy to note that people are spending on average about 4 minutes per visit which indicates that they are not only looking at the site but utilizing its features. Over 50% are returning visitors to the site.

Graph #3 shows the that the majority of users are from Florida and although we cannot cross-reference the attendee verses non-attendee using the sites, we can assume that due to the fact that the 92% of the attendees from the Landscape Show and 72% from TPIE are from Florida that it is attendees using the mobile app.

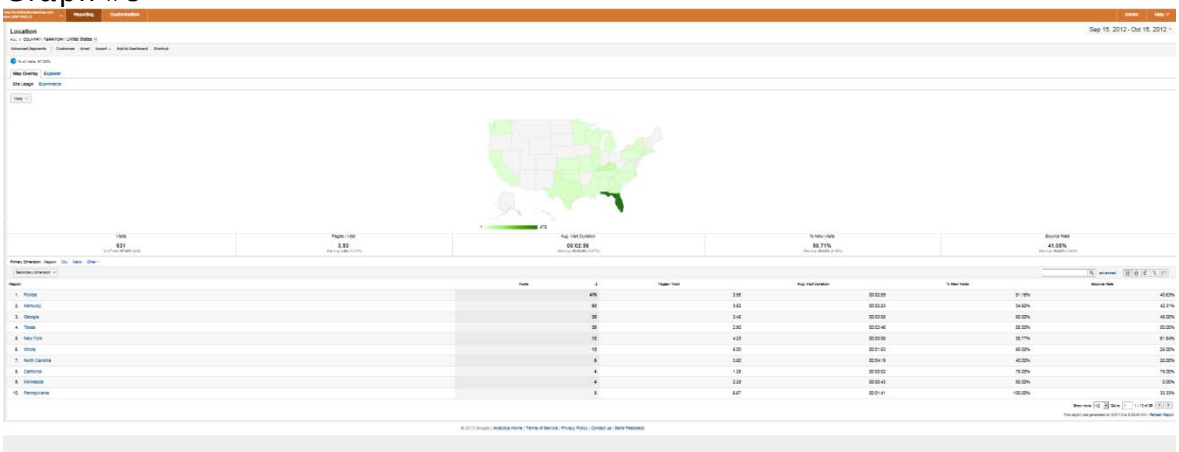
Graph #1- During TPIE



Graph #2 – During The Landscape Show



Graph #3



The following ads were secured to help promote the Landscape Show's efforts and the Tropical Plant Industry Exhibition

The Plant List - TLS AD - Full Page Color (Florida)
The Plant List - TLS AD - Full Page Color (Gulf States)
Betrock Information Systems - TLS AD - Full Page 4 Color
Progressive Communication Intl - TLS Save the Date Mailer
The Plant List - TLS-Full Page AD
The Plant List - TLS-Full Page AD
Betrock Information Systems - TLS-Full Page 4 Colors AD

The Adventure LLC - TLS - Telesummit
GIE Media Inc.- TLS-4-Color Ad-Lawn & L/S Magazine
Progressive Communication Intl - TLS-Exhibitor Postcards
QMS Services, Inc. - TLS- Email Blasts
GIE Media Inc. - TLS- 1/4 Page Ad
Progressive Communication Intl - TLS Reminder Postcard
Progressive Communication Intl - TLS Brochure
Progressive Communication Intl - TPIE Save the Date
Amex-Garden Center & Nursery-TPIE 2/3 Page 2 Color AD
Amex-Garden Center & Nursery-TPIE Web Advertising
Steam Studios-TPIE Brochure, Print Ad, Web Banner
Steam Studios-TPIE Brochure, Print Ad, Web Banner
Sunshine Photographics - Services at TLS
Business to Business Marketing (Linda Adams) Personnel

Beneficiaries

The direct beneficiaries in component are industry members. The more business tools that we can provide Florida's nursery and landscape members, the more professional the industry will be perceived. 6,100 industry professionals attended the Tropical Plant Industry Exposition in 2012, and over 7,500 attended The Landscape Show.
As a result of the mobile apps developed, the attendees at TPIE and TLS were able to better utilize the time available to them, and received information which was more relevant to their specific needs.

Lessons Learned

In the first quarter of the grant, the business to business component's timeline was adjusted to allow more time to gather the needed information. For future web design and technology-related projects, more time will need to be allotted to allow for delays, staff turnover, and other problems which cause these projects to take longer than planned.

Contact Person

Linda Reindl
407-295-7994 fice), 407-832-8279 (mobile)
407-295-7995 lreindl@fngla.org

Component (3) Certification

Component (3) Summary:

As local ordinances continue to increase, Florida's nursery and landscape industry must enhance its education to comply and excel in the areas of water conservation, fertilization and other best management practices (BMPs) for the protection of Florida's natural resources. This was accomplished through FNGLA's industry certification programs, and there are more than 1,200 currently certified professionals throughout the state. However, local government agencies were not fully aware of the program and the benefits that can be derived by recognizing, hiring and specifying FNGLA Certified Professionals for plant purchases and landscape services.

FNGLA Certified Professionals needed assistance to effectively market themselves as professionals who have demonstrated their knowledge and skills in proper horticulture and landscape practices. Holding an FNGLA certification telegraphs they have passed a rigorous exam and met the standards of Florida's nursery and landscape industry.

Goals and Outcomes Achieved

FNGLA knew of three agencies which specified FNGLA certified professionals: Orange County Expressway Authority, City of Miami Beach and Indian River County.

Surveys documented 15 agencies which now specify FNGLA certified professionals, as listed on the Final Performance Report that was submitted.

FNGLA hosted and attended several conferences and meetings as documented in quarterly reports submitted. Following are the most successful outcomes from those meetings: (1) Closer working relationship with Florida Irrigation Society to coordinate on recognition by agencies for certified and licensed professionals; (2) Assistance from the Landscape Inspectors Association of Florida, whose members are landscape architects, code enforcement and landscape inspectors for cities and counties; (3) A member of LIAF met at this meeting assisted in developing a "white paper" for use in agency promotion; and, (4) Provided a marketing and promotion venue for this project by hosting an Agency Award ceremony as part of FNGLA's Landscape Awards highlighted three agencies which hire certified professionals.

The creation of brochures and trade show displays were dependent on surveys of certified professionals and agencies to determine the best marketing method. These materials were used by FNGLA and its certified professionals to continue marketing the benefits of utilizing certified professionals following the success of the outreach conducted within the scope of the grant.

Surveyed currently-certified professionals and a variety of agency representatives to determine the best method of marketing the benefits of using certified industry professionals on landscape jobs. Survey results are attached.

Developed "Blueprint for Success" identifying goals, responsibilities and timeline for project described below. Blueprint for successes attached.

Created sample language, presentations, brochures and table-top displays that direct agencies to a website that gives specifics on the benefits. They include:

- Fiscal Responsibility
- Environmental Stewardship
- Rigors of FNGLA Certifications

Samples of the logo, the brochure and the website are attached.

The long-term goal is to continue to increase the number of agencies recognizing certified professionals beyond the number already attained, and actually even beyond the scope of this grant project. At the conclusion of the grant, a list of agencies that specify, hire and/or recognize FNGLA certified professionals was developed. They include:

- Orange County Expressway Authority
- Department of Transportation jobs in Panhandle and Miami-Dade County
- Cities of Jacksonville, Doral, Wellington, Miami, North Miami, Miami Beach, Wellington, Hialeah,
- Indian River County
- Parks Departments of Clearwater, Miami-Dade and Tallahassee

Beneficiaries

The two direct beneficiaries of this project are the certified professionals who produce quality work and the agencies that hire them. This leads to a benefit to property owners through the protection of property values and a benefit to the citizens of the state through protection of the environment. The more recognition that is given to certified professionals, the more markets are open to them.

There are currently more than 1,700 FNGLA certified professionals, so they all stand to benefit potentially from the effective marketing conducted during this project. Based on surveys, the 15 agencies listed on the Final Performance Report all hired FNGLA certified professionals for their respective positions.

Based on surveys, a minimum of 15 agencies listed on the Final Performance Report benefited from this project. These 15 have been documented, and through surveys and meetings, FNGLA believes there are many more out there for whom we do not have documentation. All 15 agencies hired FNGLA certified professionals for their respective positions.

Component (4) Education

Project Component Summary:

The educational component provided targeted education to specific segments of the nursery industry. It was divided into four programs. The following four programs are established educational events but with the help of Specialty Crop Block funds, FNGLA is able to enhance the program content and secure presenters that would not normally have been able to speak due to prohibiting costs and speaking fees.

Educating specific segments of the nursery industry will: (1) ensured a more unified industry and a greater understanding of industry members' risks and liabilities; (2) offered leadership training skills to build stronger business relationships; and, (3) provided innovative ways to market products and services. All areas will build a stronger business infrastructure to help safeguard against risk.

Project Goals/Outcomes Achieved

2011 FNGLA Floriculture Field Day:

This program has two major elements required to be successful; an educational conference and performance trial. Each plays an important role and one element could not exist without the other.

The committee deemed the trials were an essential part of the program and therefore sought out to find an experienced partner in performance trials, identify a new location, and determine the logistical aspects of not only an education program but also the field trials. Walt Disney World was identified as a partner to assist in the trials. A location was identified on property which exposed the trials to a larger consumer audience & WDW agreed to serve as host. Installation of the gardens at Walt Disney was done in April and was maintained for a 6-week period. Twenty-two companies participated in the performance trials. 42 beds were planted and over 240 new varieties were tested.

Growers Participation: Riverview Flower Farms and Knox Nursery were chosen as the official growers for the 2011 trials because of their quality growing techniques. They provided the facilities to sow the seeds and prepare plants for the trials.

Participating Companies:

Ameriseed, Inc.
Ball Horticultural Co. – PanAmerican Seed
Ball Horticultural Co. - Ball FloraPlant
Bates, Sons and Daughters
Ernst Benary of America, Inc. (Benary)
Classic Caladiums
EuroAmerican
Fides North America
Floranova/Vegetalis
Grimes Horticulture
Henry F. Michell Co.
Agri-Starts, Inc.
Conard-Pyle Co.
Greenheart Farms
Oglesby Plant Intl., Inc.
Proven Winners
Sakata Seed America
Sun-Fire Nurseries, LLC.
Suntory Flowers, Ltd
Syngenta Flowers
University of Florida

2011 FNGLA Short Course at The Landscape Show provided attendees with a wealth of information. The funding for this portion of the component was used to enhance the content of the program. The program content is a combination of industry speakers and paid expert presenters.

The following presentations were made by speakers who required an honorarium. The rest of the sessions were industry speakers who volunteered their time (FNGLA covered expenses for them). The grant enabled FNGLA to cover the honorariums of the speakers. Without the grant, FNGLA would have had to seek alternative speakers for the program and not had the level of speakers that were present.

Merchandising/Marketing	**The Business Owner's Survival Kit (S7)** – *Ron Rosenberg, QualityTalk, Inc., Raleigh, NC* Come hear seven proven strategies to get more done, grow your business, and take back your life! You're under constant pressure from the realities of the economy, the difficulties of finding qualified staff, and the overwhelming weight of being responsible for the long-term success of your organization.
Luncheon	**The Road to Remarkable (L1) - Doug Stephens, Retail Prophet Consulting, Toronto, Ontario** Consumers have less time and more choices. Success today means being remarkable and standing out from the competition. Remarkable businesses develop a loyal following, uncontested market space and ultimately survive the test of time. The Road to Remarkable will spark

	your company's imagination providing proven strategies to move your business from ordinary to extraordinary.
Landscape Design	**Design Like An Artist (S1) – Gary Smith, W. Gary Smith Design, Austin, TX** While designers solve problems, artists raise questions. Step beyond making "solutions" in garden design and explore a world where there are more questions than answers. With his award-winning work in botanic gardens and arboreta, landscape architect Gary Smith blends artistry with sustainability. After observing the visual vocabulary of patterns and processes that drive the Universe, you'll learn some simple graphic techniques for recording it all. Unleash the artist within yourself, and make meaningful gardens that express the relationship between the site and your own creative spirit.
Design	**Shabby Chic to Recycled Art (S16)** *- Carol Reese, University of Tennessee, Jackson , TN* Ever think about adding windows, bicycles, stoves or old trucks to your designs. This presentation will show you how to turn shabby into chic and create some very elegant designs. Come see how to create fabulous new landscapes with plain old stuff. It is fun, affordable and maybe a little far out. This will be a session not to miss!

There were 64 full registrations and 307 single session attendees. The audience was broken into four concurrent sessions, which averaged about 40 people per session. We were pleased with the turnout but continue to evaluate ways to generate higher numbers.

The Orlando Landscape Tour was part of the FNGLA Short Course. A bus load of attendees traveled to commerial properties in the area. Thirty people attended the planned tour. The tour featured a strong focus on relationship-buidling with commercial business and new irrigation technology and included landscapers, designers and property managers.

A program committee met four times to develop programs that provided a greater understanding of the risks and liabilities along with solutions to stronger business relationships. The program was divided into four breakouts that focused on merchandising and marketing, landscape design, plants and plant products, and landscape management.

A conference evaluation for identified the various reasons why growers and other businesses had chosen to attend:

CEUs (9)
Course Updates (2)
Inspiration (2)
Info
Increase Creativity
To Learn (8)
Improve Sales/Business (3)
Ideas (12)
Education (9)
Knowledge (9)
Speaker (6)

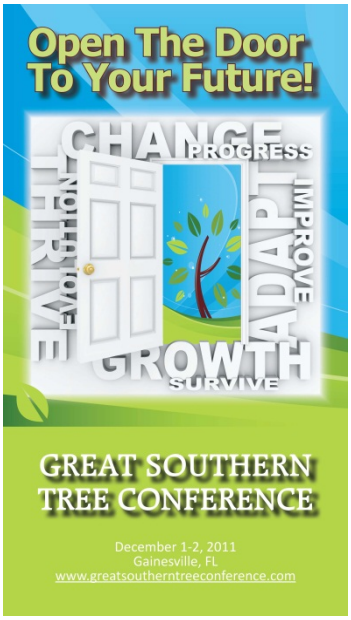
New Business/Industry (4)
Network
Topic (4)
Support FNGLA
Professional Development

Evaluations from attendees reflected a positive outcome and a demand for continuing education by the industry.

146 surveys were returned, and these indicated that the following types of business affiliations were represented at the short course: garden center professionals, growers, landscape management, landscape design firms, landscape contractors. Landscape professionals made up the largest group of attendees. 66% were repeat attendees and 67% said they would plan to return for future events.

Beneficiaries

Industry members received the direct benefits from the fourth component. By providing growers and industry members with the tools they need to minimize risk, our industry is able to supply a better quality product. The networking and communication between supplier and user of plants and products during the educational programs is essential to the success of the industry.



2011 Great Southern Tree Conference – was developed, promoted and executed on November 30 – December 2, 2011. Growth, change, and progress are all key words that were heard throughout the 2011 Great Southern Tree Conference. While the industry has certainly changed in the last ten years and it is currently being reshaped by the economy, the conference remains committed to educating the entire tree industry and aims to enhance the business knowledge of tree producers throughout the Southeastern United States.

Based on the evaluations returned after the program, the following comments were made as to the reason that people attended.

Good new information, Lots of knowledge shared, Loved first speakers, Great Speakers, Great Food and Location
Location and expanded topics beyond tree production, John Thomas
Diversity in topics offered and presented

Attendee Evaluation Form **-- Thursday, December 1, 2011**

Morning Speakers	Excellent	Good	Average	Fair	Poor
8:15 – 9:15 AM.: Today's Challenging Marketplace – What Does the Future Hold? *Dr. Charles Hall, Texas A&M University, College Station, TX*	11	4			
9:15 – 10:30 AM.: Business Survival Kit - 7 Proven Strategies to Grow Your Business *Ron Rosenberg, QualityTalk, Inc., Raleigh, NC*	7	6	1		1
11:00 – 11:45 AM.: Demographic Trends and the Green Industry *John Thomas, Sustainable Design Consultants Inc., Bluffton, SC*	6	4	4	1	
11:45 AM – 12:15 PM.: Fact OR Fiction About Trees *Dr. Ed Gilman, University of Florida, Gainesville, FL*	6	7	1	1	

Afternoon Speakers	Excellent	Good	Average	Fair	Poor
1:15 – 2:00 PM.: Affordable And Effective IPM Programs *Dr. Mike Raupp, University of Maryland, College Park, MD*	9	5	1		
2:00 – 2:45 PM.: Plants to the People: 35 Years of Collecting, Evaluating and Distributing Trees at the JC Raulston Arboretum *Mark Weathington ,JC Raulston Arboretum, Raleigh, NC*	3	7	3	1	
3:15 p.m. — 4:15 p.m.: Industry Forum *Facilitator: Ben Bolusky, FNGLA, Orlando, FL Panelists: Dr. Tom Yeager, University of Florida, Gainesville, FL; Dr. Mike Raupp, University of Maryland, College Park, MD; Jim Spratt, FNGLA, Tallahassee, FL; Mac Carraway, SMR Farms, Bradenton, FL*	4	6	2	2	
4:15 – 4:45 PM.: The Farm Review *Dr. Ed Gilman, University of Florida, Gainesville, FL*	6	4	2	1	

Attendee Evaluation Form-- Friday, December 2, 2011

Morning Speakers	Excellent	Good	Average	Fair	Poor
Current Project Review ***Dr. Ed Gilman, University of Florida***	4	4			
Long Term Impact of Cutting Large Roots ***Jake Miesbauer, University of Florida - Ph.D. candidate***	4	3	1		
Cold Hardy Palms ***John Conroy, Fish Branch Tree Farm, Zolfo Springs, FL***	3	4	1		
Pest Session ***Dr. Mike Raupp, University of Maryland, College Park, MD***	6	2			
Fertilizer Leaching *Dr. Laurie Trenholm, University of Florida, Gainesville, FL*	3	3	2		

Demonstration Site Afternoon Speakers	Excellent	Good	Average	Fair	Poor
Container Type and Size Impacts Establishment *Dr. Ed Gilman, University of Florida*	4	3			
Purchasing Too Large ***Mike Marshall, Marshall Tree Farm, Morriston, FL and Chris Medico, SMR, Bradenton, FL***	5	2			

Dominant and Co-Dominant *Jake Miesbauer, University of Florida - Ph.D. candidate*	3	2			
I-trees Software	3	2			
Mulch Type and Depth impacts tree health ***Dr. Mike Arnold, Texas A&M, College Station, TX***	3	2			

Testimonial:
I applaud the efforts, site and the promotion of the tree industry; I have attended for about 5 of these. Attendance over the years has steadily declined and its more than just the economy. Topics and the practical usefulness is not what it should be.

2012 TPIE Short Course – Florida is the largest foliage (plants used indoors) producing state in the nation, producing at least 70% of all foliage plants in the U.S. The educational programs offer risk management education on marketing, business and merchandising to the buyers of this important Florida commodity. This program was completed as scheduled on January 17-18, 2012. It attracted 90 attendees to a tour called the TPIE Road Show which is part of the TPIE Short Course. The TPIE Road Show was a full-day tour which took attendees to Homestead, FL, a major foliage production hub. The well-attended trip included visits to Farm Life Tropical Foliage, Bernecker's Nursery, Schnebly Redland's Winery, Kerry's and Burry's Berry Farm.

The TPIE Short Course provided exceptional education for interiorscapers which are direct buyers of foliage plants for Florida growers, attending from across the country. The management track introduced participants to Biominicry, a process of applying nature's solutions to human design applications. In addition, sessions with Jason Cupp, a business growth consultant, provided insights on creating the best internal team, as well as improving external sales with new marketing methods. Technician sessions were popular as they focused on biological pest controls, including a hands-on workshop. Dennis Snow provided an enlightening and entertaining luncheon keynote offering important qualities world-class service organizations share. Snow's history as a manager

at Walt Disney World provided fun and inspirational examples of exceptional customer service.

Beneficiaries

Industry members received the direct benefits from the fourth component. By providing growers and industry members with the tools they need to minimize risk, our industry is able to supply a better quality product. The networking and communication between supplier and user of plants and products during the educational programs is essential to the success of the industry.

Overal All Lessons Learned

This project had four closely related components. Through education, certification and marketing components, FNGLA was able to help its members minimize financial and business risk while increasing the awareness of the need for plants and products.

There were no unexpected outcomes but the outcomes were enhanced or more successful with the support of the funding.

Contact Person

- Linda Reindl
  - 407-295-7994 (office), 407-832-8279 (mobile)
  - lreindl@fngla.org

Project (13): University of Florida - Management of Citrus HLB by Overcoming the Salicylat Hydroxylase

Funding Year: 2010
Funding Amount: $154,522.00
Reporting Period: Final

Project Summary

The purpose of this proposal is to improve management of citrus HLB by overcoming the Salicylate hydroxylase, which is used by the causal agent of Huanglongbing or citrus greening to suppress plant defense responses. Citrus is among Florida's largest agricultural commodities and one of its most important specialty crops. Florida accounts for about 70% of the US production of citrus and is the second largest producer of sweet oranges and grapefruit in the world. Florida's citrus industry is facing an unprecedented threat from the highly destructive, fastspreading disease of citrus called huanglongbing (HLB), or citrus greening. The disease is associated with a fastidious, gram-negative, phloem-limited bacterium (Candidatus Liberibacter spp.) (Jagoueix et al., 1994). In Florida, only Ca. L. asiaticus has been detected (Sagaram et al., 2009) and is transmitted by Diaphorina citri. Symptoms such as yellow shoots, leaf blotchy mottle, and lopsided fruits with color inversion and aborted seeds are characteristic of HLB disease (Bové, 2006). HLB can debilitate the productive capacity of citrus trees with losses of 30-100% reported (Aubert 1993). The HLB-associated bacteria can infect most citrus cultivars and are threatening to decimate all 640,000 remaining acres of the Florida citrus industry. No conventional measure has been shown to provide consistent and effective suppression of HLB. Due to the destructive nature of the disease and lack of efficient control measures, growers are often forced to abandon production once the grove becomes severely infested. Development of alternative or complementary approaches for effective management of the disease is highly desirable. In order to prolong citrus production in the presence of HLB, chemical treatment for induction of plant defense responses are being used widely. In this respect, systemic acquired resistance (SAR), which is the activation of a systemic defense reaction in a plant, has been exploited for the development of resistance by a host against Ca. L. asiaticus and for the management of HLB disease by application of SAR elicitors.

Project Approach

<u>Objective 1</u>: Evaluate the role of SahA in suppression of plant defense responses.

We expressed the salicylate hydroxylase (*sahA*) gene of *Ca*. L. asiaticus in heterologous host *E.coli* BL21*[DE3]. The expression was confirmed by SDS-PAGE and western blotting using antibodies against His tag. The functionality of the *sahA* gene was tested by assaying the ability of the *E. coli* cultures carrying the expression plasmid to degrade salicylate-based substrates. Induced BL21*[DE3] carrying *sahA* expression plasmid showed salicylate hydroxylase activity in their crude cell extracts in presence of various substrates.

The *sahA* gene has been cloned into pTLAB31[construct sahA-pTLAB31 (SahA gene driven by the Cauliflower Mosaic Virus (CaMV) 35S promoter] and confirmed by sequencing. The construct, with the genes present in pTLAB31 was then introduced into *Agrobacterium* EHA105. The transgenic citrus plants have been confirmed.

The *sahA* gene was further cloned into pTA7001 [sahA-pTA7001 (SahA gene driven by the Dexamethasone inducible promoter] and confirmed by sequencing. The construct, with the genes present in pTA7001 was then introduced into *Agrobacterium*. The transgenic citrus plants using those constructs have been made.

To determine expression level of defense related genes after *Ca*. L. asiaticus infection, *Xanthomonas axonopodis* pv. *citri* strain A^W (Xac A^W) was used to induce *PR* gene expression. The *PR-1* gene expression in Xac A^w challenged plants which were previously infected with *Ca*. L. asiaticus was lower than Xac A^w challenged healthy plants. Using SA biosensor strain (*Acinetobacter* sp. ADPWH_lux), 4 fold reduction in SA accumulation was observed in the *Ca*. L. asiaticus infected as compared to healthy plants. To understand the possible synergistic effect of the presence of *Ca*. L. asiaticus on the citrus canker [caused by *X. citri* subsp. *citri* (Xcc)] we inoculated Xcc in *Ca*. L. asiaticus infected and healthy leaves of grapefruit. The population levels of Xcc were significantly higher during all the observation time points (up to 14 days) in *Ca*. L. asiaticus infected as compared to healthy citrus that modulation of SA production and subsequent regulation of defense related genes such as *PR-1* gene could be one of the mechanisms deployed by *Ca*. L. asiaticus to evade plant defense responses. The *Ca*. L. asiaticus infected plants compromised with defense responses could further succumb to the infection by other pathogens.

<u>Objective 2:</u> Optimize the SAR elicitors by overcoming the SA hydroxylase encoded by *Ca*. L. asiaticus.

We further tested whether *Ca*. L. asiaticus infection in grapefruit affects salicylic acid levels. We used a recently developed SA biosensor, *Acinetobacter* sp. ADPWH_lux to check the SA levels in HLB infected and healthy grapefruit after the inoculation with Xac A^W. The biosensor is highly specific to SA, methyl-SA, and the synthetic SA derivative acetylsalicylic acid, thus suitable for the quantification of SA from crude plant extracts. The level of SA production was significantly reduced in HLB infected as compared to healthy grapefruit.

We further conducted salicylic acid analysis using HPLC approach which confirms that SA production was significantly reduced in HLB infected as compared to healthy grapefruit.

The effect of different SAR elicitors on the population of *Ca.* L. asiaticus were evaluated in the field. The following elicitors were used including “Saver”, Acibenzolar-S-methyl (ASM, Actigard), benzo (1,2,3) thiadiazole-7-cabothionic acid S-methyl ester

(BTH), *N*-[1-[(6-Chloro-3-pyridyl)methyl]-4,5-dihydroimidazol-2-yl]nitramide (imidacloprid, Admire), and 2,6-dichloroisonicolinic acid (INA).

Objective 3: Screen SahA inhibitors and test their efficacy to reactivate plant defenses alone or in combination with known SAR elicitors.

We have purchased various SAR elicitors and compounds reported as potential salicylate hydroxylase inhibitors including: 2,6-dichloroisonicolinic acid (INA from Aldrich, Natick, MA); ascorbic acid (Acros organics, USA); and copper sulphate (Acros organics, USA). These SAR elicitors and salicylate hydroxylase inhibitors have been sprayed in various concentrations and different cocktails in healthy young citrus plants (6 months) in Mid Florida Citrus groves, Avelon, Fl. HLB infected plants (nearly 5 years old) showing moderate to high symptoms were also identified from the same grove based on disease index as suggested by Gottwald et al. (1989). These trees have also been treated by various concentrations of SAR elicitors and salicylate hydroxylase inhibitors and their cocktails.

Based on disease index ratings (Gottwald et al. 1989) our preliminary results show that application of beta-amino-butyric acid (BABA) and ascorbic acid can protect the citrus from HLB infection in moderately infected trees.

We have further identified several other new compounds and applied these in various concentrations and cocktails in another set of experiment on both young and HLB infected plants (different stages of infection). Those compounds have been applied in March, June, September, and December in 2012, March, and June 2013.

We analyzed the effect of the spray inoculations on disease incidence, PR1 expression and the population of *Ca*. L asiaticus.

Goals and Outcomes Achieved

The goal of this projects was to manage citrus HLB while keeping the US citrus industry profitable and sustainable by utilizing the defense responses of citrus by overcoming the SA hydroxylase, which is used by Ca. L. asiaticus to suppress plant defenses. The discoveries described in the Project Approach section demonstrate that this goal has been achieved. Results have been disseminated to growers as described in the Beneficiaries section so that they may apply these findings to their production practices.

Beneficiaries

Beneficiaries of this project were Florida citrus growers. Florida growers shipped 170.9 million boxes of fruit during the 2011-2012 season, valued at $3.44 billion. Results were disseminated to growers via the following activities:

Four seminars were given on this research to growers and scientific communities.

The research progress is also shared with extension specialists and has been offered to the growers using regular extension approaches.

Two posters on this research were presented national and international meetings.

Two abstracts have been published on this research and one manuscript is currently under writing.

The information has been included extension materials and research updates in multiple websites such as CRDF and University of Florida.

Totally, more than 2000 participants attended the seminars, industry update, and poster view.

Lately, the information on this research has been presented in 3nd International Research Conference on Huanglongbing (February 4-7, 2013) and IRCHLB grower day (March 6, 2013). More than 600 participants attended both events.

Lessons Learned

Our results indicate that SahA of Ca. L. asiaticus suppresses plant defense responses. Our results indicate that both SAR elicitors and SahA inhibitors have significant effect in controlling HLB and slowing down HLB disease development. The control effects are mainly shown on trees without severe dieback and defoliation. This seems to prolong the productive life of HLB diseased trees. However, the HLB diseased trees will not recover to healthy status. Additionally, variations were also observed. For one field trial, less effect was observed. It is possibly because the trees used in the trial were mostly too severe for HLB. It is very important to optimize the concentrations of SAR elicitors and SahA inhibitors. Combination of SAR elicitors and SahA inhibitors together needs to be applied separately rather than applied together, Higher concentration of SAR elicitors and SahA inhibitors did not necessary result in better control effect.

We have met goals proposed for this study. This project also requires us to use integrated approaches to control HLB diseased trees in future study.

Contact Person

Nian Wang

nianwang@ufl.edu

863-956-8828

Additional Information

Please see appendices for additional information.

Project (14): University of Florida - Bring Marketmaker to Specialty Crop Growers in Florida and Extend it into Ornamental Crops

Funding Year: 2010
Funding Amount: $84,735.00
Reporting Period: Final

Project Summary

MarketMaker is a novel, free, nationally-recognized web-based marketing tool designed to allow producers and consumers of specialty crops to establish relationships in local and regional markets, and to enhance sustainability of local food systems. To make this system successful in Florida, it was necessary to recruit as many participants as possible, and to train users on how to conduct market research using the site. This project developed training materials and offered training sessions for users at a variety of venues such as conferences and trade shows.

In recent years, there has been tremendous interest in the development of local and regional markets for food products, in order to minimize transportation costs, improve freshness of produce, increase public awareness about the food system, and enhance its environmental sustainability.

MarketMaker is a national partnership of land grant universities and state departments of agriculture, active in 20 U.S. states and the District of Columbia by the end of March 2013. The system is dedicated to the development of quality-driven food supply chains for specialty crops and food products. The system consists of searchable web-based marketing data for farmers, food distributors, retailers, and restaurants. The MarketMaker website contains demographic and business profiles that the user can query. It is intended to be a friendly forum that allows businesses from farm-to-fork to learn about one another.

The overall goal of this project was to strengthen outreach efforts to bring MarketMaker to Florida's specialty crop producers and buyers, and to teach producers how to utilize the searchable database for market research. The effort used educational events such as the statewide Small Farms and Alternative Enterprises Conference, trade shows, and local specialty grower county meetings to promote and demonstrate MarketMaker. These trainings included demonstrations of how to register a farm on the MarketMaker web site and utilize the searchable database to conduct market research identifying niche markets. Potential buyers/users of agricultural products were introduced to MarketMaker at industry trade shows, using mass media such as press releases and personal contacts through consumer groups such as Slow Foods. Outreach efforts also included online tutorials. Outreach was targeted at the University of Florida's (UF) Institute of Food and Agricultural Sciences (IFAS) Extension agents, many of whom do not have marketing backgrounds, in order to better assist clients seeking information on niche marketing. It was expected that extension agents would continue to promote MarketMaker through

their newsletters, presentations at grower meetings, and personal contacts. Information developed by the project was published on the UF/IFAS EDIS and Solutions For Your Life website.

Project Approach

The primary role of the staff was to assist in the implementation of the initial work plan. This included but was not limited to the development of marketing campaigns, creating promotional and training material for events and personnel, and forming strategic partnerships with similar grassroots organizations. For the purposes of this grant, staff identified and contacted four organizations in an effort to establish strategic partnerships with the goal to promote the use of Florida MarketMaker by the state's specialty crop producers.

MarketMaker is a broad-based platform designed to serve a range of constituents in the agriculture value chain. Its intended purpose was to help connect buyers and sellers thereby facilitating the marketing of a range of agricultural products. To ensure that SCBGP funds were used to solely benefit specialty crops, the university sought out other funds and provided some funding of its own to offset any potential benefits to non-specialty crops. Although specialty crop producers comprised almost 80% of the producer population, this SCBGP has provided less than 45% of the direct expenditures for Florida MarketMaker. Staff estimated that specialty crop producers represented about 367 of the 464 producer profiles at the end of the project funding, or about 80% of the producer population. That would represent an expenditure of less than $190 per specialty crop producers profile under the grant. Although not directly targeted toward specialty crop producers, this group also benefited from the monies spent and efforts exerted by others during that period.

Contributions to support expenditures for Florida MarketMaker's operations, research, and promotion activities came from a number of sources, in addition to the grant:

- IFAS Extension paid $60,000 in upfront startup and enrollment expenses
- Another $20,000 in program fees were paid for by a grant issued by Gulf States Marine Fisheries Commission
- Day to day activities of IFAS Extensions agents and staff in support of educating producers and promoting MarketMaker to buyers

The purpose of the team's work under this grant was to increase the competitiveness of Florida's specialty crop producers. Grant funds were spent in support of this objective with all expenditures directed solely for the benefit of specialty crop producers. All of staff's creative efforts, expensed materials, and travel expenses were for the exclusive benefit of Florida's specialty crop producers as per the proposal's parameters. It is likely that MarketMaker experienced synergistic results and other segments may have benefited from our efforts, even though they were directed specifically toward specialty crop producers.

Summary of significant project partners' roles and contributions made.

- UF/IFAS personnel were the primary contributors to the Florida MarketMaker project. This project relied on cooperation between state extension specialists, regional extension marketing specialists, county extension faculty, and Florida producers and buyers. These groups came together to determine the best way to utilize Florida MarketMaker to increase specialty crop consumption.
- The UF Office of Sustainability was very supportive financially and in promoting Florida MarketMaker to producers, intermediaries (e.g., brokers, distributors, retailers), and consumers.
- Florida Department of Agriculture and Consumer Services's (FDACS) Division of Food, Nutrition, and Wellness partnered with UF/IFAS on the Farm to School program. It was determined that Florida MarketMaker would be used as the database behind a web portal that is being designed to link schools to distributors and local producers.
- The Green Industry Research Consortium (GIRC) is a multi-state regional research committee sponsored by the National Institute for Food and Agriculture (NIFA) and the Southern Association of Agricultural Experiment Station Directors (SAAESD) and has the official designation of Multi-state Regional Project S1051. The committee is comprised of horticulturists and agricultural economists from land-grant universities and worked with MarketMaker to establish an industry profile template and search features.

After working in conjunction with our project partners, staff identified a six-point strategy to increase the competitive advantage of specialty crop producers. These activities were performed in executing the campaigns and outreach efforts described below.

- Train the trainers: educated extension personnel on the uses, benefits, and functionality of Florida MarketMaker so they could train specialty crop producers in their individual counties on the platform. These were conducted as part of training seminars where face-to-face presentations were used to teach agents how to use the website and one-on-one demonstrations.
- Ecommerce option: educated specialty crop producers' about their no-cost option to diversify marketing strategies to include, at a minimum, an online profile potentially making their overall marketing efforts more efficient and effective. These efforts were conducted as part of extension training seminars and Small Farms Academy classes where presentations were used to inform specialty crop growers about options to optimize their marketing efforts.
- Expand market options: educated specialty crop producers on using MarketMaker's market research capabilities to access direct to consumer and other niche markets via demographic research tools. Staff used promotional materials, individual demonstrations, and breakout sessions at tradeshows, conferences, association meeting, and other agriculture related events to educate audiences.
- Program materials: developed presentations, educational and promotional materials to be used in educational seminars with specialty crop producers and to share with buyers informing them about MarketMaker's uses, benefits, and functionality.

- Promotion: educated the public and buyers about MarketMaker and the availability of specialty crops on the platform. Staff used promotional materials, one-on-one demonstrations, and website tours at tradeshows, conferences, association meeting, and other agriculture related events to educate target audiences.
- Ornamental Horticultural: the goal was to expand MarketMaker access to ornamental horticultural growers thereby increasing the overall size and range of specialty crops available on the website.

After extensive consultation in the first quarter of 2011, it was determined that a three-pronged approach would be most effective in advancing the goals as outlined under the grant. The Florida MarketMaker team would work with its strategic partners to develop two marketing campaigns targeting different audiences for the purposes of reaching the state's specialty crop producers. The third prong would be to work directly with the Green Industry Research Consortium (S-1051 multi-state project) and Louisiana State University to develop parameters for introducing ornamental plant products to MarketMaker.

Summary of marketing campaigns

- Campaign I was managed in conjunction with UF/IFAS state extension marketing specialists and targeted all extension personnel. The intent of the campaign was to educate staff on the uses, benefits, and functionality of Florida MarketMaker and also to provide them with presentations and educational materials. Extension personnel could then take this information directly to their specialty crop producers within their counties. The long-run value would be that this information would be made available to producers both during the grant-funding period and also after expiration in essence institutionalizing the benefit. Copies of presentations and other materials developed for the campaign are included in *Appendix 3*. This process directly supported Outcome #3 and would facilitate the accomplishment of Outcomes #1 and #2. The campaign targeted extension related events as outlined in *Table 1*.
- Campaign II was managed in conjunction with the UF Office of Sustainability and FDACS directly targeting specialty crop producers and consumers at agricultural events throughout the state. The intent of the campaign was two-fold. Firstly, staff needed to educate specialty crop producers on the uses, benefits, and functionality of Florida MarketMaker as well as provide them educational material. Secondly, we wanted make consumers and buyers aware of the program by providing them with promotional flyers encouraging them to use the service. The dual nature of the campaign was designed to be self-perpetuating:
    1. As more producers signed-up, consumers and buyers would have more choices and would be encouraged toward more frequent use of the service;
    2. As more consumers and buyers were made aware of the service, producers would see more foot traffic to their individual websites and would be inclined to more actively manage their profiles.

  Copies of educational and promotional materials developed for the campaign are included in *Appendix 4*. This process directly supported Outcomes #1, #2, and #4. The campaign targeted

consumers and buyers at agricultural events throughout the year and the state as outlined in *Table 2*.

Summary of ornamental horticulture outreach efforts

- MarketMaker and UF/IFAS staff worked with GIRC, Louisiana State University extension, and industry to develop parameters for introducing ornamental plant products to MarketMaker. These parameters included establishing an industry standard profile template for ornamentals and assessing industry needs and desires around marketing through the MarketMaker portal. The program was primarily coordinated through UF/IFAS and MarketMaker staff and GIRC. In the 4th quarter of 2011, the team members and partners determined that the group lacked the necessary funding required to implement the coverage elements necessary to fully incorporate the ornamental industry into MarketMaker. Estimates for programing alone exceeded available budgetary resources. The standardized profile template developed by the working group for the ornamental industry is included in *Appendix 5*. This process directly supported Outcomes #5. The working group meet on several occasions and those events and participants are outlined in *Table 3*.

Goals and Outcomes Achieved

Activities completed to achieve the goals and outcomes for the project.

- Although not funded by the grant, William Barker, a graduate student in the Food and Resource Economics department, assisted with the final stages of implementation and management of the MarketMaker work plan.
- For the project period, UF/IFAS personnel attended tradeshows, conferences, association meeting and other agriculture related events to promote the use of Florida MarketMaker to specialty crop growers. By the end of the project, the Florida MarketMaker team attended more than 20 events annually.
- Developed training materials to assist producers and buyers in the use of the Florida MarketMaker website, including web-based tutorials and a website for extension personnel to use were completed and housed at http://fl.marketmaker.uiuc.edu/main/resources. As the National MarketMaker team made improvements to the National and State portals, these training materials were updated to maintain consistency.
- In support of Campaign I, MarketMaker staff attended or supported 15 events during 2011 and 2012 and the first quarter of 2013. At these events, staff trained IFAS Extension agents on the uses, benefits, and functionality of Florida MarketMaker so they could train specialty crop producers in their individual counties on the platform. They also distributed presentations, educational and promotional materials that had been developed to be used in educational seminars with specialty crop producers and to share with buyers informing them about MarketMaker's uses, benefits, and functionality. These events consisted primarily of training

classes at county extension offices, one-on-one tutorials with agents, and demonstrations at sponsored programs. The events are summarized in Table 1 below and benefited more than 600 specialty crop producers, 40 Buyers, and 600 agents who were trained at these events. A more detailed listing of all the events attended is found in *Appendix* 1 and copies of the training materials are included in *Appendix* 3.

Table 1: Campaign I (estimates of attendance by target beneficiary group)

	Consumers				
Event	**Producers**	**Buyers**	**Agents**	**Timing**	**Location**
Food Safety Planning Program	17		3	April	Marianna, FL
Annual Extension Professional Associations in Florida meeting			400	September	Orlando, FL
UF/IFAS District meetings (2011, 2012)			195	Varies	Varies
Annie's Project	160			Ongoing	Varies
IFAS Research & Education Centers / County Extension Offices	180		18	Ongoing	Varies
Presentation to Other Organizations	249	44	10	Ongoing	Varies

- In support of Campaign II, MarketMaker staff attended or supported 39 events during 2011 and 2012 and the first quarter of 2013. These events included tradeshows, conferences, association meeting, and other agriculture related events. During their attendance, staff educated specialty crop producers on the uses, benefits, and functionality of Florida MarketMaker as well as provide them educational material. Secondly, we wanted make consumers and buyers aware of the program by providing them with promotional flyers encouraging them to use the service.
  - At the events, staff manned exhibition booths, gave presentations and explained informational materials provided to consumers, specialty crop producers, agents, and buyers about the advantages of using MarketMaker to find specialty crops.
  - One-on-one demonstrations of how to register a farm on the MarketMaker website.
  - How to utilize the searchable database to conduct market research identifying niche markets enhancing overall business growth and profitability for Florida's specialty crop growers through access to a greater variety of markets, both wholesale and retail.
  - Educated specialty crop producers' about their no-cost option to diversify marketing strategies to include, at a minimum, an online profile potentially making their overall marketing efforts more efficient and effective.

The events are summarized in Table 2 below and benefited more than 4,200 specialty crop producers & consumers, almost 200 Buyers, and 370 agents who were trained at these events. A more detailed listing of all the events attended is found in *Appendix* 1 and copies of the training materials are included in *Appendix* 4.

Table 2: Campaign II (estimates of attendance by target beneficiary group)

Event	Producers	Buyers	Consumers Agents	Timing	Location
Agritunity (2011, 2012, and 2013)	395	15	65	January	Bushnell, FL
Milton Agribusiness Conference	68	3	4	February	Milton, FL
Florida Berry Expo	275	15	10	February	Balm, FL
Cooperatives: Basics and how to organize and market	17		3	April	Monticello, FL
Farm-to-Table	142	4	4	April	Ocala, FL
Stone Fruit Field Day	65	4	6	April	Citra, FL
All Florida Ag Show	110	25	15	April	Highland, FL
Sunbelt Growers meeting	50	5	5	June	Moultrie, GA
Florida State Horticulture Society Annual meeting			135	June	Varies
Small Farms/Alternative Enterprises Conference (2011, 2012)	295	35	70	July	Kissimmee, FL
Farm-to-Restaurant Workshop (2011, 2012)	50	45	5	August	Gainesville, FL
Florida Council of Cooperatives Annual Meeting (2011, 2012)	120			August	Sarasota, FL
Florida Citrus Expo	65	5	5	August	Varies
Florida Farm Bureau annual meeting (2011,2012)	400			October	Varies
Sunbelt Agriculture Expo	2,000	25	30	October	Moultrie, GA
Florida Ag Expo	125	15	10	November	Balm, FL
Desoto County Ag Fest	39	3	3	November	Arcadia, FL

- In support of ornamental horticulture outreach efforts, UF/IFAS and MarketMaker staff discussed the details of what coverage elements would be required by industry for them to consider MarketMaker a suitable platform to market their products. The following meetings/conference calls held by the working group and the Green Industry Research Consortium supported the ornamental horticulture outreach efforts.

Table 3: Ornamental Horticulture Outreach Effort Meetings

St Paul, Minnesota

Present were: Hodges, Hall, Schuch, Mathers, Barton, Ingram, Khachatryan, Behe, Campbell, Alicia (student), Yue, Posadas, and Palma.

Tampa, Florida

Present were: Alan Hodges, Charlie Hall, Dewayne Ingram, Roger Hinson, Bridget Behe, Robin Brumfield, Hayk Khachatryan, Sue Barton and Marco Palma

Columbus, Ohio

Present were: Dewayne Ingram, Marco Palma, Marc Teffeau, Chengyan Yue, Sue Barton, Ben Campbell, Bridget Behe, Alan Hodges, Charlie Hall, Hannah Mathers, Jeff Kuehny, Roberto Lopez

New Orleans, Louisiana

Present were: Alan Hodges, Charlie Hall, Roger Hinson, Bridget Behe, Marco Palma, Christine Coker, Jennifer Dennis, Robin Cross , Roberto Lopez, Daniel Warnock, Jeff Kuehny, Ben Campbell, Sue Barton, Dewayne Ingram, Craig Nessler

MarketMaker was originally designed for food crops such as fruits, vegetables and nuts, but did not cover ornamental horticulture specialty crops such as landscape trees, shrubs, flowers, tropical foliage plants, bedding plants, groundcovers, etc. These meetings were used to discuss necessary changes needed in MarketMaker to expand the program to ornamental horticulture producers.

- Determined standardized profile template for the industry
- Discussed benefits of extending the MarketMaker system to include ornamental crops, in order to enhance local and regional marketing programs.
- Educated industry participates on the uses, benefits, and functionality of Florida MarketMaker.

Progress made towards achievement

- Over the period of the grant, Florida MarketMaker experienced a 28% increase in the number of registered producers in the database since February 2011. The hope was that this work with FDACS on the Farm to School program will continue to provide a win-win for producers, schools, and intermediaries as that project to move forward independent of this grant.
- As of March 2013 there were a total of 464 producer-related profiles (258 farmers, 164 farmers markets, 24 agritourism operations, and 18 wineries) and a total of 75,526 buyer-related profiles (8 buyers, 46,212 eating and drinking establishments, 23,313 food retailers, 3,039 processors, and 2,954 wholesalers) in the Florida MarketMaker database. Table 4 provides a complete breakdown of these profiles.

Table 4: Summary of Florida MarketMaker Profiles

	User or Admin entered profiles	**Purchased profiles**	**Total profiles**	**Specialty Crop Related**
Agritourism	24	-	24	11
Buyer	8	-	8	7
Eating & Drinking Place	185	46,027	46,212	-
Farmer/Rancher	258	-	258	184

Farmers Market	164	-	164	164
Food Bank	1	-	1	1
Food Retailer	166	23,147	23,313	-
Processor/Packing Shed	287	2,752	3,039	-
Wholesaler	78	2,876	2,954	-
Winery	18	-	18	-

Comparison of actual accomplishments with the established goals

The five stated measurable goals of the grant are discussed below as the expected outcomes of this project. Summary information on events and estimates for contacts for the period are presented in Tables 1 & 2.

- Outcome #1: Training will be provided to at least 1,000 specialty crop producers in Florida, who enter/edit information for a profile on MarketMaker.
    - The MarketMaker team targeted more than 20 events annually where they conducted training classes, attended trade shows and association meetings offering guidance, informational materials, and training to more than 4,800 specialty crop producers and consumers/buyers on the use of MarketMaker.
    - A summary of the events attended and estimates for the specialty crop producers contacts made at each are presented in Tables 1 & 2.
- Outcome #2: The MarketMaker system will be exposed to at least 200 buyers or users of Florida agricultural products who use the system to source local/regional produce.
    - The MarketMaker team estimates that at least 243 buyers were contacted and introduced to the website, its capabilities and provided informational materials on its use.
    - A summary of the events attended and estimates for the buyer contacts made at each are presented in Tables 1 & 2.
- Outcome #3: Training on using Market Maker will be provided to at least 100 UF/IFAS extension agents who share the system with local clientele.
    - Staff exceeded their training goal by reaching significantly more than 100 of the State's County extension agents and IFAS personnel with educational material and operational instructions on the advantages and uses of the MarketMaker website, database, and research capabilities. Over the period of the grant, we estimate almost 1,000 agent contacts were made to individuals, or as a group, to educate UF/IFAS extension agents recognizing that many agents encountered the material on numerous occasions.
    - A summary of the events attended and estimates for the UF/IFAS extension agents contacts made at each are presented in Tables 1 & 2.
- Outcome #4. Use of MarketMaker will increase the number of customers purchasing from Florida specialty crop producers, as documented through surveys.
    - As the team prepared to conduct surveys to document increases in customers purchases from specialty crop producers, they became aware of a series of focus groups there were being held as part of another SCBGP project in 2012. These focus groups were conducted by the UF-IFAS PIE Center with the aim of identifying messages that resonate with both

consumers and specialty crop producers in reference to their use of MarketMaker including changes in purchasing habits. A decision was made to not duplicate efforts and spend the money from two grants on similar surveys documenting the same impact. Instead, staff would rely on the results from the work conducted by the team of SCBGP FFY2012 as documented support for our efforts under this grant. While the team does not claim responsibility for the labors of others under another grant, the following benefits followed from this decision:

  - Superior insight into the increased competitiveness of Florida's specialty crop producers though UF-IFAS PIE Center's expertise and proficiency in conducting consumer behavior research for little or no cost to this grant
  - Leveraging the work in progress under another grant saved funds allocated to this project which could thereby be used to further our efforts in educational, promotional, and outreach efforts in support of increasing the competitiveness of specialty crop producers
  - Avoided spending money twice to conduct similar research to document analogous outcomes

  A copy of their preliminary report is attached as *Appendix 2*.

- Although surveys were not conducted documenting customer purchasing habits, the Florida MarketMaker website statistics have improved dramatically over the period of the grant.
  - Companies with 10 or more business views on the website almost quadrupled from 71 in 2010 to more than 270 in 2012. For the first quarter of 2013, 125 companies have already had their business searched more than 10 times.
  - Total business webviews increased 14% from a little more than 10,200 in 2010 to 11,600 in 2012. In 2013, total webviews are on pace to exceed 20,000.
  - Unique users to the website have increased more than 75% since 2011 to more than 8,600 in March of 2013.

- Outcome #5. The scope of MarketMaker will be extended to include at least 1000 ornamental horticulture products.
  - Although MarketMaker, the Green Industry Research Consortium (S-1051 multi-state project), and a team from Louisiana State University continued to work on developing parameters for introducing ornamental plant products to MarketMaker, it was determined in the 4th quarter of 2011 that we would be unable to achieve Outcome #5 of extending the scope of MarketMaker to include at least 1,000 ornamental horticulture products. Lacking broad industry support, the Florida MarketMaker team did not have the financial, programming, or marketing resources necessary to configure MarketMaker to handle ornamentals. Without the necessary budgetary resources to implement the standardized ornamental profile template in MarketMaker, Outcome #5 was abandoned and the situation was promptly reported in the quarterly reports. From that point forward, no more resources from the grant where allocated to the achievement of Outcome #5.

Beneficiaries

The MarketMaker system has helped to enhance business growth and profitability for Florida's specialty crop growers by generating greater access to a variety of markets, both wholesale and retail, through the internet.

Description of the groups and other operations that benefited from the completion of this project's accomplishments

- Groups that have benefited from this project include: Florida specialty crop producers, intermediaries, such as brokers, distributors and buyers, county extension personnel, and Florida consumers.

Quantitative data and/or the potential economic impact of the project

- Staff attended 54 events since January 2011 to promote MarketMaker. The return on investment was a 28% increase in the number of registrants. Of the 464 producer-related profiles in the data base at the end of the grant period, 195 have been specifically categorized as specialty crop producers and almost 40% of those registered during the period covered by the Florida MarketMaker staff's efforts under the grant.

Lessons Learned

Insights and lessons learned

- At the end of the grant, most, but not all of the projected goals had been meet. This can be attributed to the limited staff responsible for MarketMaker. We encountered difficulty getting more FDACS divisions and various Florida commodity associations to assist with promoting MarketMaker to their members. Although we continued to reach out to industry groups encouraging their use of Florida MarketMaker, we have identified barriers to the programs use. For example, the website needed a more user-friendly design. The Florida MarketMaker team worked with the national team in an attempt to solve this and similar issues.
- Similar to the successful adoption of other new technologies by producers, intermediaries (brokers, distributors, retailers) and buyers, Florida MarketMaker required constant promotion and attention, multiple points of contact, and consistent follow-up.
- The Florida MarketMaker effort was greatly enhanced by a national coalition of MarketMaker states that were in constant communication with each other about what was working and what needed improvement regarding the MarketMaker program efforts.
- The same programmatic efforts across states that were a benefit for the "food" side of MarketMaker reminds us that to duplicate the success of food MarketMaker in the ornamental industry will require more financial and human resources than were available during this project.
- The Florida MarketMaker program would greatly benefit from a companion platform such as the MarketReady program created by the University of Kentucky to encourage producers to focus on the overall marketing strategy of their business.

Unexpected outcomes or results

- None at this time.

Lessons learned to help others expedite problem-solving

- Applying Florida MarketMaker to the ornamental industry proved more difficult than originally anticipated. Although technically possible to include profiles for producers and intermediaries in the ornamental industry, it would take significant financial and human resource investments and broad industry support for this to become a reality.

MarketMaker future needs

- As stated earlier, MarketMaker would greatly benefit from a companion programs such as MarketReady and RestaurantReady. IFAS extension will need to continue to follow-up with specialty crop producers assisting them with their overall marketing plans. They will also continue to develop and implement a set of in-service training materials and extensions training modules targeting specialty crop producers' marketing needs.
- An updated MarketMaker website will be launched during 2013 that will be more user friendly and will help simplify the registration process. This will necessitate a need for updated educational and promotional materials. Presentations and other training materials will also have to be updated as the MarketMaker portal and registration process evolve.
- UF and FDACS continue to work with the University of Illinois to develop a dedicated Farm to School portal using the MarketMaker database as the foundation. This work will generate a web portal that targets schools, foodservice distributors, and producers interested in the Farm to School Program in Florida. A successful launch of this effort will require financial and human resources to mount an effective marketing campaign targeting specialty crop producers to ensure their engagement in this developing opportunity.
- A strong need exists for continued development of promotional materials and marketing strategies that target specialty crop producers to encourage them to enter and maintain current their profile information in the Florida MarketMaker database.

Contact Person

- Dr. Allen F. Wysocki
  - 352-392-1963
  - wysocki@ufl.edu

Appendix 1: Detailed Listing of Events from January 2011 - March 2013

- January 29, 2011: MarketMaker how to presentation to 250 people at the Agritunity Meeting in Bushnell, FL.
- February 7, 2011: MarketMaker how to presentation to 75 people at the Milton Agribusiness Conference in Milton, FL.
- April 5, 2011: Cooperatives: Basics and how to organize and market: MarketMaker was offered as a tool for this group of 20 people at the Johnston Market in Monticello, FL.
- There were 8 counties that participated in the 2011 Annie's Project (a program designed to promote entrepreneurship and networking for women in agriculture). During this 6-week program, participants are exposed to many concepts and opportunities. During the marketing sessions, Florida MarketMaker is introduced to the participants as a tool for their marketing toolbox. Approximately 150 women were involved in this project.
- April 16, 2011: MarketMaker booth at the 150 person Farm-to-Table event in Ocala, Fl.
- April 18, 2011: MarketMaker how to presentation at the Food Safety Planning Program at the North Florida REC, Suwannee Valley to 20 people (agents).
- April 27, 2011: MarketMaker how to presentation and sign up to 75 attendees at the Stone Fruit Field Day in Citra, FL.
- April 28, 2011: MarketMaker how to presentation to 110 county extension personnel as part of the UF/IFAS Central District meeting, Osceola County Extension Office (agents).
- May 10-11, 2011: MarketMaker booth and discussions with U/IFAS Northeast County Agent Staff meeting with 35 people (agents).
- June 4, 2011: MarketMaker how to presentation and sign up to 60 people at the Sunbelt Growers meeting in Moultrie, GA. In addition to peanuts, a number of these producers are involved in specialty crop production.
- June 5-6, 2011: MarketMaker booth and how to presentation to 135 attendees of the annual Florida State Horticulture Society meeting in St. Petersburg, FL (agents).
- June 21, 2011: MarketMaker how to presentation and sign up to 15 people at the Washington County Extension Office, Monticello, FL.
- July 15-16, 2011: MarketMaker Booth, how to presentations, and sign for the attendees of the 3rd annual UF/IFAS Statewide Small Farms and Alternative Enterprises Conference in Kissimmee, FL. Approximately, 250 people attended the workshops and stopped in at the booth.
- July 26, 2011: MarketMaker Presentation to members of the Washington County Cattlemen Association in Chipley, FL. Travel for this event was funded by other sources. Approximately 3 people present were also involved in specialty crop production.
- July 27, 2011: MarketMaker Presentation to 18 Extension agents from UF/IFAS and UGA in Quincy, FL (agents).
- August 1, 2011: MarketMaker Booth, how to presentation, and sign up to 50 participants the 2nd annual Farm-to-Restaurant Workshop in Gainesville, FL.

- August 5-7, 2011: Florida Council of Cooperatives Annual Leadership Conference. Florida MarketMaker was a sponsor at this meeting and banners were put up and flyers were distributed to over 60 producers who attended this annual leadership conference that focuses on introducing cooperatives to people who often have little knowledge of how cooperatives are different from other forms of business.
- August 17, 2011: Conference Call with Gloria Van Treese, Deb May, and Yolanda Roundtree, FDACS personnel to discuss ways to collaborate on promoting FDACS fruit and vegetable producer programs through Florida MarketMaker and how FDACS can promote Florida MarketMaker to producers and buyers.
- August 25, 2011: Danny Raulerson, FDACS meeting. UF/IFAS MarketMaker personnel met with Danny Raulerson of FDACS to discuss ways to reach more specialty crop producers through the State Farmer's Market programs.
- August 29 – September 1, 2011: Annual Extension Professional Associations in Florida meeting in Orlando where two displays for fruits and vegetables, seafood, and consumers were used. Displays viewed by over 400 extension agents around state (agents).
- September 8, 2011: Local farm tour with Aramark in North Central Florida. Attended a tour of three farming operations as part of Aramark's efforts to connect producers with chefs in North Central Florida. As a participant on this tour, UF/IFAS MarketMaker personnel had the opportunity to discuss the benefits of MarketMaker with Aramark staff, FreshPoint (a produce distribution company) buyers and managers, chefs from the Jacksonville area, and the three producers, whose operations we visited (25 people total).
- Sept.13, 2011: A presentation to the Union County AG Advisory Committee on the MarketMaker's selling and research features and distribution of Producer Profile sheets (15 people).
- September 20, 2011: Jay, Florida. MarketMaker how to presentation and sign up for 25 producers who belong to the Panhandle Fresh Marketing Association (PFMA). This was part of a listening session where PFMA members told UF/IFAS what some of their needs were and what additional extension programming they desire.
- September 22, 2011: MarketMaker Webinar with Localecopia for continued efforts in partnership. Localecopia provides network of producers, consumers, and foodservice enterprises in the Palm Beach area (4 people).
- September 22, 2011: Hastings Area Potato Grower Meeting. MarketMaker was highlighted as another tool that the 21 Hastings potato growers who participated in a marketing session could adopt.
- September 29, 2011: Florida Organic Growers Certification program in Bell. As part of a marketing panel discussion, the Market Maker tool was presented to 25 growers who were encouraged to sign up. Also present as part of the panel, were the FDACS Farm to School representatives and an industry person.
- UF/IFAS continued to deliver Annie's Project (a program designed to promote entrepreneurship and networking for women in agriculture) in the spring of 2012. Columbia County is the first location to start. A total of 10 women are participating in Annie's project in Columbia County. This 6-session program began on Tuesday October 4.

Participants are exposed to many concepts and opportunities. During the marketing sessions, Florida MarketMaker is introduced to the participants as a tool for their marketing toolbox.

- October 6 – 8, 2011: MarketMaker Booth at the 70th annual Florida Farm Bureau Federation meeting of 200 attendees. Efforts are being made to move the Farm Bureau's current online producer listing to MarketMaker.
- November 17, 2011: MarketMaker Presentation and Booth at the annual Localecopia Meet-N-Greet in Palm Beach, Florida. There were a total of 40 participants present.
- January 28, 2012: MarketMaker Booth was displayed at Agritunity 2012 at the West Central Florida Agricultural Education Center in Bushnell FL. Agritunity is a regional farm conference and trade show with various vendors of agriculture products and presentations on new opportunities in the industry. 100 people stopped in at the booth.
- February 14, 2012: MarketMaker Presentation and Booth at the 2012 Florida Berry Expo located at the University of Florida/IFAS Gulf Coast Research and Education Center in Balm, FL. 300 people attended this exposition.
- April 25, 2012: MarketMaker Booth was displayed at the First Annual All Florida Ag Show located at the Highlands Count Fair and Convention Center in Sebring Florida. Dr. Allen Wysocki spoke on the benefits related to using Market Maker and other media devices to promote Florida Agriculture. This Ag Show showcased companies from around Florida with a broad spectrum of products and services. It is estimated that 150 people stopped by the booth.
- April 26, 2012: MarketMaker Booth was displayed at the Central District Meeting at the West Central Florida Agricultural Education Center in Bushnell FL. This symposium gathered all the extension agents from the central district to discuss and share projects and ideas they have been working on throughout the year. 50 agents stopped by the booth.
- June 28, 2012: MarketMaker Presentation at the Central Florida Young Farmers and Ranchers Meeting located at Glisson's Animal Supply in Sebring. Presentation was given to upcoming agriculturalist from the Highlands County area. 20 people attended this meeting.
- July 18, 2012: Presented to the Young Farmers and Ranchers group of Highlands County at the Farm Bureau office in Sebring, Florida around 20 people attended the meeting.
- July 26-27, 2012: MarketMaker Booth, how to presentations, and sign up to the 675 attendees of the 4rd annual UF/IFAS Statewide Small Farms and Alternative Enterprises Conference in Kissimmee, FL. 150 stopped at the booth.
- August 10-12, 2012: Florida Council of Cooperatives Annual Leadership Conference. Florida MarketMaker was a sponsor at this meeting and banners were put up and flyers were distributed to over 60 producers who attended this annual leadership conference that focuses on introducing cooperatives to people who often have little knowledge of how cooperatives are different from other forms of business.
- August 13, 2012: MarketMaker Booth, how to presentation, and sign up to 50 participants at the 3rd annual Farm-to-Restaurant Workshop in Gainesville, FL

- August 15, 2012: Attended the Florida Citrus Expo and talked to producers and handed out fliers about MarketMaker and its benefits. Approximately 75 people stopped by the booth.
- September 4, 2012: MarketMaker Presentation to around 20 producers at the Lake City Extension office. The meeting consisted of small farmers wanting to learn more about marketing.
- September 13, 2012: A presentation at the extension office in Bushnell to 30 producers about the benefits of using MarketMaker. The class was on direct marketing and online resource to help companies in the Ag industry.
- October 15-17, 2012: The MarketMaker booth was displayed at the Sunbelt Agriculture Expo in Moultrie, GA over 2,055 people stopped at the booth. We handed out informational brochures and registered companies at the event.
- October 29, 2012: Attended the 2012 MarketMaker annual meeting to discuss changes to the sight and different ways in which the website is being used.
- November 24-25, 2012: Attend and had a booth at the Farm Bureau Annual Meeting in Jacksonville, FL. 200 people stopped by the booth.
- November 7, 2012: MarketMaker booth was displayed at the Florida Ag Show in Balm, FL where exhibitors showcased agriculture companies from around the state for farmers and people in the industry. 150 people stopped at the booth.
- November 17, 2012: MarketMaker booth was displayed at the Desoto County Ag Fest located at the Turner Center in Arcadia, FL. This event is held to help educate and promote agriculture in Desoto County and is organized by the Desoto County extension office. 45 people stopped at the booth.
- November 27, 2012: A meeting was held with individuals from FDACS that are working on the Farm to School program discussing the potential opportunities of using MarketMaker to enhance the program. Staffs from national MarketMaker were also in attendance and progress was made to use the website as a tool to find producers that can provide schools with local products.
- November 29, 2012: The MarketMaker team met with the representative Tim Woods from the Kentucky MarketReady program to discuss opportunities for Florida. MarketReady is a program that helps provide technical and business development services to facilitate the profitable production, processing and marketing of locally produced and processed food by Kentucky-based enterprises and entrepreneurs. MarketMaker facilitates with the networking of the companies that are involved in MarketReady.
- January 13, 2013: Starting a Successful Hydroponic Business - Marketing Session. Workshop designed to help small farmers start a hydroponic business using controlled growing systems to provide high quality grown specialty crops for local markets. 75 people attended the workshops.
- January 15, 2013: Vegetable Producers Roundup Jay, FL. Explained variety of uses of MarketMaker in the marketing of vegetables. 20 producers attended.
- January 25, 2013: Small Farms Academy (Mushrooms) - Marketing Sessions. Hands-on one-day workshop to teach participants how to select, grow, harvest, and market

gourmet mushrooms appropriate for the Florida market. 25 people attended the sessions.

- January 26, 2013: Personnel manned a MarketMaker Exhibitors Booth at the West Central Florida Agricultural Education Center in Bushnell, FL for Agritunity 2013. Agritunity is a regional farm conference and trade show with various vendors of agriculture products and presentations on new opportunities in the industry. Approximately 125 people stopped at the booth.
- February 8, 2013: Personnel manned a MarketMaker Exhibitors Booth at the 2013 South Georgia / North Florida Vegetable Production Meeting. Used the opportunity to explain to specialty crop farmers how MarketMaker could be used to enhance their internet-marketing footprint. 100 people stopped at the booth.
- March 17, 2013: provided informational flyers and other materials to the North South Institute's 10th Annual Symposium held in Miami, FL.

Appendix 2: Preliminary Report: Florida MarketMaker

Florida Department of Agriculture and

Consumer Services Specialty Crop Block Grant

Written by Laura Conaway

Appendix 3: Presentations and Educational Materials for Marketing Campaign I

Appendix 3 FL MM Campaign I.pdf

Appendix 4: Promotional and Educational Materials for Marketing Campaign II

Appendix 4 FL MM Campaign II.pdf

Appendix 5: Standardized MarketMaker Profile Template for Ornamental Industry

Appendix 5 Ornamental Profile Template.pdf

Project (15): Miami-Dade County, Florida - Redland Raised – "Fresh from Florida Project"

Funding Year: 2010
Funding Amount: $142,557.00
Reporting Period: Final

Project Summary

Redland Raised is the county's local agricultural product brand. The "*Redland Raised: Fresh from Florida*" brand was developed in 2008 by more than thirty farmers and distributors with the guidance of the County's Agricultural Manager and support from the State as well as locally-based member organizations, such as: the Dade County Farm Bureau, Dade County AGRI Council, Tropical Fruit Growers of South Florida, Inc., and the Florida Nursery, Growers and Landscape Association. The impetus for the development of this local branding product was to showcase local specialty crops, inform the public and attempt to recapture some of the markets lost to direct foreign competition caused by the implementation of the North American Free Trade Agreement. The Re*dland Raised* brand was officially kicked off and showcased in November 2009 with great acceptance but minimal funding. The promotion was cut short due to the devastating freeze that severely impacted all Florida Farmers in January 2010, and then defunded due to budgetary constraints. This grant allowed for the implementation of this program.

A buy local program in Miami-Dade County is needed to remedy agricultural losses attributed to significant and sustained competition from foreign produce. The project was especially important and timely considering the devastating agricultural crop losses, valued at just over $280 million, endured in 2010 by Miami-Dade County farmers as a result of unusual and persistent freezing cold temperatures. The freeze had a particularly devastating effect on the vegetable industry. Florida growers are the largest U.S. supplier of vegetables during the winter months.

Project Approach

- ☐ This program needed to not only provide opportunity for marketing grower's products in a consistent region based method, but to also make changes in the way some retailers perceive their business models. The program also included the selling growers on the significance of a local, singular brand. The use of, and assistance by, the Florida Department of Agriculture's marketing staff and *Fresh From Florida* program was invaluable at making the jump to a local brand possible. Due to the success of the *Fresh from Florida* program, we did not have to "reinvent the wheel"; just expand it to promote local specialty crops and the benefits of those

crops. This made the grower's and retailers, many of which were already *Fresh from Florida* members, much more comfortable with the *Redland Raised* program. The primary component of the program was to reach out to growers and retailers and convince them to carry the label and make changes to packaging and store displays.

The activities performed during the grant period include:

- Contact specialty crop growers/packing houses/supermarket/retail outlets for buy local program:
  Numerous Miami-Dade county growers were contacted through the use of public meetings, presentations to industry groups and direct contact, to explain and encourage participation in the Redland Raised program. All major retailers within Miami-Dade County were contacted and solicited for participation in the program by the Agricultural Manager.

- Develop and produce "Redland Raised Fresh from Florida" POP materials:

  Point of purchase material was developed produced with participation from retailers with regard to specific requirements as to size/shape. A change to the original size and layout was completed at the request of our largest retail partner.

- Display POP materials at participating locations
  Material was displayed at Publix Supermarkets, Gardner's Market, some items in Whole Foods, and several of the largest retail farm stands in the area. This accounted for more than 300 retail outlets in the southeast region of Florida and more than 1200 outlets nationally. An agreement with large retailers Wal-Mart and Winn-Dixie, was never consummated although numerous attempts, meetings and discussions took place. Wal-Mart is currently showcasing Redland Raised at two of their new *Neighborhood Market* stores in the county. As acceptance of this new, grocery only, Wal-Mart stores expand, so will the utilization of the brand.

- Develop and produce the Redland Raised "Specialty Crop" cookbook

  3000 cookbooks were completed with tremendous support and assistance from local growers and packers who provided the recipes.

- Develop and produce public advertising campaign (public transit ads, print ads, and multilingual brochure)

The public advertising was a great success that has continued to generate interest form growers and the public. The trilingual informative brochures about the benefits of using local specialty crops were produced and continue to be distributed through public meetings, festivals, farmers markets, local grower organizations and CSA groups. Print and website advertising spots were purchased with the Miami-Herald and El Nuevo Herald, South Dade News Leader, numerous community newspapers and transit buses. Feature articles and advertisements have appeared in 4 "305 Fit", a quarterly magazine that is direct mailed to all households (circulation 1.1 million) in the county. A 30 second video was created on the benefits of Redland Raised and supporting local growers by buying Redland Raised produce, which aired on Miami-Dade TV as well as social media and the county website.

- Ensuring that grant funds for Redland Raised is only utilized to market and promote specialty crops
  This was accomplished very easily, as production in Miami-Dade county is almost exclusively specialty crops. The crops we produce that are not considered specialty crops are fish, cattle and other animals. None of these were promoted with the grant funds.

- ☐ Our project partners included various industry groups such as the Dade County Farm Bureau, Tropical Fruit Growers Association of South Florida and the Agri-Council. These groups assisted in promoting the program to their membership, allowing presentations at their board and membership meetings and facilitated meetings with individual growers.

Goals and Outcomes Achieved

The activities that were completed in order to achieve goals and outcomes are outlined above under "Project Approach". The goals and measurable outcomes of the project are provided as follows:

- ☐ The outcome measures for the Redland Raised program were both short and long term, as this program will continue.
- ☐ While the number of individual stores carrying the brand is greater than projected, the anticipation was that more retail companies would be including Redland Raised in their promotions. Unfortunately that was not the case. While still successful, not all major retailers agreed to utilize the free material offered, although we continue to work with them to do so. Fortunately we were able to have great success with the largest grocery retailer in Florida, Publix Supermarkets, and we value their support.

Outcome #1: *To expand local markets for local growers*

Goal #1: Establish, market, and promote a buy local program for the "Redland Raised

Fresh from Florida" brand to support local specialty crop growers and raise their product profile in local supermarket/retail outlets.

- We were able to make noticeable improvement in the recognition of local product by the consumer. This was measured based on direct feedback from growers and retailers who reported an increase in demand for Redland Raised products. The increase was reported directly by the retailers and packers who sold the items. This has led many growers to change their packaging to utilize the brand, re-tooling box dies to include the brand and create their own packaging and store display material at their expense to continue the program.
- Material was displayed at Publix Supermarkets, Gardner's Market, some items in Whole Foods, and several of the largest retail farm stands in the area. This accounted for more than 300 retail outlets in the southeast region of Florida and more than 1200 outlets nationally. An agreement with large retailers Wal-Mart and Winn-Dixie, was never consummated although numerous attempts, meetings and discussions took place. Wal-Mart is currently showcasing Redland Raised at two of their new *Neighborhood Market* stores in the county. As acceptance of this new, grocery only, Wal-Mart stores expand, so will the utilization of the brand.

Outcome #2: *To Increase local consumption of fresh, locally grown specialty crops*

Goal #2a: Raise local public awareness on the benefits of buying local, with an

emphasis on specialty crops, by developing and implementing a countywide "Redland Raised Fresh from Florida" advertising campaign (multilingual) to promote local buying and local consumption of specialty crops.

- The public advertising campaign included the trilingual informative brochures about the benefits of using local specialty crops were produced and continue to be distributed through public meetings, festivals, farmers markets, local grower organizations and CSA groups. Print and website advertising spots with the Miami-Herald and El Nuevo Herald, South Dade News Leader, numerous community newspapers and transit buses. Feature articles and advertisements have appeared in 4 "305 Fit", a quarterly magazine that is direct mailed to all households (circulation 1.1 million) in the county. A 30 second video was created on the benefits of Redland Raised and supporting local growers by buying Redland Raised produce, which aired on Miami-Dade TV as well as social media and the county website http://www.miamidade.gov/business/agriculture-redland-raised.asp .

Goal #2b: Raise local public awareness on the benefits of buying local, with an

emphasis on specialty crops, by developing and producing an official Redland Raised "Specialty Crop" cookbook with a particular focus on specialty crops grown in Miami-Dade County, complete with food handling and nutritional knowledge segments.

- 3000 cookbooks were completed with tremendous support and assistance from local growers and packers who provided the recipes, they are available for sale at http://parkstore.miamidade.gov/, http://csa.farmigo.com/store/beeheavenfarm#Tab=ahBzfmZhcm1pZ28tY3NhLWhych0LEgRGYXJtGPyfugIMCxIIQ2F0ZWdvcnkYqqozDA & http://www.dade-agriculture.org/.

The outcomes proposed in the plan have been achieved. The success of the brand has increased awareness, sales and consumption of our local products. The use of this brand as a marketing tool for growers has assisted in the increased sales of their products.

Beneficiaries

- Beneficiaries of this program are the farmers, packers, distributors and retailers of Redland Raised specialty crop produce. Seven of the County's produce packing houses have embraced the program, this group accounts for about 60% of the produce grown and shipped from the area. They represent the largest segment of local growers.
- The retailers, farmers and packers benefited from participating in the plan through increased consumption and demand. There was an increase in sales and consumption due to the program as reported from the packers and retailers. The increases and benefits are evident is also evident given the continued request by participant retailers for additional material and promotion and by growers who rebranded packages and created additional material for in store display at their own expense to promote the brand.

Lessons Learned

- Offer insights into the lessons learned by the project staff as a result of completing this project. This section is meant to illustrate the positive and negative results and conclusions for the project.
- The most significant unexpected outcome of this program was that some growers took it upon themselves to work with retailers to develop in store marketing material based on the Redland raised program, at their own expense. We had initially hoped for these growers to brand their box material, but were surprised at the creation of in-store displays. Also, several growers updated their websites with the brand and we have had tremendous unexpected support from bloggers and local "foodie" organizations touting the campaign.

Contact Person

Charles LaPradd
Agricultural Manager
Regulatory and Economic Resources Department
Miami-Dade County
305-971-5091
lapradd@miamidade.gov

Additional Information

- ☐ Sample of promotional material are attached. The cookbook is being marketed through the following websites:

http://parkstore.miamidade.gov/
http://www.dade-agriculture.org/

Project (16): National Watermelon Association - Food Safety Manual Language Conversion

Contract Number: 16800
Funding Year: 2010
Funding Total: $29,942.00
Reporting Period: Final

Project Summary

With a significant number of Spanish speaking migrant workers and line managers throughout the watermelon supply chain, especially on our farms and in our packing facilities, we found an imperative need to offer a Spanish language version of our program that they could review, become familiar with, and help the industry follow those acceptable growing and handling practices at all levels of their operations.

The scope of work that proposed was to make our program available to those workers in our industry who speak and read Spanish primarily. We accomplished that task by converting our English language version into Spanish, posting the new version on our web site for easy access, producing CD copies, and distributing the same to the industry.

This project was important because many workers in the industry do not read or write in English, and therefore it is vital for us to accomplish this outreach to all facets of our industry.

The impact on our industry, when we conducted this project, was significant. Every person that we communicate effectively with can help us in our efforts to continue to provide one of the safest crops of all fresh produce.

This project was not built on a previously funded project with the SCBGP or SCBGP-FB. This project was the next logical step in our development, educational outreach and industry implementation of our crop's commodity- specific food safety and traceability guidelines for the fresh watermelon supply chain. After comprehensive peer review, the second edition of our crop's program was released in late February 2009.

The NWA developed our crop's own food safety and traceability program after two years of extensive work with Industry, Academia, Government, Retailers, and peer trade groups. The program is based on Good Agricultural Practices, Good Handling Practices and the finest traceability program in the world today, with item-level tracking capabilities through label technology.

Project Approach

The creation of the Spanish language documents began with the awarding of the translation activity to the winning proposal, which followed our RFP process. Trusted Translations of Miami, Florida, the translation company, did a fine job of translating 190 pages and 49,000 words into the Spanish language version. The company converted the English language version into the Spanish language from start to finish, protecting the integrity of our original format, pictures, charts, audit forms, etc.

Simultaneously, we issued a second RFP for the reproduction of the translation files (along with the English-language files) on to 2,500 CDs. The food safety documents posted on to the CDs are for use by employers and workers for education, training and reference. Media Tech Plus of Winter Park, Florida was the winning bidder of this RFP, and did a fine job of copying and producing the CDs.

The posting of the Spanish documents on our web site was completed by our vendor- member and web-host; Camp 6: They are a long-time member of the NWA, and provide us with a discounted service of in-kind sponsorship through hosting and maintaining our website, www.nationalwatermelonassociation.com.

The mailing of the Spanish language materials to the industry was completed by the NWA staff in cooperation with our sister organization, the National Watermelon promotion board of Orlando, Florida.

All of our partners in this project worked well. Once the project was authorized to begin, each partner did their job on time, and well. The industry received the project through the mail prior to the U.S. domestic season beginning in mid-April (which allowed us to reach a primary goal of timeliness).

Goals and Outcomes Achieved

The objective of this project was to develop the Spanish language version of our food safety guidelines and provide the same to the industry for their own localized educational outreach within their own companies.

The number of people and operations that were affected positively by this project is enormous, and will transcend the State of Florida. It is difficult to determine the people and businesses that were affected, largely based on the differing sizes of the businesses, the numbers of employees each has, and the numbers of employees that only read and/or speak Spanish.

Our main focus was Florida, and we thoroughly expect the results to be widely distributed throughout the United States, and possibly into Canada and Central America as a result of Florida-based businesses also having year-round operations outside of our state's borders.

Our goal was to provide every employer on our watermelon farms and packing operations with the opportunity to educate their workers with the food safety and traceability program in the dominant languages (English and Spanish) that best fits each employee that works in their business. We did that.

1,000 CDs were produced, each of which contained a complete set of Spanish-language materials for use by growers. Of these, 729 were mailed directly to growers upon completion, while the remainder were distributed at events or remain available on request from NWA.

Data on website hits and/or downloads of the Spanish-language material from NWA's website was unavailable, due to the fact that our web hosting company had not installed Google Analytics to track site usage. We were not aware of this deficiency until we attempted to gather the data for this report.

Food safety is our first priority yesterday, today, and tomorrow. Because we created a Spanish language version of our comprehensive food safety and traceability program, the industry will be able to educate and train migrant workers who cannot read or speak the English language, but yet are ever present and vitally important in our industry's businesses.

No other project is more important to the industry than food safety, and that includes our version of traceability, which is by far the best in the world. Watermelon has taken the recommendations of the Produce Traceability Initiative (package labeling) and reduced it to item level tracking through label technologies. That makes this educational process of our Spanish speaking workers even more important to our overall efforts. With our Florida industry's leadership and input, we are continuing to push the envelope with the entire industry to be better than we ever have been.

Beneficiaries

Consumers and industry will benefit from this project. Consumers will benefit as a result of significant numbers of people becoming aware of our food safety practices, and helping us to assure them of a safe and healthy crop. Industry will benefit through the workers knowing what is expected of them and helping to implement those practices into the operations where they work.

The 729 producers who received our Spanish-language materials via direct mail are the primary beneficiaries of this project. Additionally, the material remains posted on the NWA website for download by melon producers. While we do not know how many have implemented the food safety practices outlined in the materials, they have the information required to do so.

We do not expect a large potential economic impact as a result of this project's success. Food safety and traceability have largely become a cost of doing business in today's world. However, it will help us to increase consumer confidence in the safeness of our crop and our industry's growing and handling practices

Lessons Learned

From an administrative stand-point, we will hire outside administrative support in the future to complete the tasks we accomplished with this project. Although we came right at our projected personnel budget, it was a burden to take our focus away from our every-day responsibilities.

Other than that area of improvement, we are grateful for the grant and know that it will provide dividends to the industry, to their customers, and to consumers in the years to come.

All of our set goals were achieved with this project, and we completed it well under the original budget.

Contact Person

Bob Morrissey
Executive Director
National Watermelon Association, Inc.
5129 South Lakeland Drive
Suite 1
Lakeland, Florida 33813
Ofc: (863) 619-7575
Fax (813) 619-7577
E-mail: bmorrissey@tampabay.rr.com

Additional Information

Copies of Spanish-language materials developed and distributed through this project are available at http://www.nationalwatermelonassociation.com/food_safety.php.

Project (17): USDA-ARS - Field Evaluation of Broad Spectrum Non-fumigant Pest Control for Strawberry and Vegetable Production

Funding Year: 2010
Funding Amount: $318,003.00
Reporting Period: Final

Submitted by:

Drs. Erin Rosskopf and Nancy Burelle, USDA, ARS, US Horticultural Research Laboratory, Fort Pierce; Dr. Joe Noling, University of Florida, Institute of Food and Agricultural Sciences (UF-IFAS), Fort Pierce and Lake Alfred; Bradley Booker and Dr. Frank Sances, Florida Ag Research, Dover; and Ted Campbell, Florida Strawberry Growers Association, Dover.

Project Summary

A novel combination of organic acids was developed in collaboration between the University of Florida and the USDA, ARS Fort Pierce, FL. The combination, referred to as 'SPK' (U.S. Patent Application Serial Number 61/153,485) has shown great potential for controlling soilborne pests including fungi, nematodes, and weeds in laboratory, greenhouse, and field microplot trials. Objectives of the proposed research were to further evaluate efficacy as a methyl bromide alternative in high-value crop production systems currently dependent on soil fumigation; raised-bed strawberry and vegetable production in Florida. Few fumigants are currently available for control of soilborne pests in specialty crops. The recent removal of iodomethane, a promising "drop-in" replacement for methyl bromide, from the US market has left only Telone®, chloropicrin (pic), metam sodium/potassium (metam), and dimethyl disulfide (DMDS, Paladin™). These materials are used in multiple combinations and all face regulatory limitations and are under scrutiny by the EPA based on their potential for by-stander exposure due to heightened concerns related to volatile organic compounds (VOCs). The ultimate goal of the proposed research was to identify a non-fumigant measure for the control of soilborne pests in specialty crops. Two strawberry trials were conducted to compare the experimental material to a chemical standard and to a non-fumigant approach to soilborne pest management. Two vegetable trials were aimed at determining if efficacy could be improved through rate manipulation and application technique.

Project Approach

In total, three vegetable and two strawberry field trials were conducted. The first vegetable trials that was established at the University of Florida, Indian River Research and Education Center, Fort Pierce, FL was repeated two times; once with a tomato/pepper crop and once with a pepper/cucumber crop. The second and third trials were conducted in cooperation with Florida Ag Research at their Dover and Thonotosassa locations. Foliar diseases at the original location at the University of Florida were not adequately controlled to assess the soil treatments. All experiments were conducted as outlined in the proposal using replicated treatments arranged in a randomized complete block design.

Two strawberry trials were conducted at the Florida Strawberry Growers Association Dover Research Farm. These trials included five treatments: Untreated Check, two rates of the experimental material SPK applied through drip lines, InLine® (Dow AgroSciences, 1,3-dichloropropene:chloropicrin, as the commercial standard), and the best non-chemical standard developed in a recently completed project. Treatments were replicated four times. The In-Line and SPK applications were performed using a standard drip application system developed by Dr. Joe Noling. The first season strawberry field trial was established in October 2010 and was completed in May 2011. The second season trial was established in September 2011 and was completed in March 2012.

The first vegetable trial was initiated at the Thonotosassa location in July 2012 and completed in December 2012. The second vegetable trial, at the Dover location, was initiated in August 2012 and completed in January 2013. The vegetable experiments were established with 6 treatments: untreated, methyl bromide, SPK shank applied at 480 gal/A and 1714 gal/A and drip applied at 480 gal/A and 1714 gal/A. Each treatment was replicated four times and a plot consisted of 100' of treated bed (36" wide at the base). All treatments were covered with Canslit brand metalized film to assist with whitefly control.

Data collection for all trials included soil pH measures, weed incidence, species composition and final weight, root-knot nematode and sting nematode soil density, crop growth parameters, incidence of soil borne disease, soil quality parameters, crop yields, and generation of volatile organic compounds. In addition, pathogen packets, containing inoculum of *Fusarium oxysporum* and *Macrophomina phaseolina* were placed in beds either under the drip tape or in the bed middle. Two packets were inserted in each replicated plot. These were recovered, plated onto selective media, and survival was quantified. Immediately after treatment, samples were collected for pH and VOC readings were performed.

Nematode, weed, and native soil fungal populations were assessed prior to treatment, immediately following treatment prior to crop establishment, at mid-season of the crop, and at the initiation of harvest. Ten soil cores were taken in each plot using a 2.5-cm-diam soil probe. Cores were combined and a 100-cm^3 subsample was used to extract nematodes using the Baermann funnel technique. Nematodes from the subsample were identified as root-knot or sting, other parasitic, or free-living nematodes and counted using an inverted microscope. Survival of fungal propagules was assessed by dilution plating of soil samples onto general media. In-field disease ratings were performed throughout the season beginning with seedling damping off and continuing through root condition ratings following the final harvest. Weeds were identified to species for quantification and weed biomass was measured at crop completion.

Plots were harvested based on the commercial standard and was supervised by Bradley Booker. After the final harvest, plants were removed from the soil and plant growth measurements, including top weight, root weight, and stem caliper at crown were recorded. At the end of the season, nematodes were extracted from plant root tissue, counted, and identified as described above.

Goals and Outcomes Achieved

Generation of volatile organic compounds (VOCs) was monitored immediately after treatment, 24 hours, and one week after treatment. No VOCs were detected in any of the SPK-treated plots. Plots treated using a shank application of the high rate of SPK remained at a low pH for significantly longer than plots with the same rate applied through drip irrigation. There are no additional results to report at this time.

There was a significant interaction between treatment and packet placement with regard to the fungal inoculum that was placed in the beds prior to treatment. *Fusarium oxysporum* inoculum survival (expressed as log [(cfu/g)+1]) was significantly decreased by both In-Line and ASD treatments when compared to the untreated check regardless of packet placement. Higher mortality occurred in packets that were placed in the bed centers compared to those that were placed to the outside of the drip toward the shoulder (Fig. 1). For the *M. phaseolina* introduced inoculum, the higher rate of SPK was more effective than the lower rate and the lowest number of colony forming units survived in the bed center with SPK rate 2 and In-Line. ASD, the non-chemical treatment, was equally effective at eliminating this pathogen in both packet placement locations (Fig. 2).

Parasitic nematode populations were much lower at this location than was anticipated. A site with a higher population of sting nematode has been identified for the repeat of this trial. Although the overall numbers were low, there was a statistically significant difference between the number of sting nematodes in the untreated check and the treated plots immediately after treatment. At harvest, the population had dropped again and few, if any sting nematodes were found in any of the plots. By the mid-season, only the numbers of non-pathogenic nematodes were significant different, with ASD treatments have the greatest number of this group (Fig 5).

Strawberry fruit was harvested based on commercial standard. There was a total of 23 picks. Total weight of fruit was numerically lowest in the UTC and ASD plots; however there were no statistically significant differences among any treatment. In the second year, crop nutrition was monitored using plant sap testing and ASD-treated plots produced the greatest number of marketable fruit (Fig. 4).

Soil populations of *Fusarium* spp. *Fusarium oxysporum* (Foxy), and *Trichoderma* were monitored throughout the trial. Immediately following treatment application, populations of *Trichoderma* spp., a potentially beneficial fungus, were significantly increased in plots treated with SPK (Fig. 4). Late season populations of *Trichoderma* remained high in both SPK treatments and increased significantly in the ASD plots by harvest (Fig. 5). The implications of this finding are extremely important for the use of this material as a methyl bromide replacement in the production of tree liners in the southeast, which require a Trichoderma population to prevent transplant failure. Also of significance is the increase in the native soil population of total *Fusarium* spp. and Foxy in the UTC, which did not occur in any of the other treatments. This resulted in an increase in disease incidence in the UTC, which was higher than all other treatments. Disease plants were analyzed for causal agent and a mixed infection of Foxy and *M. phaseolina* was found to cause the mortality observed in the field.

In the vegetable trials, the same trends were seen with regard to populations of the *Trichoderma* populations. After treatment, root-knot nematode populations were lowest in the low drip and high shank applications of the organic acid. These were equal to the methyl bromide treatment, but were not significantly different than the other two organic acid applications (Fig. 6). There were no differences in the non-pathogenic nematode population. The organic acid treatments, regardless of application strategy, did not control introduced pathogens (Fig. 7). At the Dover location, the two drip applications of the experimental material provided better weed control than the other applications (Figs. 8,9). There were few significant differences between any treatments with regard to crop yields at either location (Figs 10,11, 13,14).

The application of material at the Dover location was followed by a significant rain event immediately after the trial was established. This appeared to have a detrimental impact on all of the experimental treatments as reflected in the lack of differences between the chemical treatments and the untreated check.

Beneficiaries

Beneficiaries of this project included Florida vegetable and strawberry growers, which collectively account for over $1.2 billion per year in value of production. Results of this research were disseminated as follows:

This information has been shared with industry representatives, the Florida Strawberry Growers Association (FSGA) and the Florida Fruit and Vegetable Association (FFVA). Reports have been shared with the FSGA on an on-going basis. The membership of this organization is composed of a minimum of 40 strawberry producers and nurserymen. FFVA is an integral part of the annual meeting on alternatives to methyl bromide, at which progress on this project has been shared on an annual basis.

Lessons Learned

Additional work on the application strategy will be required before this technology can be transferred to the grower community. The approach used for applying material using a relatively deep-shank applicator should be reconsidered and a mini-coulter application strategy will be tested in the future. These trials will be conducted again, at the same locations, under the auspices of Florida Ag Research, outside of the scope of the previously funded SCBG grant. The continued work will be supported independent of this program in order to continue the optimization of the application strategy before extending the technology to on-farm trials. The patent application filed on this material prior to the grant period is still pending and no additional effort will be made regarding commercialization until that process has been completed.

The ability to control weed populations, particularly Carolina geranium, clover, and other small-seeded legumes, was limited with this material. It is likely that an herbicide partner will still be required and will need to be researched for each target specialty crop to ensure that crop phytotoxicity does not occur when soil pH is dramatically reduced using the application of SPK.

It was unexpected that rain events would have such a negative impact on the efficacy of the material. This is of particular importance for use in Florida as the period of time in which the applications of SPK would be made for fall plantings would coincide with historically rainy periods. However, the use of anaerobic soil disinfestation during this period might be improved by the regular soil saturation. In addition, the amount of water that was used to apply the SPK in these trials also caused beds to collapse, which further indicates that a mini-coulter system with less water during application would be an improvement in application method.

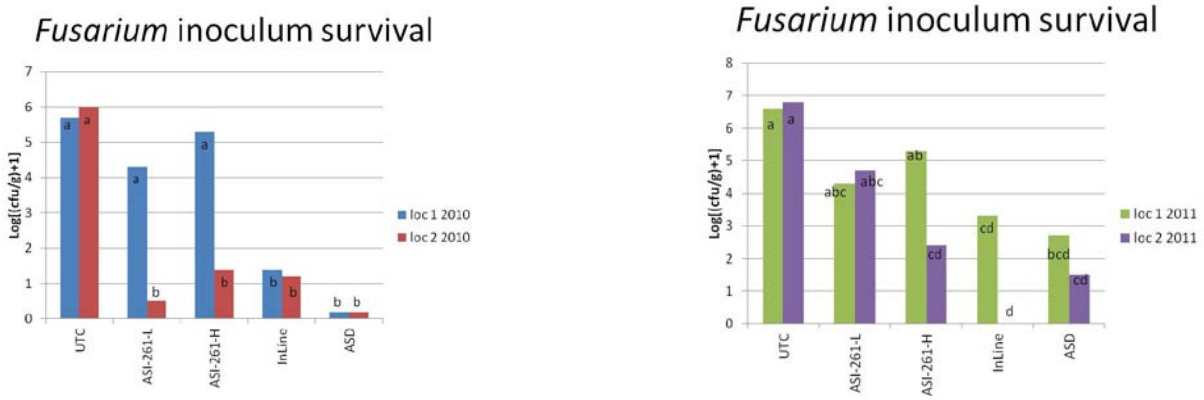


Figure 1. Survival of introduced inoculum of *Fusarium oxysporum* in 2010 (left) and 2011 (right) strawberry trials. Packets were placed in two locations, under the drip line toward the bed shoulder (loc 1) and at the bed center between the drip lines (loc 2). Survival is expressed as log [(fungal colony forming unit (cfu)/g soil) +1]. Bars with the same letter are not significantly different based on Fisher's protected LSD (0.05). The experimental material ASI-261 is equivalent to SPK.

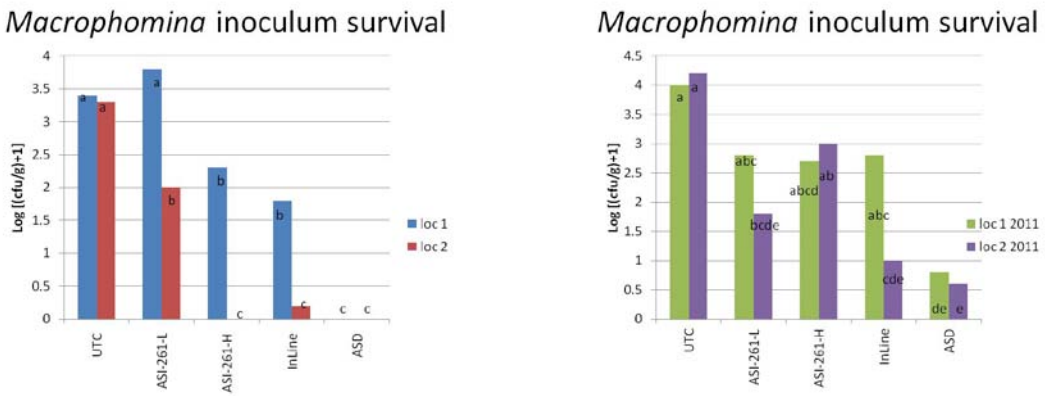
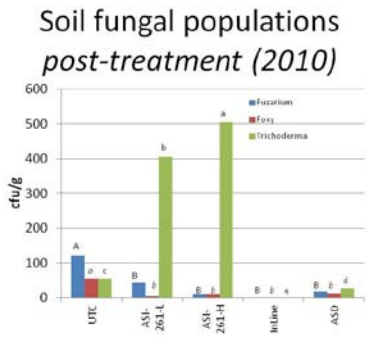


Figure 2. Survival of introduced inoculum of *Macrophomina phaseolina* in the 2010 (left) and 2011 (right) strawberry trials. Packets were placed in two locations, under the drip line toward the bed shoulder (loc 1) and at the bed center between the drip lines (loc 2). Survival is expressed as log [(fungal colony forming unit (cfu)/g soil) +1]. Bars with the same letter are not significantly different based on Fisher's protected LSD (0.05). The experimental material ASI-261 is equivalent to SPK.



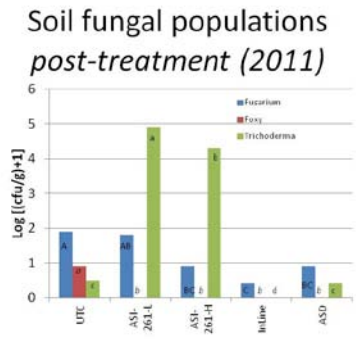
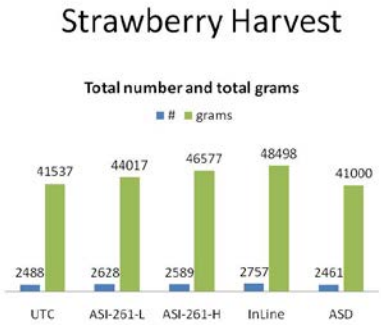


Figure 3. Post-treatment native soil fungal populations expressed as colony forming units/g soil in the 2010 (left) and 2011 (right) strawberry trials. Foxy represents *Fusarium oxysporum*. Bars within an organism category with the same letter are not significantly different based on Fisher's protected LSD (0.05). The experimental material ASI-261 is equivalent to SPK.



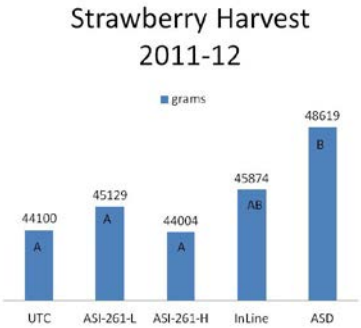


Figure 4. Strawberry harvest data expressed as number of fruit (blue) and total grams of marketable fruit (green) in the 2010 trial (left) and total marketable yield in g in 2011 (right). There were no statistically significant differences between treatments in 2010. The experimental material ASI-261 is equivalent to SPK.

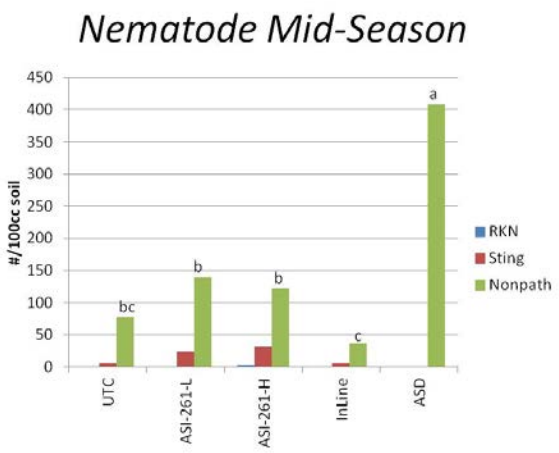
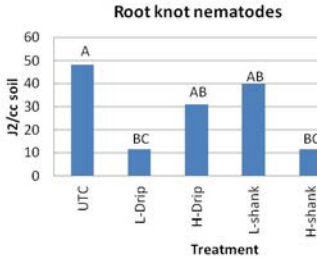


Figure 5. Numbers of root knot (RKN), sting, and non-pathogenic nematodes per 100cc of soil collected at the strawberry mid-season from the Dover trial. Bars with no letters are not statistically significantly different. Those with different letters on each bar are significantly different based on the Fisher's protected LSD (0.05).



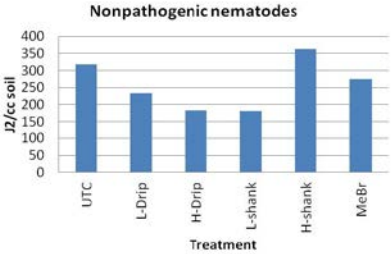
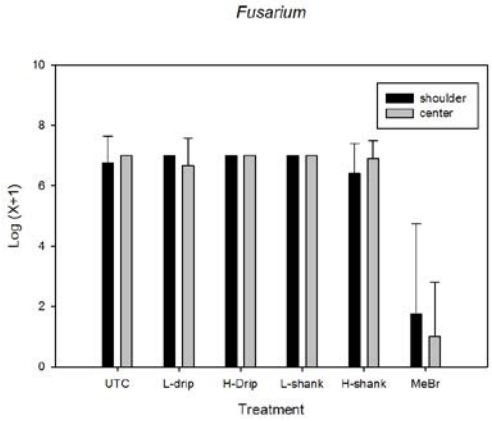


Figure 6. Number of J2 root-knot (A) and non-pathogenic (B) nematodes per 100cc of soil surviving after treatment application. Bars with different letters on each bar are significantly different based on the Fisher's protected LSD (0.05). Bars with no letters are not statistically significantly different.



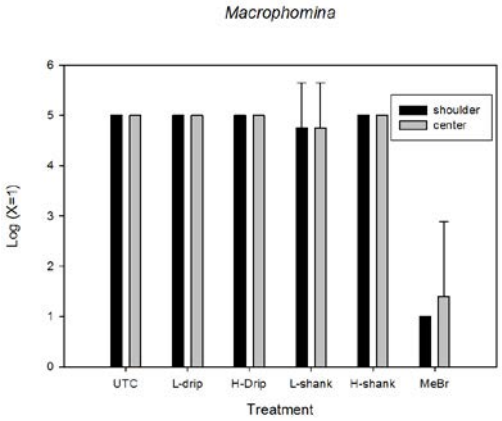


Figure 7. Survival of colony forming units of *Fusarium oxysporum* (A) and *Macrophomina phaseolina* (B) per gram of soil (cfu/g). Log+1 data transformation was used for statistical testing in order to meet the assumption of normality.

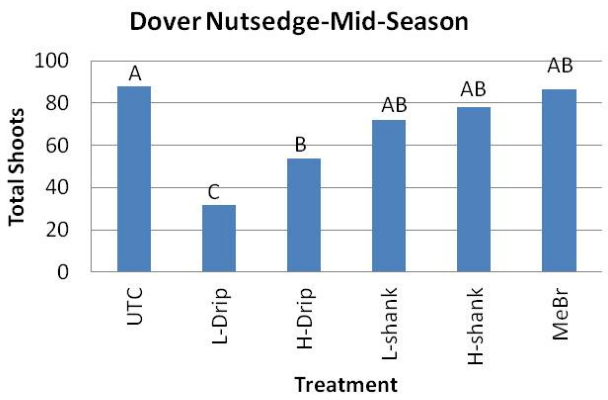


Figure 8. Total mid-season nutsedge counts per bed Dover pepper/cucumber trial. Bars with different letters are significantly different based on mean separation using LSD (0.05).

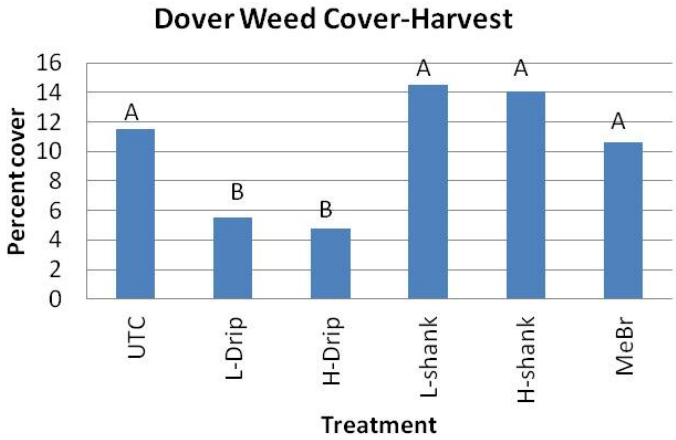


Figure 9. Total harvest weed cover Dover pepper/cucumber trial. Bars with different letters are significantly different based on mean separation using LSD (0.05).

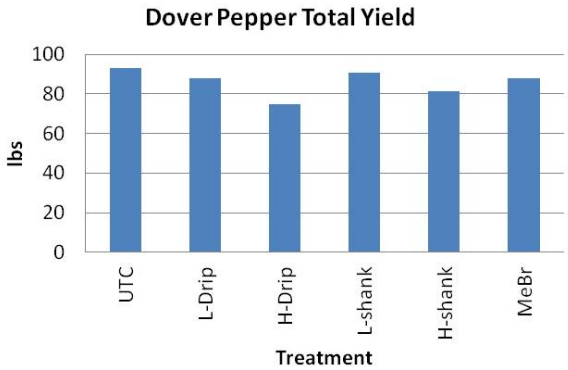


Figure 10. Total marketable pepper yield Dover pepper/cucumber trial. Not significantly different based on ANOVA (0.05).

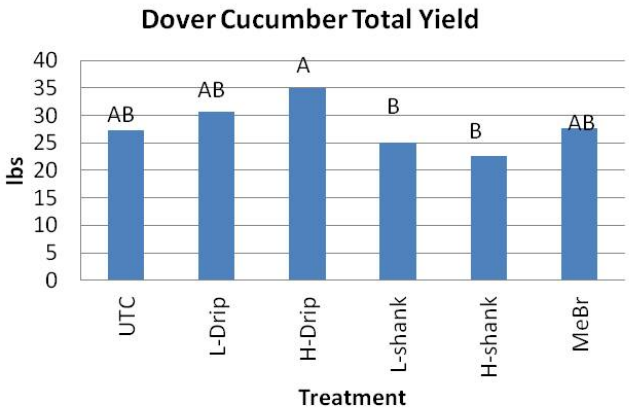


Figure 11. Total marketable cucumber yield Dover pepper/cucumber trial. Bars with different letters are significantly different based on mean separation using LSD (0.05).

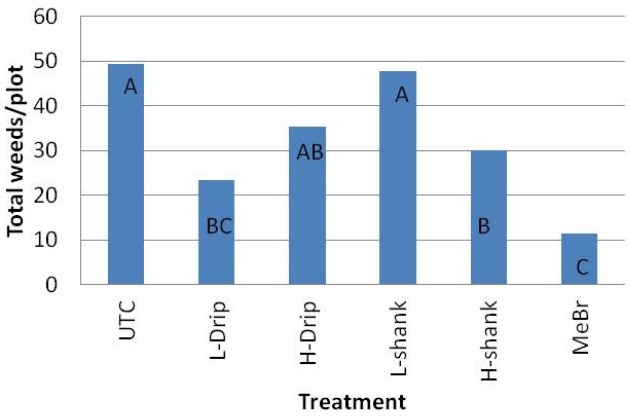


Figure 12. Total harvest weed counts Thonotosassa tomato/pepper trial. Bars with different letters are significantly different based on mean separation using LSD (0.05).

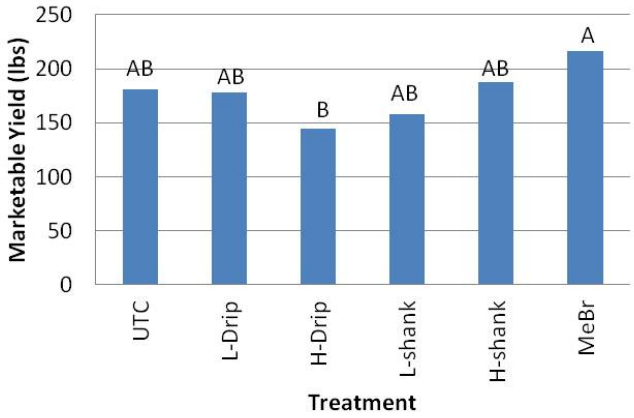


Figure 13. Total marketable tomato yield Thonotosassa tomato/pepper trial. Bars with different letters are significantly different based on mean separation using LSD (0.05).

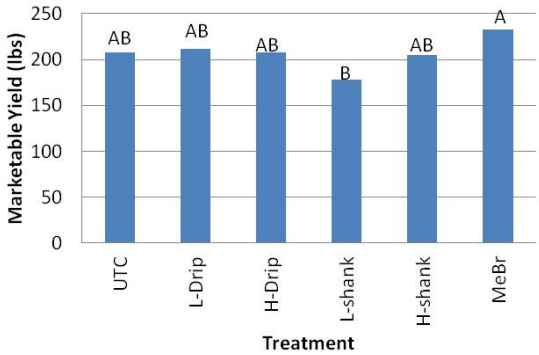


Figure 14. Total marketable pepper yield Thonotosassa tomato/pepper trial. Bars with different letters are significantly different based on mean separation using LSD (0.05).

Project (18): Florida Specialty Crop Foundation - Novel Populations of Phytophora Intestans Associated with Severe Outbreaks of Late Blight on Tomato and Potato

Funding Year: 2010
Funding Amount: $150,000.00
Reporting Period: Final

Project Summary

Late blight disease in south Florida winter tomato and potato crops causes variable, but often significant yield losses, ranging up to 50% in some fields. For the previous several seasons, the oomycetic pathogen, *Phytophthora infestans*, exhibited extreme changes in aggressiveness and sensitivity to fungicides. The additional fungicides needed for late blight control can increase pest management costs up to $100 /acre, primarily due to the year-to-year unpredictability of fungicide efficacy and timing for application against this variable pathogen. Improving growers' ability to delay infections and manage outbreaks economically and sustainably was identified as a critical need and the goal of this project. Knowledge gain in several key areas would lead to the development of integrated management techniques in south Florida with the ultimate goals of mitigating disease losses, reducing fungicide applications, and increasing sustainability. To effectively manage late blight, we examined: 1) the genotypic and phenotypic structure of the pathogen population in Florida through yearly monitoring: and 2) the endemic inoculum sources including alternative hosts and the role of oospores in oversummering of *P. infestans*.

We proposed to monitor *P. infestans* populations in tomato and potato crops, and determine their seasonal genotypic and phenotypic variation in order to assess epidemic potential in these specialty crops. Knowledge of inoculum sources is critical if growers are to implement sustainable, non-chemical preventive practices, and to this end, monitoring of potential off-season hosts, including weeds, volunteers and cull pile discards was conducted during the fallow season. Intensive fallow monitoring began immediately after crop destruction with a focus on locations where high disease levels occurred, and continued as long as feasible or until the beginning of the next planting season. Off-season monitoring activity contributed key information needed to determine whether the ability to sexually produce survival structures, oospores, has developed in our local *P. infestans* populations. This ability, if present, would explain much of the year-to-year variability in disease incidence and severity, and was thus a critical second goal of the proposed study.

Project Approach

The cooperators on this grant conducted intensive surveys of tomato and potato fields from fall 2010 through December 2012. In April 2011, the outbreak of late blight occurred and samples were collected till the end of tomato season in June. Samples of tomato and potato infected with late blight were taken from one site on the east coast of Florida, one site in south Collier Co. in March, and three sites around Immokalee, FL in April. The scope of the epidemic was not as widespread as in previous years. Characterization of isolates was completed for GPI profile, mefenoxam sensitivity, mating type and additional phenotypic characteristics. Samples from all sites were taken during scouting, GPS coordinates noted, and disease incidence noted. Samples were processed in the lab to purify the pathogen, GPI profile, mefenoxam sensitivity, mating type and additional phenotypic characteristics. Molecular profiling was performed in conjunction with cooperator Dr Bill Fry, Cornell University. Phenotypic and genotypic variation was detected in the isolates and was assigned to either genotype US-23 (tomato) or US-24 (potato). Both of these genotypes were sensitive to mefenoxam.

In the 2011-2012 growing season, late blight was detected in January in tomato and potato fields in Manatee, Hendry, Lee, Collier, and Homestead counties and continued through May in 2012. The epidemic of late blight was widespread and severe in some fields causing tomato growers to destroy badly infected fields due to disease and low tomato prices. We isolated the pathogen from plant samples and completed comparison of isolates by GPI profile, mefenoxam sensitivity, mating type and additional phenotypic characteristics. In comparison to the previous season, isolates were US-11 and US-8, both resistant to mefenoxam indicating that this fungicide should not be used for control. In addition, US-24 and US-23 were detected. Molecular profiling was performed in Dr William Fry's lab, Cornell University. Phenotypic and genotypic variation allowed isolates to be assigned to US genotypes and compared to isolates in other parts of the country. The isolates from tomato continue to exhibit genotypic variability.

Alternate host surveys were conducted for petunia, volunteer potato and tomato. Petunia plants were established in research plots in Immokalee in rows of tomato with an active outbreak of late blight. No symptoms of late blight occurred. Potato tubers from soil were assayed for the pathogen and were negative. A spore trap to capture airborne sporangia was placed in a grower's field and later transferred to SWFREC. Another spore trap was placed at TREC, Homestead. Roberts lab (SWFREC) collected the tubes twice weekly for detection by PCR. Zhang's lab (TREC) collected weekly and observed microscopically. All were negative. All samples were negative by visual or PCR tests. No airborne sporangia were detected.

In summary, phenotypic variation was detected in the recovered isolates. We were successful with the phenotypic and genotyping of isolates. However, we were not able to identify in our studies naturally infected alternate host(s) or survival in soil. Alternative hosts and soil do not appear to play a role in the survival or source of inoculum for this pathogen.

Tables 1 and 2 in the appendix summarize the detection and characterization of the isolates.

Glades Crop Care personnel collected plant samples for analysis throughout the growing seasons and monitored volunteer tomatoes and susceptible weeds for signs of late blight disease both

during the season and off-season. Crop and disease monitoring was conducted primarily by Glades Crop Care in commercial tomato and potato production fields covering approximately 10,000 and 3,500 acres respectively, at biweekly intervals during the growing season, and monthly during the fallow off-season, using established standard scouting methods. Drs. Roberts and Zhang managed laboratory analysis of field-collected *P. infestans* specimens. Both Roberts and Zhang scouted and erected spore collectors in attempt to detect sporangia of the pathogen in tomato fields. Roberts collected the tubes twice weekly for detection by PCR. Zhang collected weekly and observed microscopically.

Goals and Outcomes Achieved

The lack of finding any viable sources of off-season survival in soil, volunteers, or other hosts is significant information. It does not appear that the epidemiology of this disease has changed significantly as we thought at the initiation of this grant. The initial inoculum sources continue to be from outside of Florida. We did not find endemic sources of the pathogen oversummering nor were there any unique genotypes that would indicated sexually recombination in oospores. Therefore, growers will need to continue to monitor the seed sources for potato and perform preventative scouting in tomato for detection of late blight.

The summary of genotyping is presented in table 2 in the appendix. Almost all the known genotypes described for P. *infestans* appears to have occurred in Florida at some point since the population has been monitored. This supports the movement of the pathogen into Florida from other places as previously described. It also appears that *P. infestans* genotypes lag a season behind those appearing in the northern USA; in other words the genotypes in Florida are those that were present in the preceding production season.

During the grant period, in both seasons, management recommendations were made to growers during individual conversations and also through the Pest and Disease Hotline to use other fungicides not containing the active ingredient mefenoxam since isolates tested sensitive. Additionally, a mini-field was held on late blight management at SWFREC in the spring 2012 that was attended by more than fifteen participants. An extension publication was prepared containing this up-to-date information and is available online at http://edis.ifas.ufl.edu/pp301. Roberts presented a talk at the 2012 Florida Tomato Institute that had 310 attended for the meeting. Glades Crop Care also contributed to final data analysis and discussion in preparation for the presentation by Dr. Roberts at the Florida Tomato Institute in Naples, FL on 09/05/2012.

Publications (6)

Extension Documents (2)

Donahoo, R. and Roberts, P.D. Late Blight of Potato and Tomato. 2012. Florida Cooperative Extension Service. EDIS Extension Fact Sheet PP301. http://edis.ifas.ufl.edu/PP301

L. Zotarelli, P.D. Roberts, P.J. Dittmar, S.E. Webb, S.A. Smith, B.M. Santos, S.M. Olson. 2012 Potato Production in Florida. 2012 Vegetable Management Guide. Florida Cooperative Extension Service.CV131. http://edis.ifas.ufl.edu/CV131

Conference Proceedings (1)

Roberts, P.D., Donahoo, R. S., Mellinger, C., and Galen, F. 2012 The continuing challenge of late blight on tomato. Florida Tomato Institute Proceedings. PR0529, pp 25-27.

Refereed publications (3)

Fry, W. E., McGrath, M.T., Seaman, A., Zitter, T.A., McLeod, A., Danies, G., Small, I., Myers, K., Everts, K., Gevens, A., Gugino, B. K., Johnson, S., Judelson, H., Ristaino, J., Roberts, P., Secor, G., Seebold, K., Snover-Clift, K., Wyenandt, A., Grunwald, N.J., and Smart, C.D. 2012. The 2009 Late Blight Pandemic in Eastern USA. APSnet Features: http://www.apsnet.org/publications/apsnetfeatures/Pages/2009LateBlight.aspx

Hu., C.-H., Perez, F. G., Donahoo, R., McLeod, A., Myers, K., Ivors, K., Secor, G., Roberts, P.D., Deahl, K. L., Fry, W.E., and Ristaino, J. B. 2012. Recent genotypes of *Phytophthora infestans* in the Eastern United States reveal clonal populations and reappearance of mefenoxam sensitivity. Plant Disease 96:1323-1330.

W. E. Fry, M. T. McGrath, A. Seaman, T. A. Zitter, A. McLeod, G. Danies, I. M. Small, K. Myers, K. Everts, A. J. Gevens, B. K. Gugino, S. B. Johnson, H. Judelson, J. Ristaino, P. Roberts, G. Secor, K. Seebold, K. Snover-Clift, A. Wyenandt, N. J. Grunwald, and C. D. Smart 2013. The 2009 Late Blight Pandemic in Eastern USA – causes and results. Plant Disease: 97: 296-306.

During the grant period, in both seasons, management recommendations were made to growers during individual conversations and also through the Pest and Disease Hotline to use other fungicides not containing the active ingredient mefenoxam since isolates tested insensitive. Additionally, a mini-field was held on late blight management at SWFREC in the spring 2012 that was attended by more than fifteen participants. An extension publication was prepared containing this up-to-date information and is available online at *http://edis.ifas.ufl.edu/pp301*. Roberts presented a talk at the 2012 Florida Tomato Institute that had 310 attended for the meeting. Glades Crop Care also contributed to final data analysis and discussion in preparation for the presentation by Dr. Roberts at the Florida Tomato Institute in Naples, FL on 09/05/2012.

How many adopted the recommendations? Florida tomato acreage was around 30,000 A in all years covered by this grant. Growers representing 5,000 A or 20% used recommendations.

By how much was disease mitigated, as measured by reduced yield losses and lower cost of fungicide?

During the period that this grant covered (2010-12), documented losses to late blight on tomato in test plots without fungicides average 62%. Losses to tomato that followed fungicide recommendations were greatly reduced to approximately 10% or less. Therefore disease mitigation was an average of 50% and associated yield losses reduced by 50%.Tomato acreage planted in 2010 that was not harvested was 9.2% of total planted, in 2011, the acreage not harvested was 5%, in 2012, the acreage was less than 3%. The

yield per acre for fresh market tomato in cwt was 290, 320, and 330 in 2010, 2011, and 2012, respectively. These numbers demonstrate that the feedback to our project verbally by tomato growers that they did not have great losses to late blight on average of fungicide(s) recommended during these presentations would result in an average price decrease for a single fungicide application by $10.00 per acre.

Beneficiaries

Tomato and potato growers, crop consultants, extension agents, seed producers, transplant producers, scouting organizations, citizens of Florida.

Tomato-20% of total production benefited from the genotyping which was used to make management decisions such as fungicide selection

Scouting organizations and crop consultants - 5 benefitted from having information on which to base recommendations to clients

Extension agents - 1 benefitted by sharing information from this program in his hotline that was shared with more than 1,500 subscribers

Seed producers – 1 beneficiary organization. Resources from this program, including genotypes, were incorporated into their program

Lessons Learned

Although all the goals of the grant were addressed, the primary route of the tomato strains of late blight still needs to be determined. Additionally, although the ability to genotype and use this information as a proxy for mefenoxam resistance through Dr Bill Fry's lab, we still are in need of a quick diagnostic tool for fungicide resistance.

Contact Person

Dr. Pamela D Roberts
Professor
SWFREC, Plant Pathology
University of Florida
Immokalee, FL 34142

Ph: 239-658-3400
pdr@ufl.edu

Additional Information

Appendixes

Table 1. Date and host of first detection for seasons covered under the duration of this grant.

2010-11	Apr 7	Tomato
2011-12	Dec 15	Tomato

Table 2. Year, Location, Host, US genotype, Mating and sensitivity to mefenoxam of isolates recovered during this study

2011	Homestead	Potato	US-24	A1	S
2011	Immokalee	Tomato	US-23	A1	S
2012	Immokalee, Tampa	Tomato	US-11	A1	R
2012	Immokalee	Potato	US-8	A2	S-I
2012	Immokalee	Tomato/potato	US-24	A1	S-I
2012	Homestead	Tomato	US-23	A1	S

Project (19): University of Florida - Statewide Implementation of Novel Push-Pull Strategies for Integrated Pest Management (IPM) of Thrips

Funding Year: 2010
Funding Amount: $229,423.40
Reporting Period: Final

Project Summary

The invasive western flower thrips (*Frankliniella occidentalis*) and the native Florida flower thrips (*F. bispinosa*) and the eastern flower thrips (*F. tritici*) are pests of numerous crops in Florida, including bell pepper and tomato. Injury from the western flower thrips is extremely damaging throughout Florida. Attempts to control the western flower thrips with applications of broad-spectrum insecticides were unsuccessful, in part because these insecticides suppress populations of the important natural predators of thrips, the minute pirate bugs, *Orius insidiosus* and *O. pumilio*. Additionally, the western flower thrips developed resistance to insecticides from numerous chemical classes with different modes of action. Both the western flower thrips and the Florida flower thrips are competent vectors of Tomato spotted wilt virus, the type species of an important group of plant viruses in the genus Tospovirus.

Companion plants can reduce insect pests on the crop by serving as a sink for the pests or by serving as habitat for natural enemies that feed on the pest either in the companion plant or on the crop. Plants that serve as hosts for natural enemies and traps for crop pests are important components of push-pull strategies. In such a system, the herbivore is pushed away from the crop and pulled toward a companion plant where they are removed by the natural enemy. Behavior of the natural enemy can be manipulated using appropriate stimuli to increase biological control of the herbivore either in the companion plant, the crop, or both the companion plant and the crop. The purpose of this research was to evaluate a push-pull system for managing flower thrips on peppers and tomatoes. Push components under evaluation were UV-reflective mulch and foliar applications of kaolin, and the pull component was the companion plants, sunflower (*Helianthus annuus*) and Spanish needle (*Bidens alba*). The objectives were to determine the separate and interactive effects of each component on the abundance and population dynamics of each thrips species, minute pirate bugs, and the yield and quality of pepper and tomato. Education and extension activities were conducted to disseminate the knowledge gained from this project and to enhance adoption of integrated pest management programs for thrips and tospoviruses. These activities were targeted at national, state, and local research and extension entomologists/pathologists/specialists in integrated pest management; county extension agents

with responsibility for vegetables; regulatory entomologists and pathologists; crop consultants; vegetable grower associations; and vegetable producers.

Project Approach

Replicated field experiments were conducted in 2011 and 2012 in northern Florida at the North Florida Research and Education Center, University of Florida in Quincy. The crop was tomato and the companion plant was Spanish needle. Replicated field experiments were conducted in 2011 and 2012 at the Glades Crop Care research facility in Jupiter. The crop was pepper and the companion plant was sunflower. The results of each of these four experiments are briefly summarized below:

North Florida Field Experiment 2011: The experiment was established in late March. All treatments were applied as planned. Treatments of mulch (black vs. UV reflective), companion plant (Spanish needle) vs. no companion plant, and twice weekly kaolin application vs. no kaolin were applied as planned. The experiment was arranged as a split-split-plot randomized complete block with mulch type the whole plot, companion plant the subplot, and kaolin the split-split plot. There were three replications of each treatment. The tomatoes and the companion plant began flowering in late April/early May when sampling began. The samples were collected twice weekly. Two samples of ten flowers from each plot on each sample date (n=6 on for each treatment on each sample date) were placed in vials containing 70% alcohol. Eastern flower thrips was the most abundant species found on tomato flowers in 2011, followed by the western flower thrips, with very low numbers of the Florida flower thrips. Numbers of larvae were higher on the tomato plants than on the Spanish needle companion plants. Incidences of plants infected with the thrips-vectored *Tomato spotted wilt virus* were moderately high.

For all treatments and all variables, there was a significant interaction effect of date and thus the data were analyzed by date. The data were analyzed using generalized linear mixed models (proc glimmix) following logarithmic transformations to normalize the data. The data were analyzed separately for each species of thrips and for each sex, but for simplicity sake the sexes were combined for the report (the results for both sexes followed a similar pattern). Minute pirate bugs were not found in large enough numbers for analysis.

Mulch: The ultraviolet reflective mulch reduced the number of western flower thrips adults compared to black mulch at the beginning of the season (Figure 1). The reflective mulch also reduced eastern flower thrips numbers although the effect was significant in the middle of the season rather than at the beginning of the season. The reflective mulch also significantly reduced the incidence of tomato spotted wilt in the middle of the season (Figure 2).

Kaolin clay: Kaolin clay applications significantly reduce populations of eastern flower thrips during the beginning and middle of the growing season, but do not significantly reduce western

flower thrips populations during the growing season (Figure 3). Kaolin clay did not have a significant effect on the incidence of tomato spotted wilt.

Companion plants: Companion plantings of Spanish needle plants significantly reduced populations of western flower thrips at the end of the season and significantly reduced eastern flower thrips species at the beginning and middle of the season (Figure 4). Presence of Spanish needle plants was also associated with a significant reduction of tomato spotted wilt incidence at the end of the season (Figure 5).

North Florida Experiment 2012: The experimental design, treatments, and procedures were the same as described for 2011. As in 2011, there was a significant interaction effect of date for all treatments and as such the analyses were conducted by date.

Unusually for north Florida, Florida flower thrips was the most abundant species of thrips found; eastern flower thrips and western flower thrips were found in much lower numbers. The adults of Florida flower thrips have no pest status, and they actually are beneficial in that they out-compete the damaging western flower thrips. This is one reason that there were few western flower thrips in this experiment. Western flower thrips numbers were too low in 2012 to be analyzed. Tomato is not a good host for the predatory minute pirate bugs, and there were inadequate numbers in the tomato flowers to control the thrips, as expected. There were many minute pirate bugs in the companion plants. The plots were harvested in June and July. Harvest data included marketable and unmarketable yield and quality. The incidence of plants infected with *Tomato spotted wilt virus* was determined weekly during the season based on visual symptoms, with all plants later confirmed using serological techniques. Along with the low numbers of western flower thrips on the tomatoes in 2012, the incidence of tomato spotted wilt in the field was very low and could not be analyzed.

Mulch: Reflective mulch significantly reduced numbers of Florida flower thrips and eastern flower thrips on the first date of sampling, and on one day in the middle of the season for eastern flower thrips (Figure 6). The thrips numbers remained lower on plants grown over reflective mulch than black mulch throughout the season, although they were only significantly lower on those dates mentioned.

Kaolin clay: The application of kaolin clay significantly reduced numbers of both Florida flower thrips and eastern flower thrips from the beginning to the middle of the season (Figure 7). Numbers remained lower on plants that received kaolin clay applications throughout the season.

Companion plants*:* Spanish needle plants significantly decreased the number of Florida and eastern flower thrips on the tomato flowers during the beginning and middle of the season (Figure 8).

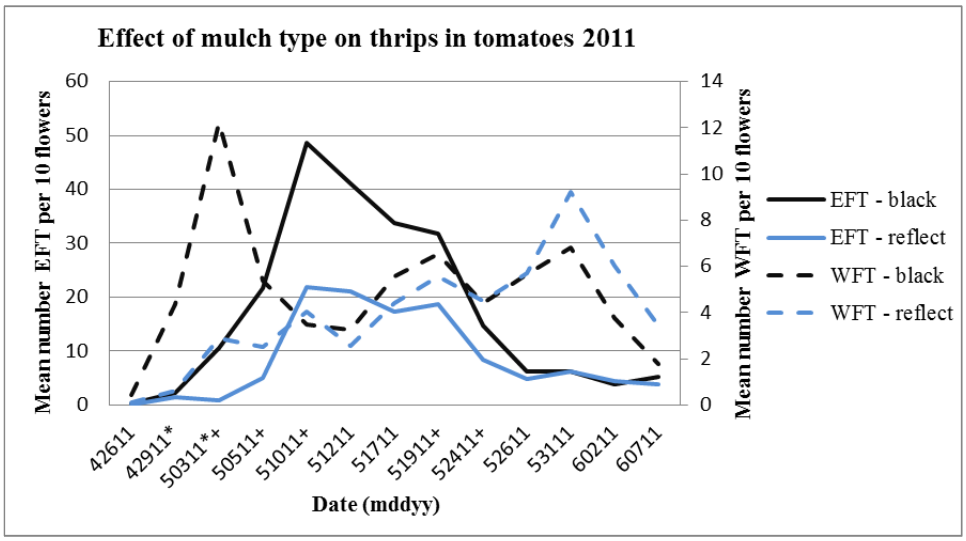


Figure 1. Mean number of eastern and western flower thrips per 10 tomato flowers for each mulch type. EFT= Eastern flower thrips; WFT= Western flower thrips; * Indicates a significant effect on WFT; + indicates a significant effect on EFT; (α=0.05).

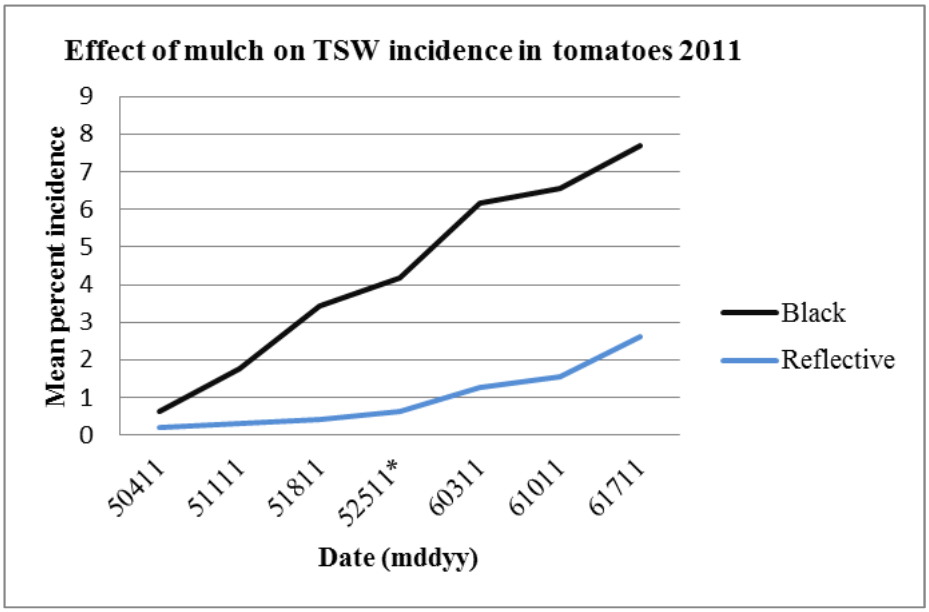


Figure 2. Mean percent incidence of TSW in tomatoes for each mulch type, from the 2011 North Florida experiment. Significant difference is indicated by *(α=0.05).

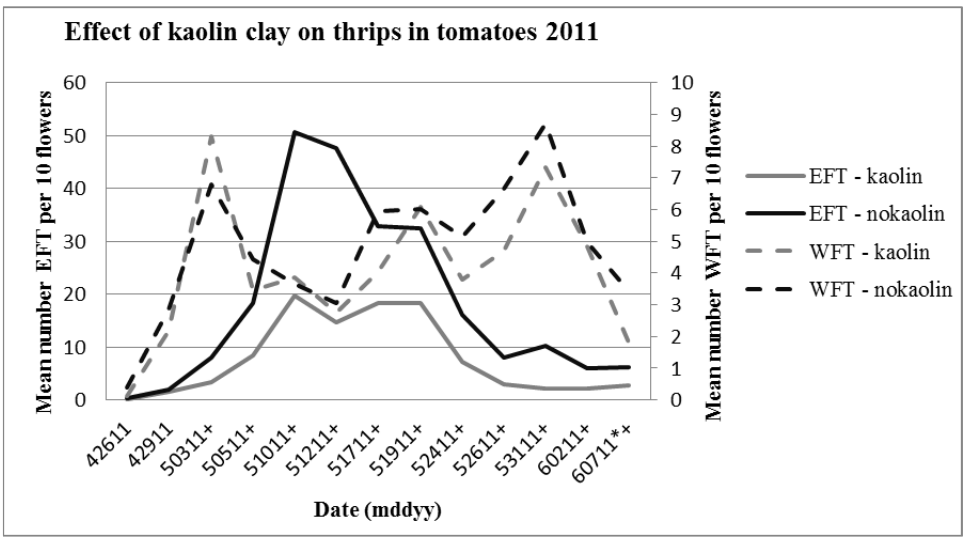


Figure 3. Mean number of eastern and western flower thrips per 10 flowers on the tomatoes in each kaolin condition. EFT= Eastern flower thrips; WFT= Western flower thrips; * Indicates a significant effect on WFT; + indicates a significant effect on EFT;

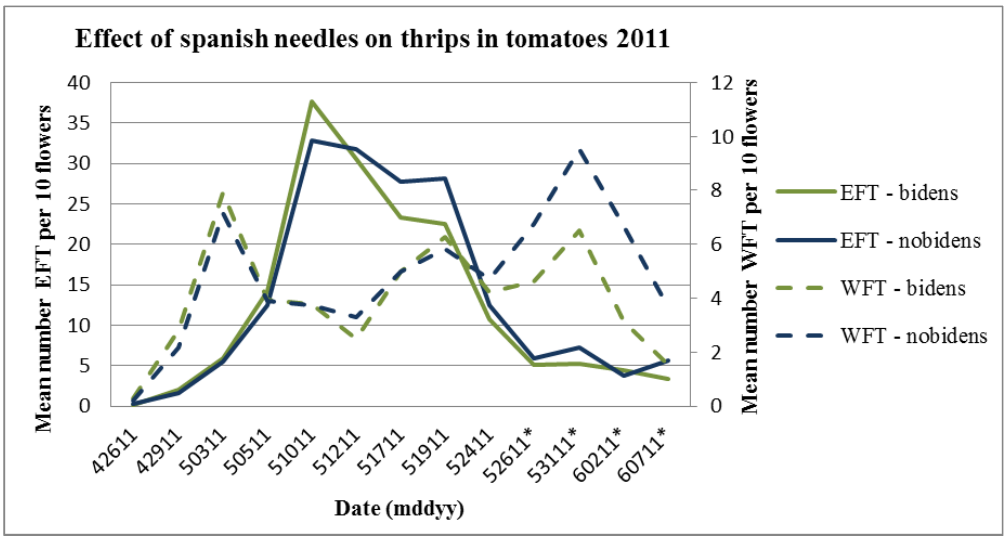


Figure 4. Mean number of eastern and western flower thrips per 10 tomato flowers in 2011 in each companion plant condition. EFT= Eastern flower thrips; WFT= Western flower thrips; * Indicates a significant effect on WFT; + indicates a significant effect on EFT; (α=0.05).

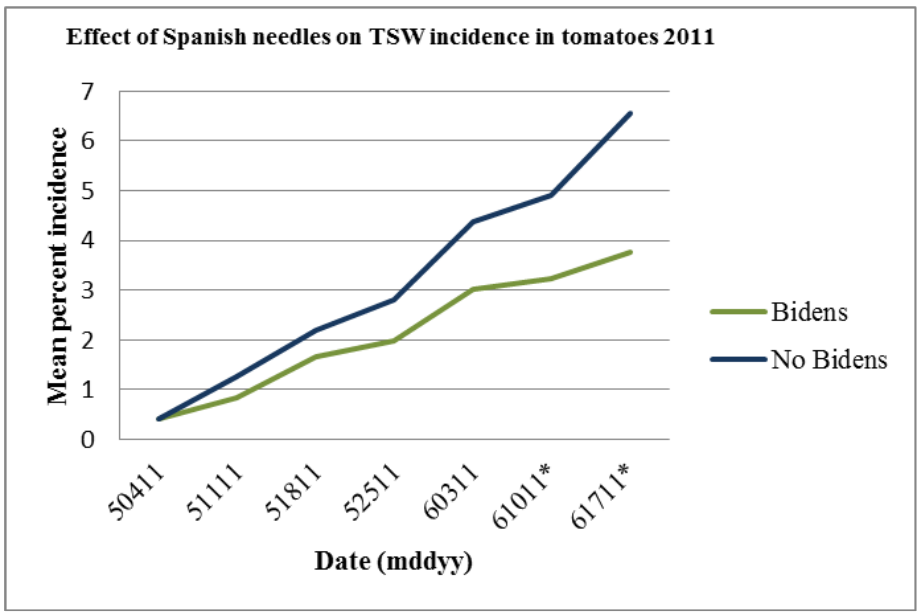


Figure 5. Mean percent incidence of TSW in the tomato plot in 2011 for each companion plant condition. Dates on which the difference between the conditions was significant are indicated by * (α=0.05).

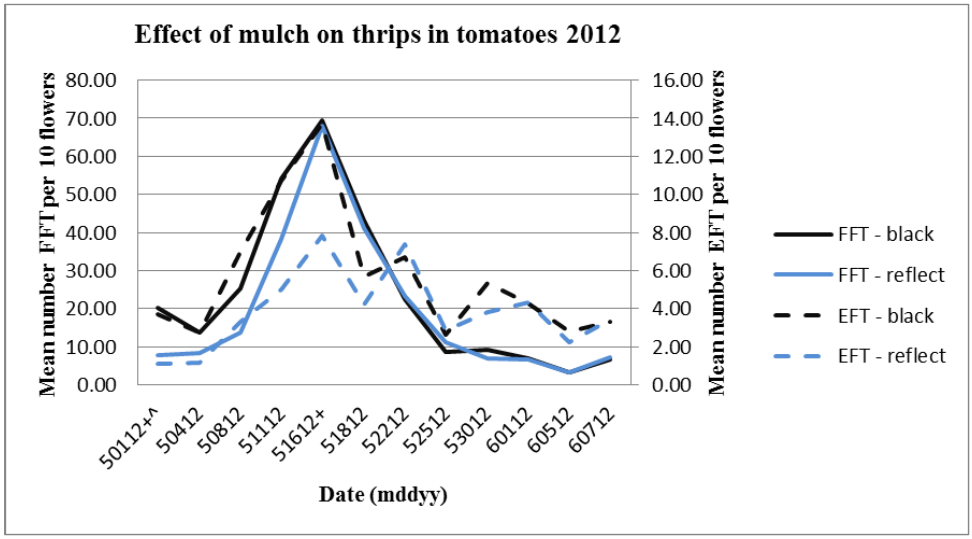


Figure 6. Average number of Florida flower thrips and eastern flower thrips per 10 tomato flowers in each mulch condition in 2012. EFT= Eastern flower thrips; FFT= Florida flower thrips; + indicates a significant effect on EFT; ^ indicates a significant effect on FFT. (α=0.05)

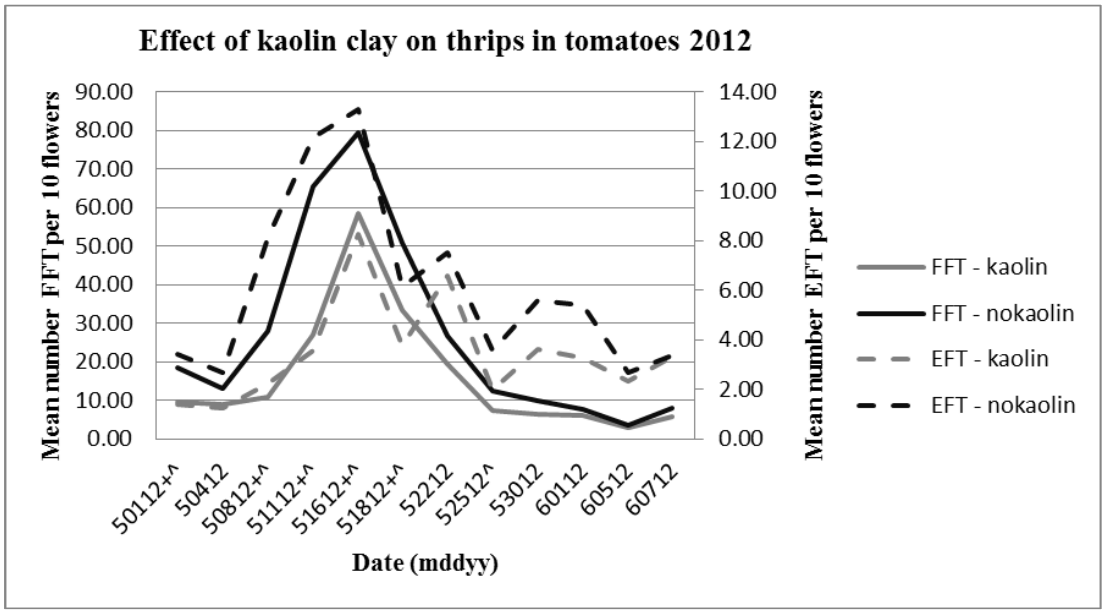


Figure 7. Average number of Florida flower thrips and eastern flower thrips per 10 tomato flowers in each kaolin condition in 2012. EFT= Eastern flower thrips; FFT= Florida flower thrips; + indicates a significant effect on EFT; ^ indicates a significant effect on FFT. (α=0.05)

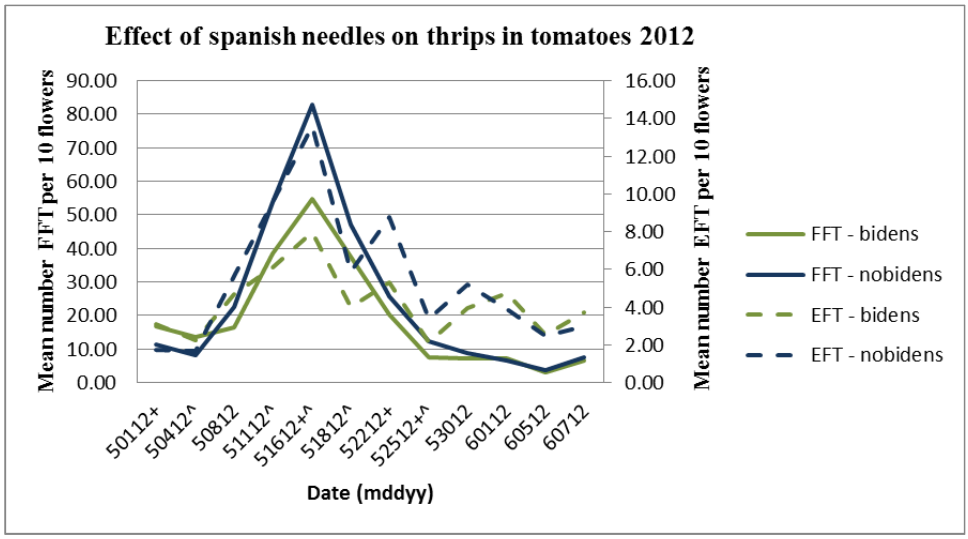


Figure 8. Mean number of Florida flower thrips and eastern flower thrips per 10 tomato flowers in each companion plant condition in 2012. EFT= Eastern flower thrips; FFT= Florida flower thrips; + indicates a significant effect on EFT; ^ indicates a significant effect on FFT. (α=0.05)

South Florida Field Experiment 2011: The 2011 experiment was conducted using a different design than the tomato experiments. The different conditions were black mulch, UV-reflective mulch, and black mulch + twice weekly kaolin application, black mulch + sunflower companion plant, UV-reflective mulch + sunflower companion plant, and black mulch + twice weekly kaolin application + sunflower companion plant. Treatments were arranged in a randomized design with three replications of each treatment. Florida flower thrips were the most numerous species in the pepper fields. Other species of thrips were present in very low numbers, too low for analysis. There were very few western flower thrips (the important pest) in this experiment. The reason is due to the fact that in South Florida this pest must be induced with the use of broad-spectrum insecticides. The results of our experiments are indicative of a grower that follows University of Florida recommendations for an integrated pest management program for pepper. Two species of minute pirate bug, *Orius insidiosus* and *O. pumilio* were numerous in the pepper fields and the two species are combined in the analyses. Each plant in each plot was evaluated weekly for infection of tospovirus. There were no plants in these plots that showed visual symptoms for tospoviruses, the thrips-vectored viruses. This is not unexpected as epidemics of these diseases are very rare in southern Florida. The plots were harvested twice in May. Harvest data included marketable and unmarketable yield and quality.

Mulch/Kaolin: UV reflective mulch and kaolin clay applications reduced thrips populations on peppers at the beginning of the growing season in 2011 (Figure 9). Thrips numbers were lowest on the reflective mulch and the highest on the black mulch. Minute pirate bugs responded similarly to thrips, with reduced numbers on reflective mulch and where kaolin clay was applied. Mulch and kaolin clay both significantly increased yield of pepper (data not shown).

Companion plants: Sunflower companion plantings significantly increased thrips populations on peppers early in the season and increased (not significant) the number of minute pirate bugs on peppers later in the season (Figure 10). Companion plants significantly decreased yield of pepper (data not shown).

South Florida Field Experiment 2012: The experiment was established in mid-February by Glades Crop Care at their experimental farm in Palm Beach County. The 2012 experiment followed the design from the North Florida experiments. Flowers of the pepper and companion sunflower were first sampled for thrips and natural enemies when the peppers and sunflowers began flowering in late March 2011. The samples were collected twice weekly, then weekly beginning on 26 March until 26 April for a total of seven sample dates. Two samples of ten flowers from each treatment in each of the 3 replications were collected in vials of 70% alcohol on each sample date (n=6 for each treatment on each sample date). Due to the significant interaction effect of date, the analyses were completed separately for each date. As in 2011, the main thrips species on the peppers and sunflowers was the Florida flower thrips. Plants were evaluated weekly for evidence of tospovirus: none was found. There were no significant effects of any treatment on marketable or unmarketable yield.

Mulch: Mulch did not have a significant effect on thrips numbers in the 2012 experiment, this data is not shown. Mulch did not significantly affect yield (data not shown).

Kaolin clay: Kaolin clay applications significantly reduced thrips numbers on pepper plants throughout the season. Kaolin clay also affected minute pirate bugs, significantly reducing their numbers at the end of the season (Figure 11). Kaolin significantly increased yield (data not shown).

Companion plants: Thrips populations were higher on peppers with sunflower companion plantings in the beginning of the season, lower in the middle of the season as minute pirate bug populations increased enough to control the thrips on peppers with sunflower companion plantings in 2012 (Figure 12). Companion plants significantly increased yield (data not shown).

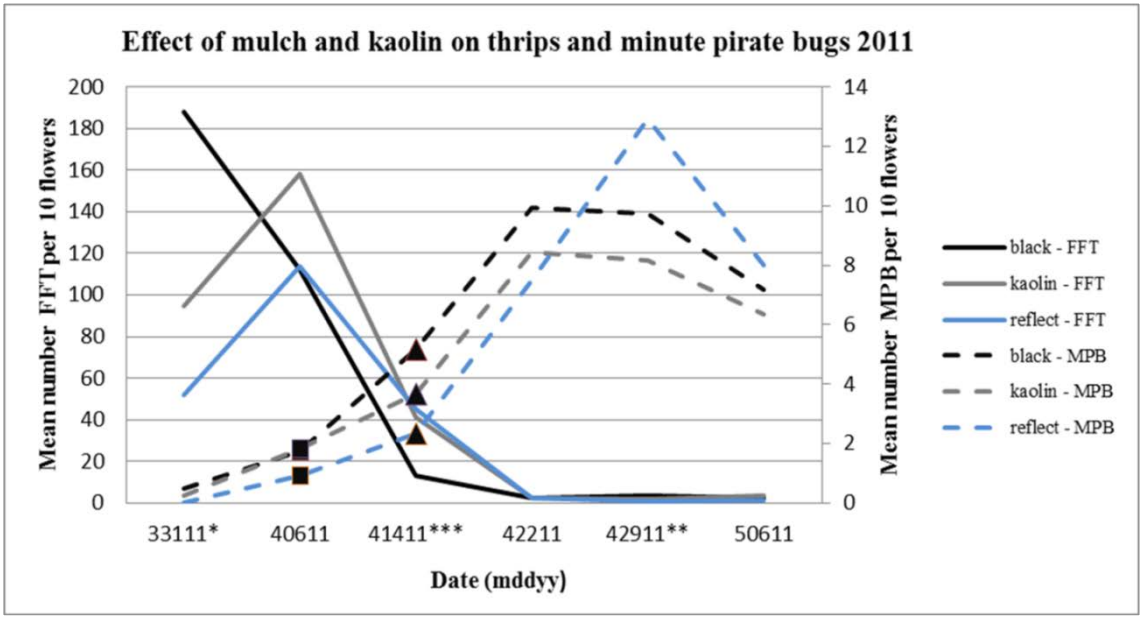


Figure 9. Mean number of Florida flower thrips and minute pirate bugs per 10 pepper flowers for each treatment in 2011. FFT= Florida flower thrips. MPB= Minute pirate bugs. * Indicates a significant effect on thrips numbers, ** indicates a significant effect on minute pirate bug numbers and *** indicates a significant effect on both thrips and minute pirate bug numbers; (α=0.05).■ Indicates the point at which the minute pirate bug to thrips ratio was high enough for suppression (1 predator to 180 thrips).▲ Indicates the point at which the minute pirate bug to thrips ratio was high enough for complete control (1 predator to 40 thrips) .

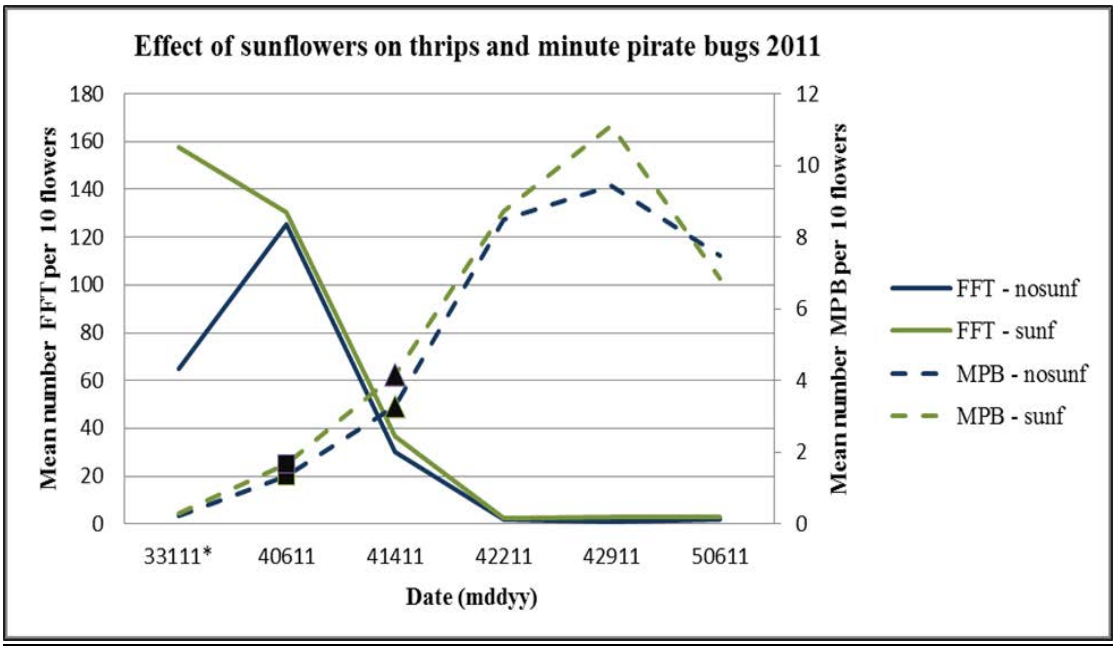


Figure 10. Average number of Florida flower thrips and minute pirate bugs per 10 pepper flowers in each companion plant condition in 2011. FFT= Florida flower thrips. MPB= Minute pirate bugs. * Indicates a significant effect on thrips numbers, ** indicates a significant effect on minute pirate bug numbers and *** indicates a significant effect on both thrips and minute pirate bug numbers; (α=0.05).■ Indicates the point at which the minute pirate bug to thrips ratio was high enough for suppression (1 predator to 180 thrips).▲ Indicates the point at which the minute pirate bug to thrips ratio was high enough for complete control (1 predator to 40 thrips) .

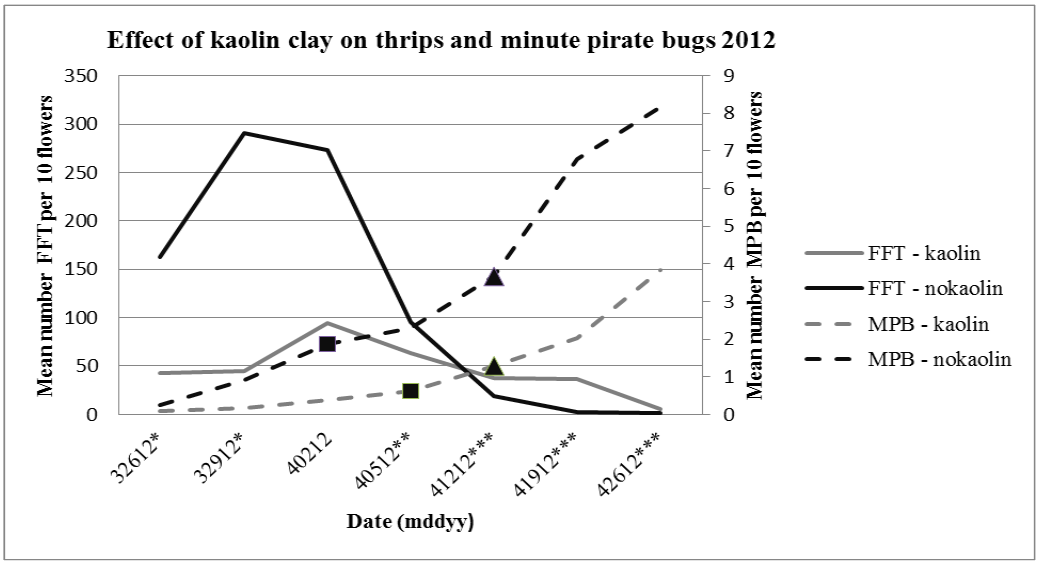


Figure 11. Average number of Florida flower thrips and minute pirate bugs per 10 pepper flowers in each kaolin condition in 2012. FFT= Florida flower thrips. MPB= Minute pirate bugs. * Indicates a significant effect on thrips numbers, ** indicates a significant effect on minute pirate bug numbers and *** indicates a significant effect on both thrips and minute pirate bug numbers; (α=0.05).■ Indicates the point at which the minute pirate bug to thrips ratio was high enough for suppression (1 predator to 180 thrips).▲ Indicates the point at which the minute pirate bug to thrips ratio was high enough for complete control (1 predator to 40 thrips) .

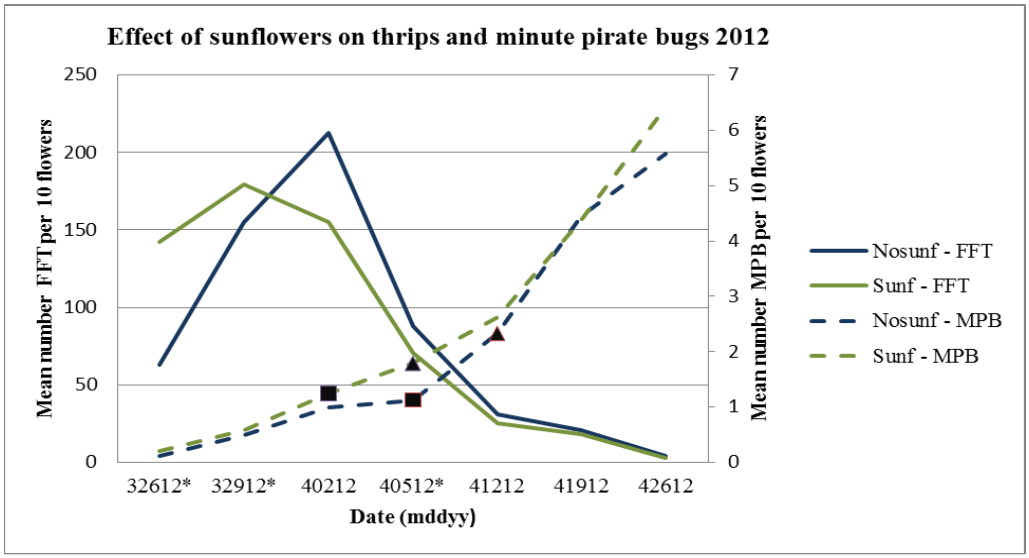


Figure 12. Average number of Florida flower thrips and minute pirate bugs per 10 pepper flowers in each companion plant condition in 2012. FFT= Florida flower thrips. MPB= Minute pirate bugs. * Indicates a significant effect on thrips numbers, ** indicates a significant effect on minute pirate bug numbers and *** indicates a significant effect on both thrips and minute pirate bug numbers; (α=0.05).■ Indicates the point at which the minute pirate bug to thrips ratio was high enough for suppression (1 predator to 180 thrips).▲ Indicates the point at which the minute pirate bug to thrips ratio was high enough for complete control (1 predator to 40 thrips) .

Overall, we concluded that UV-reflective mulch, kaolin clay, and companion plants are efficacious tactics for management of thrips and thrips-vectored tospoviruses. Each is an important tactic for inclusion in integrated pest management programs of organic, reduced-input, and conventional production systems. We also conclude that they are suitable as a combined push-pull system on small spatial scales.

Education and extension activities included publications in refereed journals, refereed extension publications, grower proceedings, and trade journals. Presentations were made at scientific meetings, in-service trainings and other extension meetings, and grower association meetings. All of the project co-directors, students, and technicians supported all or in part through this grant were actively engaged in the research and the reporting of the results. These activities are detailed below.

Refereed Journal Articles:

Demirozer, O., K. Tyler-Julian, J. Funderburk, S. Reitz, and N. Leppla. 2012. Integrated pest management program for thrips and tospoviruses in fruiting vegetables. Pest Management Science 68: DOI: 10.1002/ps.3389. this article is being downloaded according to Digital Commons at the consistent rate of 12 to15 per month.

K.A., Tyler-Julian, J.E. Funderburk, S.M. Olson, M.L. Paret, C. G. Webster, and S. Adkins. 2013. A stimulo-deterrent method of thrips and Tomato spotted wilt virus management in tomatoes. Acta Horticulturae, in press.

Adkins, S., C. G. Webster, H. C. Mellinger, G. Frantz, W. W. Turechek, E. McAvoy, S. R. Reitz, and J. E. Funderburk. 2013. Detection and characterization of tomato viruses: A case study of emerging tospoviruses in Florida. Acta Horticulturae, in press.

Tyler-Julian, K., J. Funderburk, G. Frantz, and C. Mellinger. 2013. Evaluation of a push-pull system for the management of Frankliniella bispinosa (Thysanoptera: Thripidae) in bell peppers. Environmental Entomology, submitted.

Tyler-Julian, K., J. Funderburk, S. Olson, S. Reitz, and P. Andersen. 2013. Evaluation of a push-pull system for the management of Frankliniella species (Thysanoptera: Thripidae) in tomatoes. Environmental Entomology, in preparation.

Refereed Extension Articles:

Funderburk, J., S. Reitz, S. Olson, P. Stansly, H. Smith, G. McAvoy, O. Demirozer, C. Snodgrass. M. Paret, and N. Leppla. 2011. Managing thrips and tospoviruses in tomato. Document ENY-859 (IN895) Florida Cooperative Extension Service, IFAS, University of Florida. EDIS document available online at http://ipm.ifas.ufl.edu This publication has received about 530 downloads since publication.

Funderburk, J., S. Reitz, P. Stansly, S. Olson, D. Sui, G. McAvoy, A. Whidden, O. Demirozer, G. Nuessly, and N. Leppla. 2011. Managing thrips in pepper and eggplant. Document ENY-658 (IN401) Florida Cooperative Extension Service, IFAS, University of Florida. EDIS document available online at http://ipm.ifas.ufl.edu This publication has received about 850 downloads since publication.

Presentations at Scientific Meetings:

Srivistava, M., J. Funderburk, O. Demirozer, and S. Olson. 2011. Management of western flower thrips in pepper and tomato in north Florida. Florida Entomological Society Meeting. Ft. Myers, Florida. (about 250 people in attendance)

Funderburk, J. 2011. Implemention of integrated pest management programs for thrips in vegetables. Annual National Meeting of the Entomological Society of America. Reno, Nevada. Symposium. (about 3000 people in attendance).

Funderburk, J. 2011. Biological control and thrips competition. Pacific Branch of the Entomological Society of America. Waikoloa, Hawaii. (about 80 people in attendance)

Tyler-Julian, K., J. Funderburk, S. Olson, G. Frantz, and C. Mellinger. 2012. Management of thrips in tomatoes and peppers using cultural methods. Annual meeting of the Entomological Society of America, Knoxville, Tennessee (winner second best student poster). (about 3000 people in attendance)

Tyler-Julian, K., C. Funderburk, J. Funderburk, S. Olson, P. Andersen, G. Frantz, and C. Mellinger. 2012. Push-pull system for thrips in tomato. Florida Entomological Society meeting. Jupiter, Florida. (about 250 people in attendance)

Reitz, S., M. Srivistava, and J. Funderburk. 2012. Conservation biological control in pepper and eggplant. Florida Entomological Society meeting. Jupiter, Florida. (about 250 people in attendance)

Presentations at In-Service Trainings and Other Extension Meetings:

Funderburk, J., D. Sui, S. Reitz, N. Leppla, G. Frantz, and C. Webster. 2012. Push-pull strategy for thrips, tospoviruses and other vector/viruses. Field Day and In-Service Training. Ft. Pierce, Florida (21 attendees).

Funderburk, J., D. Sui, S. Reitz, N. Leppla, G. Frantz, and C. Webster. 2012. Vertically integrated management program for thrips and other insects in peppers. Field Day and Demonstration. Boca Raton, Florida (81 attendees).

Presentations at Grower Association Meetings:

Adkins, S., C. Webster, C. Mellinger, G. Frantz, W. Tucharek, E. McAvoy, S. Reitz, and J. Funderburk. 2012. Groundnut ringspot virus and tomato spotted wilt virus – Tospoviruses in Florida. Proceedings of the Florida Tomato Institute, Naples, Florida. (about 250 people in attendance)

Reitz, S., J. Funderburk, and G. McAvoy. 2012. Conservation biological control program for western flower thrips in pepper. International Pepper Conference, Naples, Florida. (196 people in attendance)

McAvoy, G., Funderburk, J., M. Srivistava, and N. Leppla. 2012. The proper role of insecticides in IPM Programs for western flower thrips in pepper. International Pepper Conference, Naples, Florida. (196 people in attendance)

Tyler-Julian, K., G. Frantz, J. Funderburk, C. Mellinger, and S. Reitz. 2012. A novel push-pull method for managing thrips in bell peppers. International Pepper Conference, Naples, Florida. (196 people in attendance)

Tyler-Julian, K., J. Funderburk, S. Olson, S. Reitz, G. Frantz, and H. C. Mellinger. 2013. A stimulo-deterrent method of thrips and Tomato spotted wilt virus management in tomato. Fourth International Symposium of Tomato Diseases and 28th Annual Tomato Disease Workshop, Orlando, Florida. (about 100 people in attendance)

Adkins, S., C. Webster, H. C. Mellinger, G. Frantz, W. Turechek, E. McAvoy, S. Reitz, and J. Funderburk. 2013. Detection and characterization of tomato viruses: A case study of emerging viruses in Florida. Fourth International Symposium of Tomato Diseases and 28th Annual Tomato Disease Workshop, Orlando, Florida. (about 200 people in attendance).

Reitz, S., J. Funderburk, and G. McAvoy. 2013. Conservation biological control program for western flower thrips in pepper. Southeast Regional Fruit and Vegetable Conference, Savannah, Georgia. (over 400 people in attendance)

McAvoy, G., Funderburk, J., M. Srivistava, and N. Leppla. 2013. The proper role of insecticides in IPM Programs for western flower thrips in pepper. Southeast Regional Fruit and Vegetable Conference, Savannah, Georgia. (over 400 people in attendance)

Goals and Outcomes Achieved

The push-pull replicated field experiments were successfully completed with all data collected, processed, and analyzed. These included the 2011 and 2012 experiments to evaluate push-pull system for tomatoes conducted in northern Florida, and the 2011 and 2012 experiments to evaluate the push-pull system for peppers in southern Florida.

Five refereed journal articles were developed as a result of the research and education/extension activities of this project have been published, submitted, or nearing completion.

Two refereed extension articles were developed as a result of the activities of this project.

An in-service training for extension specialists and agents was conducted, and two field demonstrations were successfully conducted.

Six papers were presented at professional society meetings, two papers were presented at in-service trainings and other extension meetings, and eight papers were presented at grower association meetings.

The University of Florida conducted a press release on this project, and two industry trade journals are publishing articles on this push-pull project.

The press release can be accessed as follows:

Nordlie, T. (writer) and Funderburk, J. (source). 2012. Push-pull approach could keep western flower thrips off peppers, UF/IFAS researchers say. University of Florida Press Release.

http://news.ifas.ufl.edu/2012/12/push-pull-approach-could-keep-western-flower-thrips-off-peppers-ufifas-researchers-say/

To date we have documented that there were 1003 downloads of refereed scientific journal and extension articles. There were about 6830 attendees at papers presented at scientific meetings, and there were about 1742 people reached at extension and grower association meetings. These are of

course underestimates, and we have no estimate of the number of people reached as a result of the press release. We are aware of several trade journal articles that published stories on then push-pull system under investigation. There is widespread interest in the push-pull system for implementation in Florida and elsewhere. Western flower thrips is one of the great challenges to agriculture globally and Florida is no exception, and our integrated pest management programs are proving the best way to deal with this pest. Consistently growers when surveyed indicated that over 95% gained knowledge from our extension program activities, with about 85% reporting changes in practices as a result of our recommendations. Growers of many vegetable crops in Florida are showing widespread willingness to implement the push-pull systems.

Beneficiaries

The ultimate beneficiaries are the producers who adopt integrated pest management as the best way to deal with western flower thrips. We documented $US28.8 million in saving to Palm Beach County pepper producers in reduced costs of pesticides and prevention of damage to pepper yield and quality.

David Sui, former County Extension Agent in Palm Beach County, collected the data. Here is the write-up for a paper presented at the Florida State Hort Society meeting that explains the methods:

Western Flower Thrip Monitoring for Pepper (Capsicum annuum) Production

D. Sui*, Palm Beach County Extension; J. Funderburk, UF-IFAS NFREC

Palm Beach County growers produce near 14,000 harvest acres of bell peppers, 25% of Florida production, with annual farm sales of $104 million. Western flower thrip (WFT) (Frankliniela. occidentalis) is a major invasive pest to bell pepper production in Florida, forcing growers abandoning IPM for calendar sprays and causing yield loss of 20-50% during the 2005-2008 seasons. Since the majority of thrips population is constituted by many Florida native species which are competitors to WFT, the ability to differentiate WFT from the native thrip species is the key for growers to re-adopt IPM and lower the culls. Objectives: 95% of 25 pepper growers changing their “Blind Sprays” to WFT-ID featured IPM practices, and reducing the culls to 10% or less. Methods: Working together with IFAS entomology specialists and scouting companies, we organized 3 hands-on workshops to train growers for WFT identification and monitoring, established economic thresholds and IFAS recommendations, and field demonstrated cull reduction by practicing IPM. Results: Surveys showed: 21 growers (85%) have re-adopted the WFT-ID featured IPM practices and lowered the culls to 2-10% ($28.8 million in yield gains and reduced pesticides). Conclusions: Such WFT monitoring IPM extension program is applicable to all pepper production in Florida and worldwide. It also improves agricultural environment by following the economic threshold, under which there is no spray needed, and by putting natural enemies back to work.

NFREC-IFAS-UF put together a success story which also may be of help in showing how the economic impacts are being estimated. It is available at:

http://nfrec.ifas.ufl.edu/Success_Stories/Bell_Pepper_and_Thrips.pdf

We are in the process of publishing the results of the experiments you supported. The disease data is in press in Acta Horticulturae. The effects of the push-pull on pests and beneficials in pepper has been submitted to Environmental Entomology. We are in the process of revising the first draft of a manuscript detailing the effects of the push-pull on pests and beneficials in tomato and plan to submit to Environmental Entomology.

The pesticide companies developing new reduced risk pesticides are also beneficiaries as integrated pest management allows for sustained use of these products by avoiding the development of resistant pest populations.

Lessons Learned

The direct collaboration with the staff at Glades Crop Care was especially beneficial in getting credibility concerning the practical applications. Since they provide a scouting and consulting service to a very large base of clientele, it enhanced rapid dissemination of the findings and of implementation. It was a good university/industry collaboration. Their involvement was an excellent educational experience for university extension specialists and agents.

Contact Person

Joe Funderburk, phone 850.875.7146, jef@ufl.edu

Project (20): Florida Certified Organic Growers and Consumers, Inc. - Organic Systems Management Education Initiative for Florida Specialty Crop Producers

Funding Year: 2010
Funding Amount: $90,048.00
Reporting Period: Final

Project Summary

Florida Organic Growers (FOG) has a long history of successfully conducting on-farm workshops trainings throughout the state. For example, from 2007 to 2009 FOG offered on-farm workshops through an EPA supported grant to help growers minimize pesticide use. From 2008 to 2010 FOG used a SCBG grant (contract #014689) to investigate the views of stakeholders in the organic sector, especially growers and consumers in the state. Through these experiences FOG identified a high demand for information and training related to organic and sustainable farming. FOG's research found that about 60% of conventional growers have considered transitioning to organic agriculture. In this context, the lack of reliable and practical information was identified as an important challenge. Additionally, the research shows that there is a very high support for organic and pesticide-free Florida products among consumers. Finally, the incentive for growers to take advantage of the organic market is high; the organic market has enjoyed the highest agricultural sector growth throughout the last 13 years, even in the middle of the economic crisis.

Within this context FOG proposed to use SCBG funds to provide technical assistance and training opportunities for Specialty Crop producers in the state. FOG organized and led 8 on-farm workshops throughout the state on specialty crop farms on topics as diverse as sustainable soil management, pest management, organic certification and regulations from the USDA-NOP (National Organic Program), marketing organics and more. FOG partnered with exemplary organic growers throughout the state and University of Florida and Florida Agricultural and Mechanical University Faculty to offer these trainings.

The main focus of each training was either soil management and organic certification and regulations. More than 350 participants took place on these trainings. Evaluations of each training and a follow up survey show that these trainings were highly successful and useful to participants. Additionally, FOG created the Growers Resource Page in FOG's website. This web platform was created to host valuable resources and information that will prove useful to any grower interested in organic and sustainable production. There are various elements to the Growers Resource Page,

including an information resource center, a farmer forum, a full web map with many resources for networking, and more.

Project Approach

- FOG organized and conducted 8 on-farm workshops focused on soil management, organic certification and regulations, and other relevant topics. FOG achieved this by carrying out the following activities for each workshop.

    - FOG identified and enter into contact with potential host specialty crop farmers. They were selected based on their organic farming expertise, type of operation and location.

    - Once the farmer had been identified, FOG worked with the host farmers, UF-IFAS extension Staff, and other farmers in the area to understand what were the most important topics the workshop should focus on.

    - Based on the preliminary topics identified, FOG worked on inviting University of Florida, Florida Agricultural & Mechanical University, or any other relevant expert or stakeholder to speak at the farm workshops. The role of Faculty from partner universities or other experts was critical to the success of each workshop. They brought unique expertise and insights that complemented the more practical experiences of host farmers and FOG's.

    - Once a core team of invited guest speakers had been identified, FOG worked with them and the host farmer to draft workshop agendas and identify useful information for resource packages.

    - FOG publicized on-farm workshops through on-line list-serves, newspapers, FOG website, and other social media outreach. Participants had to register either online or by sending their registration by fax, e-mail, or regular mail. FOG asked each participant to identify in their registration their priorities for learning. These comments were summarized and circulated among workshop speakers and host farmers; and were used to refine workshop agendas.

- FOG compiled on-line and paper resources for workshop participants into a resource package that was given to percipients during the workshop. As each workshop was unique, due to the location, crops produced and specific regional challenges; great effort was put in place to make sure that all information was relevant. The resource packages included about 11 short articles (about 60+ double sided pages), along with other resources, event announcements, and dozens of online resources. Sources for these documents were UF-IFAS-EDIS publications, SARE publications, UF and FAMU Faculty collaborator, ATTRA, other sustainable agriculture organizations, host farmers and FOG's own summary articles for other workshops.

- FOG organized all the logistical aspects of carrying out the workshops. This included chair, portable toilet rentals, refreshment and working lunch, directions and other minor logistics.

- FOG staff traveled to most farms for pre-workshop visits where all the logistics were finalized, agenda topics were discussed and finalized.

- FOG conducted each of the eight on-farm workshop as planned with an overall attendance of 350 participants and an average attendance of 43.5 participants per workshop. At the end of each workshop, workshop evaluation forms were distributed among participants. Such evaluations show that farmers found the workshop events very useful. See **Appendix 1** for more information.

- FOG wrote summary articles that described the event and highlighted the most important topics and tips discussed. Those articles were published in FOG website.

- FOG carried out a follow up online/paper survey with about 60 participants to understand long term impacts of these training events. This survey confirmed the success of the on-farm trainings, as indicated by workshop evaluations. Please see Appendix 2 for more information.

- FOG created a "Growers Resource Page" section in its website with various elements that will assist specialty crop growers in providing useful information to benefit their farms.

  - FOG had initially planned to carry out this work through FOG's own staff expertise.

Unfortunately FOG experienced staff changes and sickness that prevented adequate progress in this project outcome. After review and interviews with three Florida web companies, FOG decided to contract with Frankel Media to develop the technical aspects of the Growers Resource Page.

- The Growers Resource Page was created as a platform where useful resources are expected to grow over time. Currently these are the main elements included:

  - Web-Map: This is a web-based map where any individual will be able to locate resources near their geographic location. Resources include organic farms, organic processor, farmer markets, organic input suppliers, organic consultants.
  - Resources: This is a database that contains hundreds of useful references regarding organic agriculture production, marketing, financing and policy. It is arranged in a simple way so that website visitors can narrow down their search easily.
  - Farmer Forum: After a lot of discussions with Frankel Media, FOG decided to set up a Facebook forum to create a space for discussion regarding organic farming, sell and buy, and more.
  - Florida Farm Finder: Through a formal agreement with the Conservation Trust of Florida, FOG took over full control and management of a web platform that is designed to help growers find farm land in the state. FOG decided this element should be part of the Growers Resource Page.

To ensure that specialty crop funds solely enhanced the competitiveness of specialty crops, the on-farm workshops were held at farms specializing in specialty crops and all the educational sessions focused on specialty crop topics. In a few cases, the farm did have some animals (mostly for personal consumption, such as Swallowtail Farm has some chickens and the Family Garden, a pig) but the workshops did not have any animal education and focused solely on specialty crop education.

Goals and Outcomes Achieved

This project had proposed the following measurable outcomes.

1. *To involve at least 120 specialty crop producers (including prospective producers) in on-farm workshops conducted over a two-year period.*

FOG is pleased to report that more than 350 specialty crop producers, prospective farmers, extension and other stakeholders attended the workshops. The eight workshops took place on the following specialty crop farms and dates. Significant efforts were put in place to cover most of the state.

1. June 20, 2011 –- Turkey Hill Farm, 3546 Baum Road, Tallahassee, FL 32309
2. September 29, 2011 --- The Family Garden Organic Farm; 2440 SW 32nd Place, Bell, FL, 32619
3. October 31, 2011 --- Worden Farm; 34900 Bermont Road | Punta Gorda, FL 33982
4. April 23, 2012 -- Green Industries Institute; 2729 W Washington St | Monticello, FL 32344
5. October 11, 2012 – LNB Groves and Bee Heaven Farm, Homestead, FL
6. November 5, 2012 – Osceola Organic Farm, Vero Beach, FL
7. April 29, 2013 – Gateway Organic Farm, Clearwater, FL
8. June 03, 2013 – Swallowtail Farm, Alachua, FL

2. *To increase knowledge among fruit and vegetable growers in on-farm workshops about organic, whole-system farming methods and National Organic Program regulations.*

Initially FOG had proposed to measure this by conducting a pre and post-test at each workshop. After the two initial workshops FOG realized that pre and post-test were not practical in this setting. FOG requested a contract amendment; which was approved on 02/10/2011. The contract amendment required FOG to carry out only post-workshop surveys to obtain feedback from growers.

Analysis of the pre and post-test, as well as post-workshop surveys indicate that the workshops were highly successful. This feedback strongly supports the idea that these on-farm workshops increased knowledge of these topics among specialty crop producers. Please see results in **Appendix 1**.

3. *To increase the application and/or effectiveness of organic practices implementation on the farms of project workshop participants.*

This was largely measured and achieved by a follow up survey carried out in June 2013, which targeted all on-farm workshop participants, and collected views from about 60 participants. According to the survey results, the perception of workshops participants was that knowledge acquired at the on-farm events was useful and positively impacted their farming practices, from 2 to 24 months after the event took place.

Farmers reported significant increases in their use of sustainable agricultural practices as a result of the on-farm workshops. Among all growers who responded 62% claimed to have

increased the use of compost as a result of their attendance to the training. Between 43 to 50% of farmers also indicated increase use of cover cropping, crop rotation, beneficial organisms and soil amendments. Between 29 to 38% of farmers reported an increase use of manure, Integrated Pest Management and Mulching. FOG believes that these are very encouraging results, and demonstrates the usefulness of practical and collaborative on-farm trainings. Please see **Appendix 2** for more information.

4. *To increase availability of online educational resources for Florida specialty crop producers.*

This was largely achieved through the creation of a website platform center called "Grower Resource Page" within the FOG website. The platform was created and initial information was used, but the expectation is that this will become one of the most useful resource centers for specialty crop growers interested in sustainable and organic agriculture in Florida. FOG's website currently averages about 4500 unique visitors per month, 125% more visitors than at the beginning of this project grant. Additionally, FOG's e-newsletter is distributed to more than 3,500 growers, consumers and other stakeholders; 60% increase when compared to the beginning of this project. These numbers are substantially higher than the ones FOG used as a baseline.

Beneficiaries

Largely the main two groups of beneficiaries were current specialty crop growers and prospective growers throughout the state of Florida. This included current organic growers, current specialty crop growers considering organic production, and some livestock producers considering organic crop production. Other important groups were extension agents, service providers and university students. A few gardeners and consumers also attended some workshops.

FOG did not track specific demographic details such as gender, age, and education level. From the information collected in the registration form and our own estimation our impression is that most specialty crop producers had a relatively small farm (less than 20 acres).

Specifically, more than 350 participants attended the 8 workshops offered throughout the project. Following is a breakdown of the number of participants per workshop.

1. June 20, 2011 –- Turkey Hill Farm, 60+ participants.
2. September 29, 2011 --- The Family Garden Organic Farm, 50+ percipients
3. October 31, 2011 --- Worden Farm; 34900 Bermont Road, 60+ participants
4. April 23, 2012 -- Green Industries Institute, 22 percipients
5. October 11, 2012 – LNB Groves and Bee Heaven Farm, 35 participants

6. November 5, 2012 – Osceola Organic Farm, 35+ participants
7. April 29, 2013 – Gateway Organic Farm, 45+ participants
8. June 03, 2013 – Swallowtail Farm, 45+ participants

The list and information obtained from participants for each workshops is attached in Appendix 3.

Lessons Learned

Throughout the project FOG realized once more about the high demand for practical on-farm trainings for organic and sustainable farming in Florida. There was a high number of prospective farmers that were looking for orientation. During the registration process FOG had to turn away interested individuals due that the ideal number of participants had been surpassed (This number varied according to host farmer preferences, but was usually about 40 people). In most cases the use of the megaphone acquired through this grant proved invaluable to manage large crowds.

From our evaluation we can state that the workshops were highly successful. FOG brought unique expertise and practical focus, host farmers brought their unique experience and insights; guest speakers contributed significantly on providing expert advice; and the workshop focus allowed for collaborative, lively discussions where workshop participants also shared their knowledge and experiences.

The different workshop locations provided the opportunity to zoom in on a specific regional location, crops grown, and specific issues affecting specialty growers. This flexibility proved to be important on delivering a workshop that participants were highly interested in, and obtained relevant information.

In summary FOG believes that there is a high need for continuing practical training support; and FOG hopes to work collaboratively with other partners in the future to fulfill this need.

In terms of problems encountered for organizing the workshops, there was the issue of timing. Many farmers were interested in hosting workshops but found it hard to find dates that would work with their busy schedule. The off-farm season was not an option, given that there would not be anything to see at the farm. The best times for these workshops proved to be either at the beginning or the end of the growing season; as farmers could take the time to do the workshop, and there were crops growing at the farm.

On the other hand, the project experienced significant setbacks to create and finalize the Growers Resource Page. At the time of the writing of the project proposal, FOG staff included the expertise to create and deliver all the elements of the Growers Resource Page FOG had planned. Unfortunately due to staff health problems and staff changes; FOG was unable to capitalize on that expertise. Project staff looked for alternatives to complete this task, but this proved lengthy and

difficult. Controlling this situation is very challenging for any organization. In the future, FOG will take this issue into account when it comes to unique needed expertise to complete projects.

Due to the issue of staff problems and workshop timing, FOG requested and obtained approval for a six month extension which proved to be critical to the completion of the project.

In regards to the Growers Resources Page, FOG evaluated the terms and conditions for 3 different web companies and decided to work with Frankel Media Group. FOG worked collaboratively with Frankel to develop the Growers Resource Page. The resource created is a platform that will store information, links, events, and other resources that will support specialty crop growers looking for information pertinent to organic and sustainable farming. This resource is expected grow and the vision for it is to become the most important hub for organic and sustainable farming resources in Florida.

Contact Person

Marty Mesh, Executive Director Florida Organic Growers
PO Box 12311
Gainesville FL, 32604
352-377-6355
marty@foginfo.org

Additional Information

Please find attached the following appendixes:

- Appendix No. 1. Results from Individual workshop evaluations.
- Appendix No. 2. Results from follow up survey.
- Appendix No. 3.Grower's Resource Snapshots.
- Appendix No. 4. Sample Registration form, agenda, list of participants, collaborators and speakers, announcement, advertisement, participant evaluation form, and post-workshop article for one workshop.
- Appendix No. 5. Pictures of the on-farm workshops.

Project (21): University of Florida - Protecting Florida Avocados from Laurel Wilt

Funding Year: 2010
Funding Amount: $232,493.00
Reporting Period: Final

Project Summary

Laurel wilt is a lethal disease of plants in the Lauraceae plant family. It has been known for only a decade, is vectored by an exotic insect, the redbay ambrosia beetle, and is caused by a fungus that was first described in 2008, *Raffaelea lauricola*. Avocado (*Persea americana*) is the primary agricultural suscept, and several native species, such as redbay (*P. borbonia*), are also affected. In early 2010, a redbay ambrosia beetle infested with *R. lauricola* was trapped 10 miles from the state's primary avocado production area in Miami-Dade County, and in 2011 the disease was confirmed in this production area. During the current project, laurel wilt continued to spread and cause increasing damage in commercial production in Miami-Dade County. To ensure that continued production of this important specialty crop ($54 million yr^{-1}) is possible, viable short- and long-term measures are needed to manage and interdict this disease.

Project Approach.

Protocols were developed to protect avocado trees from laurel wilt with fungicides. In cooperation with avocado producers in Brevard, Martin and Miami-Dade Counties, Rainbow Treecare Scientific Advancements (St Paul, MN), and extension personnel of the University of Florida (in particular, Dr. Jonathan Crane, TREC-Homestead), the efficacy and retention of fungicides in treated trees were established in field studies. With one exception, producers graciously provided trees that were needed for this work free of charge.

The disease's establishment, development and movement were studied in a natural ecosystem at the Archbold Biological Station (ABS) in Highlands County; personnel at ABS provided data and guidance on its access and use. Ancillary funding for collecting and analyzing epidemiological data from ABS and commercial avocado settings in Miami-Dade County came from an SCRI, NIFA grant to Ploetz and the University of Florida; it was used to fund a Ph.D. student, Ms Er Hong Ling.

Work on new, disease-resistant avocado genotypes was initiated by the USDA-ARS counterpart on the project, Dr. David Kuhn. From the national collection of this crop at USDA-ARS Miami, seedling (hybrid) populations were established at the USDA-ARS facility in Ft Pierce and subsequently inoculated with *R. lauricola* to screen for resistance to laurel wilt. Ancillary funding for this aspect of the research was provided by the USDA (Dr. Ed Stover, Ft Pierce) and the University of Florida (Dr. Mark Ritenour, Ft Pierce and graduate assistance for Ph.D. student, Ms Cristina Pisani).

Goals and Outcomes Achieved

Fungicide movement, retention and efficacy. Movement of significant doses of effective fungicides into the xylem of trees (the infection court for the laurel wilt pathogen, *Raffaelea*

lauricola) is needed in order to protect avocado from this disease. Topical bark applications of fungicides were proposed for study in the original version of this project. However, it was subsequently shown that as bark thickened bark applications become progressively less effective at moving propiconazole into the xylem of avocado trees; in trees that were more than ca 7 years old it was not possible to move more than 1 ppm into the xylem. Another inexpensive application method, soil drench, was even less efficient than bark application at moving propiconazole into avocado xylem (Ploetz et al. 2011b). Thus, a different application method, macroinfusion, was tested in the present work.

Two macroinfusion experiments were completed with three different fungicides/active ingredients (a.i.s). The efficacy of propiconazole and thiabendazole was demonstrated in prior bark and drench application studies on potted plants (Ploetz et al. 2011b), and a third fungicide, tebuconazole, which impeded the growth of *R. lauricola* in vitro, had not been tested against laurel wilt (Ploetz, unpublished). To assess concentrations of these fungicides that could be achieved and maintained in xylem over time, 'Simmonds' trees in two commercial orchards in Miami-Dade County were treated in April, 2011 with low, medium and high concentrations of each of two formulations of propiconazole (Tilt, 41.8% a.i.: 7, 11 and 14 ml/inch dbh; and Propiconazole Pro, 14.3% a.i.: 20, 30 and 40 ml/inch dbh), thiabendazole (Arbotect 20S: 1, 2 and 3 ounces/inch dbh) and tebuconazole, 16% a.i. (20, 30 and 40 ml/inch dbh).

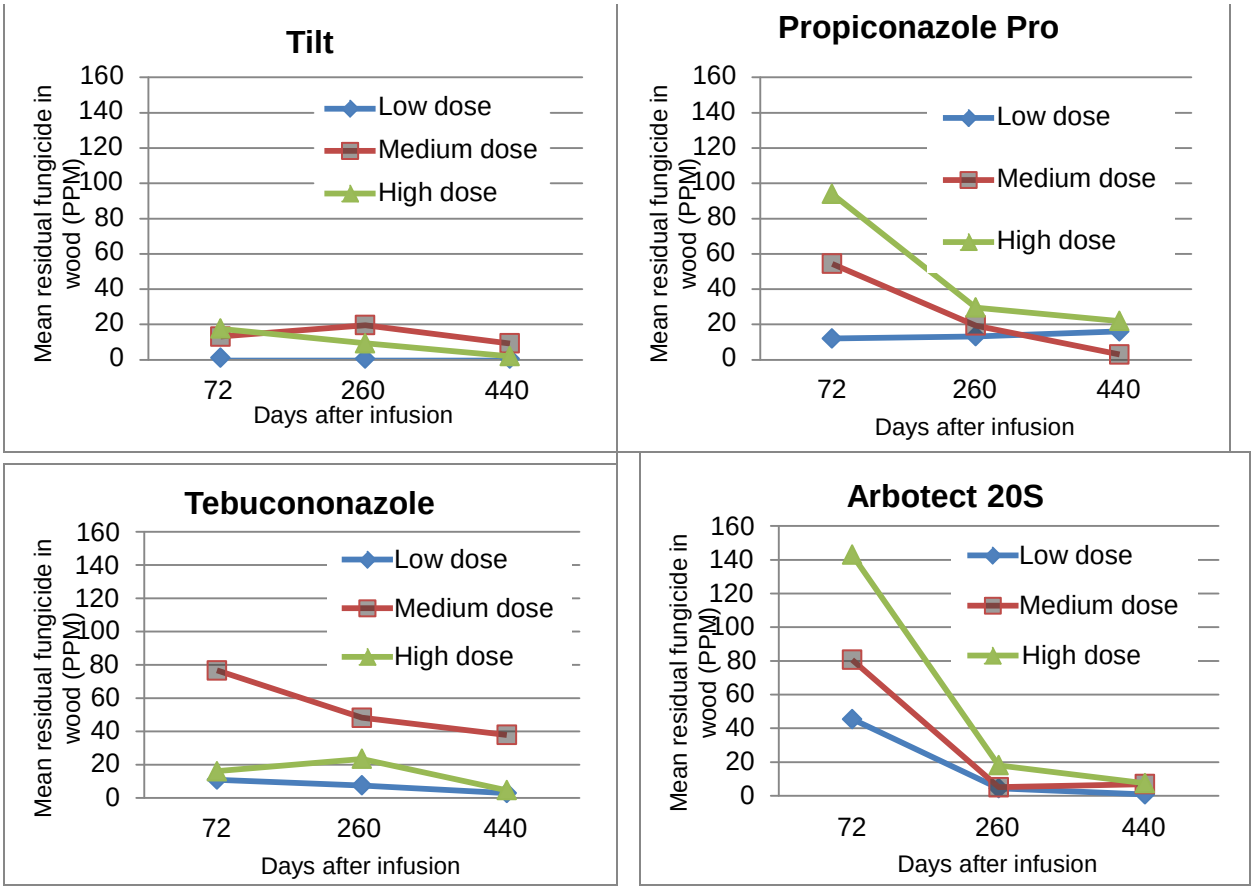


Figure 1. 'Simmonds' avocado trees in two commercial groves in Miami-Dade County were macroinfused with fungicides in April 2011. Tilt contains 41.8% of the active ingredient (a.i.) propiconazole, Propiconazole Pro 14.3% of propiconazole, Tebuconazole 16% of tebuconazole, and Arbotect 20S 26.6% of thiabendazole. Xylem concentrations of the a.i.s were assessed in July, 2011, and January and July, 2012 (respectively, 72, 260 and 440 days after treatment). Days after macroinfusion are indicated on the x-axes, and mean xylem concentrations of the different a.i.s at the different application rates are indicated on the y-axes.

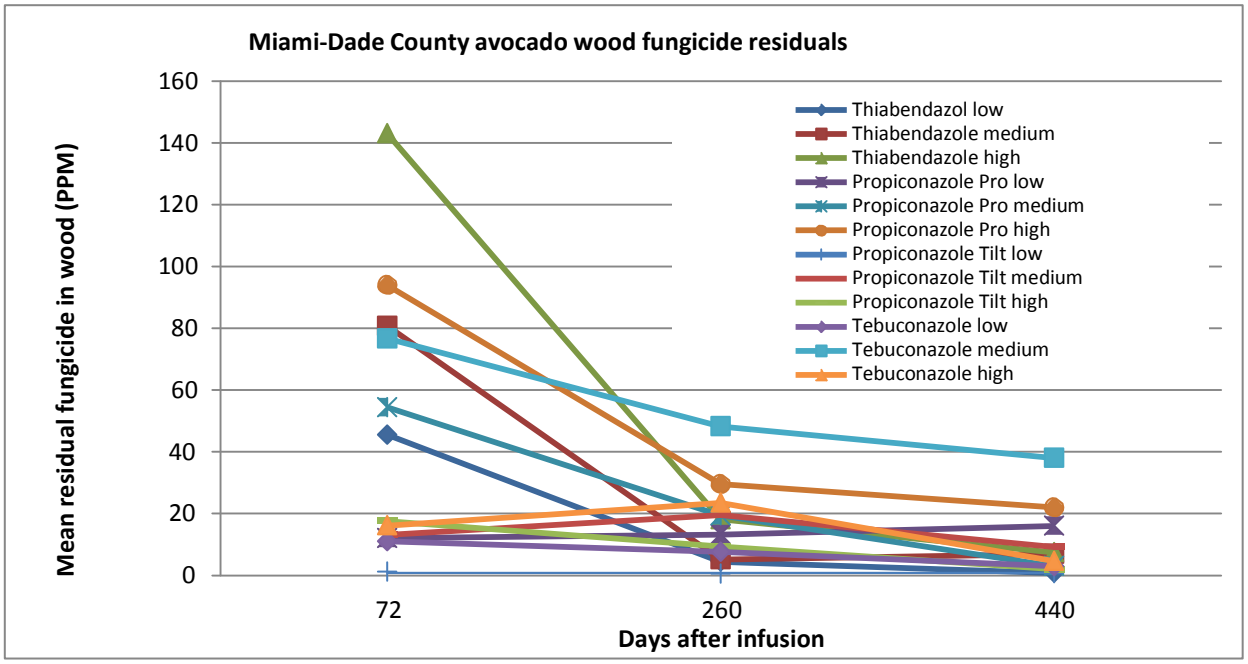


Figure 2. Overall decline in mean fungicide concentrations in the Miami-Dade County residue experiment, from 72 to 440 days after macroinfusion. Note that tebuconazole levels (medium rate) were higher than for any other fungicide after 440 days, even though full dosages of this fungicide could not be applied (see text).

Table 1. Mean concentrations of fungicide in Miami-Dade County, 72-440 days after macroinfusion.

	Thiabendazole			Propiconazole Pro			Propiconazole Tilt			Tebuconazole		
Days	Lo	Med	Hi	Lo	Med	Hi	Lo	Med	Hi	Lo	Med	Hi
72	45.5	80.7	143	12.05	54.4	93.9	1.15	13.15	17.59	11.02	76.69	16.12
260	4.41	5.14	18.14	13.25	19.4	29.55	0.49	19.57	9.33	7.565	48.23	23.49
440	0.80	6.93	7.43	16.01	2.98	21.96	0.65	9.21	1.99	2.91	37.97	4.65

None of the treatments were phytotoxic (data not shown). About 2, 9 and 15 months (73, 260 and 440 days) after trees were treated, xylem samples were taken from branches throughout the canopies of treated trees and analyzed for the different a.i.s at ABC laboratories in Gainesville, FL. In general, high concentrations of fungicides were detected in treated trees after 2 months (Figs. 1 and 2, Table 1). Unfortunately, the formulation of tebuconazole that was used in this work did not mix well with water and plugged injection lines; thus, intended volumes of this fungicide did not enter trees. This problem was also encountered with a second formulation of tebuconazole that was used in efficacy experiments (see below). Nonetheless, tebuconazole appeared to have a longer residual life in treated trees than the other tested fungicides (Table 1). Relatively high concentrations of thiabendazole were detected 2 months after macroinfusion with Arbotect, but there was a precipitous decline in this a.i. by the 9-month sample date.

The efficacy of these fungicides against laurel wilt was tested in several different orchards in Brevard and Martin Counties; macroinfusions of different rates of Arbotect, Propiconazole Pro and a second formulation of tebuconazole were tested (Table 2). Trees were treated in July, 2011, inoculated with *R. lauricola* in October, 2011, and rated for laurel wilt development in

December, 2011 and June, 2012. Trees were assayed for *R. lauricola* with a semi-selective medium, CSMA+ (Ploetz et al. 2012).

Table 2. Fungicide efficacy against laurel wilt on field-grown avocado trees[a]

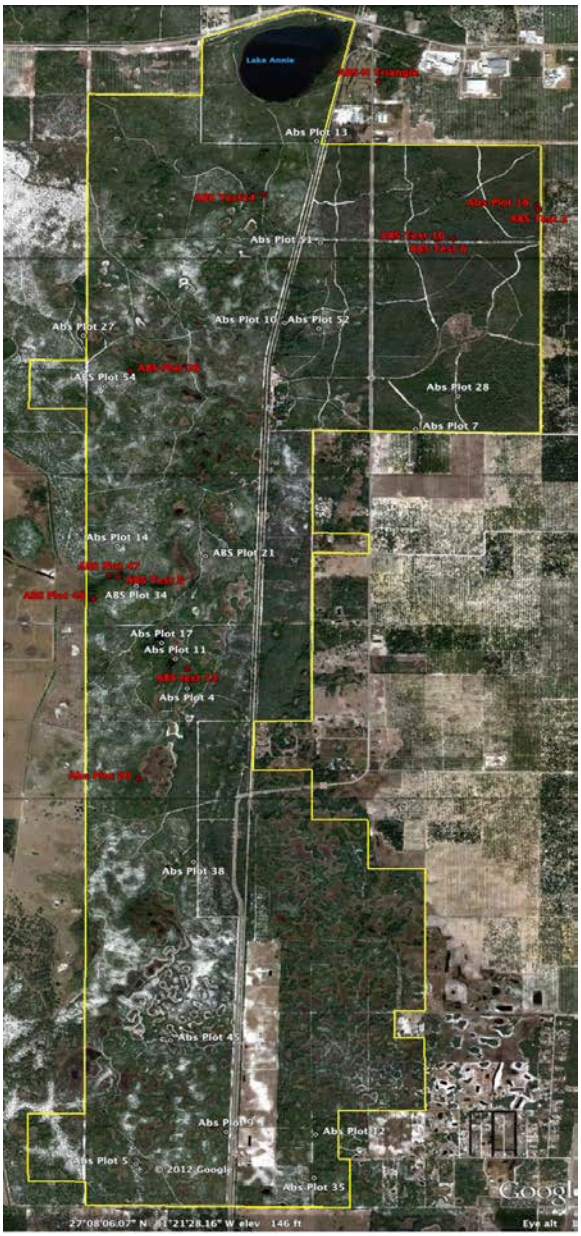
Treatment	Rate (vol product / inch dbh)	Mean incidence (%) 60 dai	239 dai	558 dai	Canopy with laurel wilt symptoms Mean severity (%) (range) 60 dai	239 dai	*Rl* recovery 60 dai	239 dai	558 dai
Nontreated	N/A	85.7	100	100	65.7 (0-100)	82.9 (30-100)	5/6	6/6	nd
Propi Pro	20 ml	0	83.3	67	0 (0)	20.0 (0-80)	0/6	0/6	1/6
Propi Pro	30 ml	0	100	83	0 (0)	33.3 (5-70)	0/6	1/6	nd
Propi Pro	40 ml	0	66.7	50	0 (0)	19.2 (0-50)	0/6	1/6	nd
Means/totals		0	83.3	67	0 (0)	24.2 (0-80)	0/18	2/18	1/6
Tebuconazole	20 ml	33.3	83.3	67	3.5 (0-20)	15 (5-30)	2/6	3/6	4/6
Tebuconazole	30 ml	0	83.3	67	0 (0)	19.5 (0-50)	0/6	0/6	2/6
Tebuconazole	40 ml	16.7	100	67	15.8 (0-95)	25 (0-50)	1/6	1/6	3/6
Means/totals		16.7	88.9	67	6.4 (0-95)	19.2 (0-60)	3/18	4/18	9/18
Arbotect 20S	1 oz	60	80	60	14 (0-40)	42 (0-98)	2/6	3/6	4/6
Arbotect 20S	2 oz	60	100	50	22.6 (0-100)	28 (10-80)	2/6	3/6	4/6
Arbotect 20S	3 oz	66.7	100	67	30 (0-90)	68 (50-90)	4/6	5/6	5/6
Means/totals		62.5	94.1	59	22.7 (0-100)	46.3 (0-98)	8/18	11/18	13/18

[a]Trees in Brevard and Martin Counties were macroinfused with fungicide or not treated on July 11-13, 2011, inoculated with *Raffaelea lauricola* on October 13-14, 2011, and rated for laurel wilt development on December 12-13, 2011, 60 days after infection (dai), June 8, 2012 (239 dai) and (558 dai). Incidence = whether or not a tree exhibited symptoms of laurel wilt. Severity = the % of a given tree canopy that had symptoms of laurel wilt. *Rl* recovery = # trees from which *R. lauricola* was recovered / # of trees that were assayed. nd = not determined.

Laurel wilt developed to a greater extent 60 days after inoculation (dai) on trees that were treated with either tebuconazole or Arbotect 20S than those treated with Propiconazole Pro (60 dai, no symptoms developed at any rate of this fungicide). By 239 dai a large proportion of the treated trees had developed symptoms, regardless of the fungicide that was used (mean incidences of 83, 89 and 94 % for, respectively, Propiconazole Pro, tebuconazole and Arbotect 20S) (Table 2). However, after 239 days disease severities and the recovery of the pathogen were lower in the propiconazole- and tebuconazole-treated trees (Table 2). Reduced recovery of *R. lauricola* in fungicide-treated vs nontreated trees continued 558 dai, but was most pronounced for the triazoles (Propiconazole Pro and tebuconazole). Determining the relationship between pathogen viability and the development of laurel wilt will be key to understanding effective management of this disease with fungicides.

In summary, the movement and retention of propiconazole in avocado was dependent on the formulation that was used; an injectable formulation, Propiconazole Pro, was more mobile in macroinfused avocado trees than Tilt, and was detected in higher concentrations in treated trees.It controlled laurel wilt better than tebuconazole and Arbotect 20S. Two formulations of tebuconazole, were marginally soluble in water and could not be infused into trees to any great extent. Nonetheless, the long-term retention of tebuconazole in trees and its impact on laurel wilt, despite the low levels of it that entered trees, indicated that future work with this fungicide is warranted. These and other fungicide treatment objectives are currently being investigated with Farm Bill funding.

Epidemiology. The Archbold Biological Station (ABS) is located on the Lake Wales Ridge, 12 km south of Lake Placid in south-central Florida. It is ca 10 x 4 km, and contains sand pine scrub (SPS), scrubby flatwoods (SF), flatwoods (F), southern ridge sandhill (SRS), bayhead/swale



(BH), and seasonal pond (SP) vegetation types (Er et al., 2013). The main tree species are various pines (*Pinus* spp.) and oaks (*Quercus* spp.), with a wide variety of understory plants. Redbay (*Persea borbonia*) and swampbay (*P. palustris*) are mostly found in the F and BH vegetation types on poorly drained soil, whereas silkbay (*P. humilis*) is mostly found on well-drained sandy soil in the SF, as well as the SPS, SRS and F, vegetation types. In the vicinity, laurel wilt was first detected 0.5 km north of ABS in Jan 2011. Its presence within ABS was monitored on Feb, Mar and Jul of 2011, in Mar, Apr, Jun and Aug of 2012, and in May, 2013 (Fig. 3).

Reduced spread of laurel wilt was associated with host clustering, most likely because highly clustered hosts had thinner stems that were less attractive to the vector (Er et al., 2013). The greatest spread was associated with intermediate densities of laurel wilt hosts (redbay, *Persea borbonia*; swampbay, *P. palustris*; and silkbay, *P. humilis*). Daily minimum temperature, daily precipitation and soil organic matter were also associated with the dynamics of the laurel wilt epidemic at this location, and dispersal gradients from an apparent disease focus were steeper in the southern direction compared to the northern

Figure 3. Distribution of laurel wilt on the Archbold Biological Station. Red circles indicate the location of laurel wilt-affected trees in or outside previously characterized GIS plots. Note the general contagious movement of the epidemic from the NNW to the SSE.

direction. The dispersal range of this disease was about 0.2 km in the 13th month of the epidemic and flattened out to 2 km in the 17th month. Disease incidence was significantly higher on redbay and swampbay than on silkbay, regardless of stem diameter. SIR (Susceptible, Infected, Recovered) and percolation models predict that for an epidemic to begin a threshold host density exists. Results from ABS indicated that a threshold host density existed for the establishment of this disease, and that spatial heterogeneity impeded its spread.

This work will serve as the basis for future efforts to model the epidemiology of laurel wilt, and will assist in the development of disease management strategies in avocado agroecosystems, as well as natural plant communities (Er et al., 2013).. The dispersal range of about 2 km in 27 months that was calculated for this study is indicative of the flight range of the beetle vector under conditions at this location. This is much slower than the estimated rate of spread of LW of 54.8 km/year in another study in more Northern areas (Koch & Smith 2008), indicating that the

dispersal range of this disease varies greatly depending on the location. Identifying factors that influence spread could assist the development of effective measures for managing this disease, which are currently very limited (Ploetz et al. 2011).

Identify resistance to laurel wilt in avocado. High density, high resolution genetic recombination maps have been made for both the Florida and California mapping populations (Kuhn et al. 2011; 2012). In addition, 475 germplasm accessions have been genotyped with 5050 SNP markers. The open-pollinated progeny from a subset of these accessions have been planted in Ft. Pierce. In June, 2013 the initial inoculations of ~600 2 year old trees at the USHRL with mycelia of *R. lauricola* were made and the trees scored for disease symptoms every 2 weeks through the summer. On September 12, the same trees were re-inoculated with a conidia suspension of *R. lauricola* and scoring for disease symptoms will be on the same two week schedule. Three trees of the CAMP were positive for laurel wilt and were destroyed.

A no-cost extension was granted for the laurel wilt funding. This allowed us to complete the germination and hardening in the full sun nursery of the 500 seeds sent in 2012 from the UC Riverside South Coast germplasm collection, which represent Mexican and Guatemalan cultivars that are not currently in the SHRS collection. At this time, another 750 seeds have been sent in 2013 from UC Riverside South Coast, which will be germinated and planted at both USHRL and SHRS. All trees at Ft. Pierce and SHRS will be labeled with barcode labels and also have a GPS coordinate. Data collection will be on Android tablets linked to barcode readers that will facilitate rapid data collection. The Android tablets and barcode readers were purchased with the laurel wilt funding. When resistant progeny are identified, a subset of the SNPs from the chip will be used with the EP-1 SNP platform for genotyping. A 600 SNP assay subset (costing ~$36,000 and paid for by supplementary funds from NP301 and NP304 for this project) have been purchased for genotyping on the Fluidigm EP-1 SNP genotyping platform (acquired last year with $143,000 in supplementary funds from NP301).

Beneficiaries

Progress that was made during this project on the use of fungicides benefited commercial producers. Macroinfusion of the tested fungicides reduced the development of laurel wilt, compared to nontreated trees. However, only Propiconazole Pro provided total, albeit short-lived, protection against the disease. Macroinfusion makes economic sense when used to stop the expansion of laurel wilt foci; healthy trees immediately surrounding a “hotspot” are treated, rather than entire orchards. Nonetheless, longer lasting, effective products and less expensive application measures are needed, as they may encourage the adoption of control measures by growers, which is now disappointingly low.

Progress in understanding the epidemiology of this disease and resistance to it in avocado will also benefit producers. These are long-term goals that require additional, ongoing work that is being conducted with other funding.

Oral presentations were given at 3-5 ad hoc laurel wilt meetings per year. Stakeholders included avocado growers (numbers who attended a given meeting ranged from 15 to 175), farm suppliers, packing house operators, grove maintenance personnel, researchers at universities and the USDA-ARS, and the press. Results were also shared in written handouts and monthly meetings of the Florida Avocado Administrative Committee in Homestead. The Florida Avocado Administrative Committee shares information with all avocado growers who sell fruit in the state, which includes minutes from the monthly meetings.

There are about 1,000 avocado growers in Florida, all of whom could benefit from this project. About 20% of this total attended at least one of the above ad hoc meetings, with unclear additional numbers availing themselves of this information by other means (e.g. word of mouth, handouts, and minutes from the monthly meetings of the Florida Avocado Administrative Committee.

Lessons Learned

Despite persistent warnings by the PI and others at the University of Florida, there remains a troubling attitude among avocado producers in Miami-Dade County to either not treat this disease seriously or error on the side of economics when managing the problem rather than using effective, but more expensive, measures. Some producers do not destroy affected trees promptly, or do nothing until much of their orchard is devastated by the disease. And other producers who

have destroyed trees adopt unproven and dubious application measures for fungicides that have, predictably, failed.

Awareness programs in the state and the education of producers continues with the hope that these attitudes will eventually change. Major efforts by the Extension Tropical Fruit Crops Agent in Homestead, Dr. Jonathan Crane, and assistance by FDACS in Gainesville (Drs Richard Gaskella and Wayne Dixon) have been most helpful. In addition, funding from the current Farm Bill is being used to demonstrate in the commercial production area which approaches do and do not affect this disease (this was not possible when the disease was not present in this area). These efforts must be successful to curb the spread and impact of this disease.

Contact Person

Randy C Ploetz

305 246-7001, x 321 kelly12@ufl.edu

Additional Information

References cited

H.L. Er, Hughes, M., Smith, J., Pruett, G., Konkol, J., Ploetz, R.C., Marois, J.J., and van Bruggen, A.H.C. 2013. Spatio-temporal analysis of laurel wilt survey data in the Southeastern USA. (In review).

Kuhn DN, Livingstone D, Mockaitis K, Tondo CL, Schnell RJ. 2011. SNP Discovery in Avocado from Second Generation Sequencing of the Leaf and Flower Transcriptome. Paper presented at the Plant and Animal Genome XIX, San Diego, CA, January 15-19

Kuhn DN, Mockaitis K, Podicheti R, Tondo CL, Schnell RJ. 2012. Design of an Illumina Infinium 6k SNPchip for genotyping two large avocado mapping populations. Paper presented at the Plant and Animal Genome XX, San Diego, CA, January 15-18

Ploetz RC, Pena JE, Smith JA, Dreaden TJ, Crane JH, Schubert T, Dixon W. 2011a. Laurel Wilt, Caused by Raffaelea lauricola, is Confirmed in Miami-Dade County, Center of Florida's Commercial Avocado Production. Plant Disease 95:1589-1589

Ploetz RC, Perez-Martinez JM, Evans EA, Inch SA. 2011b. Toward Fungicidal Management of Laurel Wilt of Avocado. Plant Disease 95 (8):977-982

Ploetz, R.C., Pérez-Martínez, J.M., Smith, J.A., Hughes, M., Dreaden, T.J., Inch, S. A. and Fu, Y. 2012. Responses of avocado to laurel wilt, caused by *Raffaelea lauricola*. Plant Pathology 61:801–808.

Project (22): University of Florida - Protective Structures for Crop Diversification, Improved Fruit Yield and Quality and Appropriate Water Management and Freeze Protection

Funding Year: 2010
Funding Amount: $432,740.00
Reporting Period: Final

Project Summary

Protected Agriculture and its Potential in Florida. Protected agriculture is utilized around the world to improve vegetable and fruit yield and quality, improve earliness and steady product supply, reduce water use and nutrient leaching for freeze protection, and ameliorate the incidence of pests. Protected culture includes structures such as greenhouses, high tunnels, and screenhouses. A greenhouse is a permanent structure with a solid glass or plastic roof and walls and in most cases possesses heating and cooling systems. This characteristic can be beneficial for winter season production and for crops that need warm temperatures. Crops inside greenhouses are mostly produced in growing media or soilless culture. Structures range in size from small sheds to very large buildings. High tunnels are unheated, plastic covered, solar structures, with passive ventilation through roll-up side walls. Height might vary from 6 ft to more than 18 ft tall. Crops are usually grown on soil. However, pot, bag and sack culture could be used, along with various growing media (e.g. peat, perlite, and tree bark) depending on availability, prices, and crops. Screenhouses are permanent structures covered with saran-like nets that are commonly used to produce low-light ornamentals and nursery crops.

All over Florida, there are agricultural operations that need: a) diversification to high-value crops or b) improve fruit yield and quality. For instance, in west central, central, and northeast Florida, citrus and leatherleaf fern growers used to produce large number of plants for their operations in greenhouses and screenhouses. However, citrus area is rapidly shrinking, partly because of hard-to-control diseases such as citrus canker and leaf greening, and due to diminishing whole fruit prices. The same scenario applies to tomato, pepper, and cucurbit growers around the state. In north central and west central Florida, blueberry (5000 acres) and strawberry (10,000 acres) production is facing limiting conditions due to reduced supply of water for freeze protection and current efforts to reduce nutrient leaching and run-off into ground waters and rivers. Protective structures may be an answer to these operations, improving their competitive ability against national and foreign markets, and reducing water use for freeze protection and crop maintenance.

Previous work illustrated the advantages of protected agriculture in Florida for crop diversification and yield earliness, water use, and soilless culture to avoid fumigation. In Hillsborough County, studies were conducted to determine the effects of high tunnels on strawberry growth, fruit yield and quality, and on freeze protection. Those studies indicated that no sprinkler irrigation was needed to protect the crop against hard freezes, including during the extreme winter weather in west-central Florida, saving about 60,000 gal/acre per 10 hours of freeze protection while increasing early and total yields increased by 35% and 57%, respectively. High tunnels demonstrated to be a valuable alternative to produce specialty cantaloupes, following strawberry culture, which cannot otherwise be grown in open fields mainly because

rain-induced cracking. The first season of that study showed a 12% fruit yield increase inside tunnels in comparison with open-field culture, whereas soluble solid content (^{o}Brix) improved from 11.5 to 14.0. During the second season, plants growing outside the high tunnels did not survive cold temperatures.

General Objective and Specific Goals. The general objective of this project was to devise strategies for crop diversification and appropriate water usage for crop maintenance and freeze protection under existing protective structures in seven Florida counties. There were five specific goals: 1) determine the biological and economic performance of alternative high-value vegetable and fruit crops under existing greenhouse, high tunnel, and screenhouse structures; 2) assess the impact of protective structures and non-irrigation based freeze protection methods on water volume and quality for blueberry and strawberry winter production; 3) evaluate the feasibility of alternative soilless culture methods to produce high-value vegetable and fruit crops under protective structures; 4) develop educational and training programs and demonstration units for growers, stakeholders, regulators, industry representatives, and the general public on the benefits and potential of producing high-value crops under protective structures in Florida; and 5) identify channels and develop strategies for established growers to market non-traditional vegetables and small fruit crops in local and statewide venues.

Project Approach

Activity 1.1. Adaptability and performance of strawberry, high-density blueberry, grape tomato, specialty melons and watermelon, plums, and peaches under high tunnels in north-central Florida.

This activity was conducted in several farms throughout the state and it demonstrated the benefits of growing specialty crops under protective structures (e.g. high tunnels, screen houses, and greenhouses), as well as to identify and solve production issues on the adaptation of the technology to Florida conditions. **Many of these studies/demonstrations overlap with Activities 1.3, 3.1 and 4.1; therefore, they are reported together**. Below, there is a summary of this activity.

1) JG Ranch (Hernando Co.), Kai-Kai Farms (Martin Co.), Extension Offices (Bradford and Hendry Co.), Suwannee Valley Agricultural Extension Center (Suwannee Co.): Five small high tunnels were acquired and built at these five locations as part of a demonstration on protected culture and freeze protection of specialty vegetable crops. At the Hernando Co. location, the grower had already installed approximately 0.5 acres of high tunnels for producing tomato and pepper.
2) Hobe Sound Farms (Martin Co.): Two validations under high tunnels were installed in December 2012. The first study examined the effects of two planting densities (12,750 and 17,000 plants/acre) on the growth and yield of indeterminate bell pepper. The second study sought to compare the number of stems needed for optimum bell pepper production inside the structures. Due to the economic success of this demonstration, the grower repeated the production cycle into the 2013-14 season.
3) DiMare Tomato (Hillsborough Co.): This is one of the largest tomato operations in Florida. They installed 5 acres of greenhouses in 2010, as the first phase of a 25-acre specialty tomato project. A validation to compare production practices, such as planting densities and soilless media is in progress since 2011 for the next two seasons. Also, one Roma-type tomato cultivar used in this operation was planted inside high tunnels at the Gulf Coast REC in Balm

to replicate the grower production system. Due to the economic success of this demonstration, the grower repeated the production cycle into the 2013-14 season.

4) Straughn Farms (Alachua Co.): This is the largest blueberry operation in the state (600 acres). There were two field demonstrations at this location. First, the results of a two-year study evaluating the effects of high tunnels on blueberry early yield and freeze protection were published in 2012, showing improved earliness of the two tested cultivars (Snowchaser and Springhigh). For strawberry, 0.5 acres were planted in October 2012 and 2013 to diversify production under protective structures.
5) C&B Farms (Hendry Co.): A field validation comparing three growing media (i.e. coconut coir, pine bark, and aged compost) for organic basil was started in October 2012 and repeated in February 2013. Organic basil production with compost resulted on the highest yields.
6) Mathis Farms (Hillsborough Co.): This operation installed 6 acres of high tunnels in the 2011-12 season and my program advised the owner on the procedures for producing strawberries under those conditions. Also, in October 2012, a demonstration was installed to compare the performance of Florida-produced plug strawberry plants and conventional bare-root and plug plants. The results indicated that Florida-produced plugs are competitive in comparison with bare-root transplants. Alicia Whidden, extension agent for the county, was cooperating in this activity.
7) Fancy Farms (Hillsborough Co.): This farm established 3 acres of high tunnels in the 2011-12 season and my program is advising the owner on the procedures for producing strawberries under those conditions. In October and December 2012, two validations were initiated with Florida-produced plug strawberry and red determinate bell pepper transplants under high tunnels. The studies are in progress and will be repeated in 2013. The growers continued planting high value vegetables into the 2013-14 season. Alicia Whidden, extension agent for the county, was cooperating in this activity.
8) C&T Farms and Lands (Polk Co.): This operation wanted to diversify from primarily citrus production to other crops. Currently, they grow strawberry, cucurbits, heirloom tomato, greens, and blackberry in six greenhouses and high tunnels covering approximately 1.5 acres. Dan Doran's Farm (Putnam Co.): This leatherleaf fern grower has 3 acres of screenhouses. In cooperation with Daniel Cantliffe, extension agent for St. Johns Co., we initiated a crop diversification project under screenhouses to produce bell pepper, blueberry, and strawberries in late 2010 through 2013. The demonstration is evaluating the performance of the crops in that non-traditional production area.
9) Sunshine Produce (Hillsborough Co.): A field demonstration was established in October 2010 to compare the yields of strawberries inside and outside high tunnels. Preliminary results have shown significant increases in yield (above 50%) inside the tunnels in comparison to open fields. As a result, he increased this part of his operation to 6 acres of high tunnels.
10) Florida Pacific (Hillsborough Co.): The owner increased its protected agriculture operation from 3 acres of strawberries in the 2009-10 to 4 acres in the 2011-12 season. Yields in the 2010-11 season increased at least 62% inside the high tunnels in comparison with outside the structures.
11) G & B Ranch (Hernando Co.): This blueberry grower installed approximately 0.5 acres of high tunnels for producing tomato.

12) Sunnyridge Farms (Polk Co.): This producing/packing operation has 2.3 acres of high tunnels that were installed in 2008. A field demonstration was installed in September 2010 to show the benefits of the production system. Preliminary results showed early yields of 3.2 ton/acre.

Activity 1.2. Management of high-value vegetables and fruit crops in northeast Florida.

In Putnam Co., one leatherleaf fern screen house was conditioned to grow vegetables and fruits, two bell pepper varieties were planted in bags filled with a mix of pine bark, sand and commercial potting mix, four blueberry cultivars, four blackberry cultivars, and four peach varieties were planted in large pots using pine bark as media. More than a 1000 strawberry plants were planted in September 2011 and harvested until May 2012, including the cultivars 'Florida Elyana', 'Strawberry Festival' and 'Camarosa'. Strawberries were planted in troughs filled up with a media mix of pine bark and peat media, irrigated via drip tape. Bell pepper harvest started in December and continued through April 2012. At this site, ten cultivars of peppers were planted in trays in February and were transplanted in early April. Eight bell pepper cultivars, red, orange and yellow and two jalapeño cultivars were planted in 3-gallon pots, filled with pine bark and drip irrigation on the first week of April 2012 under a shadehouse, which was previously used for fern production.

The grower was interested in marketing jalapeno peppers to the local Hispanic community in the Putnam County area and marketing the bell peppers to restaurants in a five county area (Putnam, St Johns, Flagler, Volusia, and Duval Co.). The purpose was to grow a spring and fall crop to cover an extended harvest period. Plum cultivars that were planned for this location have also been purchased and planted as well as a new blueberry cultivar ('Sweet Crisp').

At a new second site, a high tunnel was used to grow summer squash and zucchini. The trial was established in February 2012 and there were 25 harvests. Bumble bees are used for pollination and the plants are harvested three times a week. Biological control was used for pest management. Marketing of produce was explored at local restaurants in the surrounding counties. Fruit is usually sold at $4-5/lb. The plants were grown in 3-gal pots with pine bark and fertigated eight times daily. Trellises were constructed and the plants were tied to drop strings from the trellises.

Activity 1.3. Performance of indeterminate bell pepper, tomato, specialty melons, and strawberry under high tunnels in west-central Florida.

In addition to the studies/demonstrations presented in Activity 1.1., the following were accomplished. **Many of these studies/demonstrations overlap with Activities 1.3, 3.1 and 4.1; therefore, they are reported together**.

1) In Hillsborough Co., determinate tomatoes, indeterminate peppers and strawberries were planted in high tunnels. Crop growth and yield were recorded for strawberries. Due to the cold weather, the pepper and the tomato trails were injured, so data for that is incomplete. Peppers were replanted in March 2011. A storm by the end of March destroyed the tunnels where strawberries were, so there were not intercropped specialty melons. The trial was replanted in September 2011 and harvested once a week since the last week of November 2011. Determinate bell peppers were replanted on 15 February, 2012, and concluded in May 2012. This study was part of a Master's project for a graduate student and it will be published in a scientific journal.
2) In Hillsborough County, three indeterminate tomato cultivars were seeded and transplanted in early April 2013 under a 16-ft high tunnel. The crop was planted in 20-gal containers filled with a 50:50 mix of coconut coir and pine bark. Growth and yield performance of these TYLCV-resistant cultivars will be recorded through 2013 and beginning of 2014. In

Hillsborough Co., determinate red bell pepper was planted in early January 2013 to study the effects of five planting densities (10,900 to 32,600 plants/acre) on crop performance. The crop was planted in 20-gal containers filled with pine bark. Growth and yield performance of these TYLCV-resistant cultivars will be recorded through July 2013 and the study will be repeated in fall 2013.

3) In Hillsborough Co., determinate red bell pepper was planted in high tunnels on late March 2013 using four different irrigation programs and three soilless media to determine the irrigation needs to produce the crop under soilless conditions.
4) Former greenhouse citrus facilities in Polk Co. (C&T Groves and Lands) have three protective structures, in one of them strawberries were planted on table tops in fall 2011. The media used were fine and coarse coconut coir fiber and pine bark. In the second structure, at the beginning of the strawberry season was used to grow in vertical systems with perlite as growing medium. In January 2012, the vertical system was eliminated, and a new horizontal system was installed to grow indeterminate tomatoes, which were harvested until the end of June 2012. In the third structure, the STS (Soilless Trench System) was build, and two media were used to produce two indeterminate pepper cultivars. The grower continued expanding to five structures in the 2013-14 season.

Activity 2.1. Evaluation of alternative freeze protection methods and their impact on water volume and quality in north-central Florida.

A graduate student was hired in December 2011 to perform the activities related to freeze protection in high tunnels in Alachua Co. Literature review, and model simulation for the high tunnels heating system was performed. This information will be the basis for future field work (Appendix 1).

Activity 3.1. Performance of high-value vegetables and strawberry in soilless culture media in west-central and northeast Florida.

These studies/demonstrations overlap with Activities 1.3, 3.1 and 4.1; therefore, they are reported together.

Activity 4.1. Creation of protected agriculture demonstration and educational units.

The educational units are installed in Hastings and Balm with demonstrations of small fruit and vegetable production under protected structures. The units are available for tours, including vegetable and small fruit production under shade house, net-house and high tunnels. The educational unit at Hastings, St Johns Co., was a greenhouse constructed and planted with a variety of different vegetables including peppers, herbs, tomatoes, various lettuces, beets, kale and various other cole crops, eggplant, and squash. Also, another small greenhouse was constructed and planted with a variety of different vegetables. This site is being used for demonstrations to market gardeners and pick-your-own growers. Pests are controlled with organic pesticides and cultural practices.

In Balm, nine high tunnels and two shade houses (about 2 acres) were built and equipped with partial funding from this grant. A total of 550 and 650 attendees have visited the

demonstration unit in Balm during the 2011-12 and 2012-13, respectively. The visits were organized in several events/tours (see Activity 4.2 and figures).

Activity 4.2. Elaboration of workshops, field tours, and trainings.

Field Days.

1) 2011 Florida Ag Expo. In November 2011 at the Gulf Coast REC in Balm, 125 attendees learned on the benefits of protected culture for production of small fruit and vegetables, including types of structures, soilless media, and cultivar selection.
2) 2011 Strawberry Field Day/Berry Ag Expo. In February 2011, 380 growers from the U.S. and overseas, extension faculty, and industry representatives, toured the demonstration areas and learned about freeze protection alternatives, and managing crops under protective culture.
3) 2011 PAINet Minifield Day. In coordination with the Southwest Florida Small Farmers Network, which is coordinated by Dr. Robert Klusson, Sarasota County extension agent, we received the visit of 30 growers and small garden owners. The program included a presentation on the objectives of PAINet (Protected Ag Information Network) and current activities at the GCREC on protected agriculture. Following that presentation, the participants visited all tomato, bell pepper, and strawberry research and demonstration sites under the permanent educational units at the GCREC, which includes high tunnels and screenhouses.
4) 2011 Protected Ag Tour. In June 2012, 20 attendees, including extension agents and researchers, visited four grower sites in Polk and Hillsborough Counties and learned about the advantages and disadvantages of protected culture for strawberry, pepper, and tomato, including two protected agriculture facilities, a CSA shade house vegetable production operation, and a retractable-roof ornamental production facility.
5) 2012 Florida Ag Expo. In November 2012 at the Gulf Coast REC in Balm, 120 participants visited demonstration areas and were instructed on the objectives of protected and soilless culture of vegetable and fruit crops.
6) 2012 Berry Ag Expo. A field day was conducted at the Gulf Coast REC in February 2012 with the participation of 182 growers, extension faculty, and industry representatives, who toured the demonstration areas and learned about freeze protection alternatives under protected culture.
7) 2012 Protected Ag Tour. A group of 30 attendees, including extension agents and researchers, visited two grower sites in Palm Beach Co. and learned about the advantages and disadvantages of protected culture for vegetables and ornamentals.
8) A training was conducted in Putnam Co. for an international consortium composed of representatives from Ecuador, Haiti, and Nicaragua. The training included demonstration and manipulation of nutrients and irrigation systems, cultural practices for peppers, strawberries, blackberry, blueberries and peaches under protective structures. Also, at least six growers from different parts of the state had visited the facility, to learn about the production systems.
9) The Hasting educational unit featured a Tour-de-Farm on 22 April 2012. Last year 2000 people traveled the tour and 400 hundred plus visited these sites. FDACS Block Grant partners donated the hybrid squash and pepper seeds, the greenhouse and plants contained therein, and the USDA donated the tunnel.
10) 2nd Vegetable and Small Fruit Protected Ag Field Day. It was conducted in March 2013 at the Gulf Coast REC with the participation of 150 growers, extension faculty, and industry

Representatives, who toured the demonstration areas learned about protected culture of vegetable and fruit crops.

Workshops, Seminars and In-Service Trainings.

1) Santos, B.M., T.P. Salame-Donoso, A.J. Whidden, and M. Ramirez-Sanchez. A summary of current irrigation and fertilization research for strawberry production in Florida. 7th North American Strawberry Symposium. Tampa, Florida. February 2011.
2) Santos, B.M., T.P. Salame-Donoso, and H.A. Obregon-Olivas. Improving fruit postharvest quality through best management practices for perishable vegetable production in protective structures. Hort CRSP Spring Workshop, US-AID. University of California at Davis, Davis. August 2011.
3) Santos, B.M. Potential of protected agriculture for small fruit and vegetable production in Florida. High Tunnel Symposium, State College, Pennsylvania. October 2011.
4) Salame-Donoso, T.P. and B.M. Santos. Validation of multiple soilless culture practices under protective structures for vegetable and small fruit production. 2011 Southern Region-American Society for Horticultural Science meeting, Corpus Christi, Texas. January 2011.
5) Santos, B.M. and T.P. Salame. Performance of blueberry cultivars under high tunnels. Fall Blueberry Short Course, Plant City, Florida. November 2011.
6) Santos, B.M. and E. Torres-Quezada. General horticultural aspects of tomato production under protective structures. 2011 Florida Tomato Institute, Naples, Florida. September 2011.
7) Santos, B.M. Current research on transplant establishment and freeze protection for strawberry production. 2011 Strawberry AgriTech Seminar and Trade Show, Plant City, Florida. August 2010.
8) Santos, B.M. Current experiences in protected agriculture for vegetable and fruit crops in Florida. 2011 Small Farms Conference, Kissimmee, Florida. July 2011.
9) Torres-Quezada, E., C. Zambrano-Vaca, and B.M. Santos. Bell pepper production under protective structures: Evaluation of soilless media, container types, and granular nitrogen sources. 124rd Florida State Horticultural Society meeting, St. Petersburg, Florida. June 2011.
10) Salame-Donoso, T.P. and B.M. Santos. Performance of blueberry cultivars under high tunnels. 124rd Florida State Horticultural Society meeting, St. Petersburg, Florida. June 2011.
11) Torres, E.A. and B.M. Santos. Effects of in-row distances on indeterminate bell pepper cultivars under high tunnels in Florida. 21st International Pepper Conference. Naples, Florida. November 2012.
12) Santos, B.M., T.P. Salame-Donoso, E.A. Torres-Quezada, and C.J. Mendez-Urbaez. Cultural practices for tomato, bell pepper, and strawberry production under protected culture in Florida. Caribbean Food Crops Society Meeting. May 2012.
13) Santos, B.M. Advances on protected culture of strawberry and blueberry in Florida. 109th American Society for Horticultural Science Conference. Miami, Florida. July 2012.
14) Torres-Quezada E.A., T.P. Salame-Donoso, C.J. Mendez-Urbaez, and B.M. Santos. Evaluation of nitrogen rates for tomato and bell pepper growth and yield under protected culture. 2012 Southern Region-American Society for Horticultural Science Meeting. Birmingham, Alabama. January 2012.

15) Salame-Donoso, T.P. and B.M. Santos. Performance of blueberry cultivars under high tunnels. 2012 Southern Region-American Society for Horticultural Science Meeting. Birmingham, Alabama. January 2012.
16) Santos, B.M. Current experiences on protected culture in Florida, Central America, and the Caribbean. 28th Florida Seed Association Seminar. Ft. Myers Beach, Florida. June 2012.
17) Santos, B.M., P. Huang, T.P. Salame-Donoso, and A.J. Whidden. 2012. Strategies on water management for strawberry establishment and freeze protection in Florida. 125th Florida State Horticultural Society Meeting. Delray Beach, Florida. June 2012.
18) Salame, T.P. and B.M. Santos. 2012. Evaluation of soilless media for strawberry production in vertical and horizontal systems under a nethouse. 125th Florida State Horticultural Society Meeting. Delray Beach, Florida. June 2012.

Publications

1) Salame, T.P. and B.M. Santos. 2011. Performance of blueberry cultivars under high tunnels. Proceedings of the Florida State Horticultural Society 124:(in press).
2) Santos, B.M., D.N. Moore, T.P. Salame-Donoso, C.D. Stanley, and A.J. Whidden. 2011. Evaluation of freeze protection methods for strawberry production in Florida. Proceedings of the Florida State Horticultural Society 124:(in press).
3) Torres, E.A., B.M. Santos, and C.A. Zambrano. 2011. Bell pepper production under protective structures: Evaluation of soilless media and container types. Proceedings of the Florida State Horticultural Society 124:(in press).
4) Santos, B.M. and E.A. Torres-Quezada. 2011. General horticultural aspects of tomato production under protective structures. 2011 Florida Tomato Institute Proceedings, pp. 31-31.
5) Santos, B.M. and T.P. Salame-Donoso. 2012. Performance of blueberry cultivars under high tunnels in Florida. HortTechnology 22:700-704.
6) Santos, B.M., P. Huang, T.P. Salame-Donoso, and A.J. Whidden. 2012. Strategies on water management for strawberry establishment and freeze protection in Florida. Proceedings of the Florida State Horticultural Society 125:(in press).
7) Salame, T.P. and B.M. Santos. 2012. Evaluation of soilless media for strawberry production in vertical and horizontal systems under a nethouse. Proceedings of the Florida State Horticultural Society 125:(in press).
8) Santos, B.M. and T.P. Salame-Donoso. 2012. Protected culture for vegetable and small fruit crops: The soilless trench system. University of Florida/IFAS, EDIS Extension Fact Sheet HS1204 <http://edis.ifas.ufl.edu/pdffiles/HS/HS120400.pdf>. 3 pp.
9) Santos, B.M., G.E. Vallad, and E.A. Torres-Quezada. 2013. Protected culture for vegetable and small fruit crops: Types of structures. University of Florida/IFAS, EDIS Extension Fact Sheet HS1224 < http://edis.ifas.ufl.edu/pdffiles/HS/HS122400.pdf>. 4 pp.

Goals and Outcomes Achieved

Summary of proposed versus achieved measure indicators. Completed activities are presented in the preceding section.

Indicators	Proposed	Achieved
Scientific articles	3	6
Extension/outreach documents	3	3
Presentations and workshops	6	18
Field tours/days	0	10 (1443 participants)
Grower field demonstrations	0	15 (10 counties)

Outcome 1, Specific Goal 1: *Determine the biological and economic performance of alternative high-value vegetable and fruit crops under existing greenhouse, high tunnel, and screenhouse structures.*

Proposed target: The adaptability and yields of strawberry, high-density blueberry, grape tomato, specialty melons and watermelon, plums, and peaches under protective structures will be determined.

Achieved target: The adaptability of strawberry, blueberry, tomato, and bell pepper under high tunnels and shadehouses was documented and analyzed.

Proposed performance measure: Publication of one extension/outreach document, one scientific article, and presentations in two statewide conferences.

Achieved performance measure:

a) Scientific articles (3): Salame, T.P. and B.M. Santos. 2011. Performance of blueberry cultivars under high tunnels. Proceedings of the Florida State Horticultural Society 124:(in press).

   Torres, E.A., B.M. Santos, and C.A. Zambrano. 2011. Bell pepper production under protective structures: Evaluation of soilless media and container types. Proceedings of the Florida State Horticultural Society 124:(in press).

   Santos, B.M., P. Huang, T.P. Salame-Donoso, and A.J. Whidden. 2012. Strategies on water management for strawberry establishment and freeze protection in Florida. Proceedings of the Florida State Horticultural Society 125:(in press).

b) Extension document (1): Santos, B.M. and E.A. Torres-Quezada. 2011. General horticultural aspects of tomato production under protective structures. 2011 Florida Tomato Institute Proceedings, pp. 31-31.

c) Presentations (4 field tours with 600 attendees; see meetings in the Workshops, Seminars and In-Service Trainings subsection above): 2011 Protected Ag Tour; 2012 Protected Ag Tour; Tour-de-Farm at Hastings; 2nd Vegetable and Small Fruit Protected Ag Field Day.

Outcome 2, Specific Goal 2: *Assess the impact of protective structures and non-irrigation based freeze protection methods on water volume and quality for blueberry and strawberry winter production.*

Proposed target: At least one non-irrigation based method for freeze protection will be identified.

Achieved target: Using row covers, high tunnels, and low-volume sprinkler irrigation were identified as suitable alternatives for freeze protection of berry crops. Similarly, a detailed report on the potential of using biofuels for complementary heating under high tunnels was generated (Appendix 1).

Proposed performance measure: Publication of one extension/outreach document, one scientific article, and presentations in two statewide conferences.

Achieved performance measure:

a) Scientific articles (2): Santos, B.M., D.N. Moore, T.P. Salame-Donoso, C.D. Stanley, and A.J. Whidden. 2011. Evaluation of freeze protection methods for strawberry production in Florida. Proceedings of the Florida State Horticultural Society 124:(in press).

   Santos, B.M. and T.P. Salame-Donoso. 2012. Performance of blueberry cultivars under high tunnels in Florida. HortTechnology 22:700-704.

b) Extension document (1): Santos, B.M., G.E. Vallad, and E.A. Torres-Quezada. 2013. Protected culture for vegetable and small fruit crops: Types of structures. University of Florida/IFAS, EDIS Extension Fact Sheet HS1224 <http://edis.ifas.ufl.edu/pdffiles/HS/HS122400.pdf>. 4 pp.

c) Presentations (2 field tours with 262 attendees; see meetings in the Workshops, Seminars and In-Service Trainings subsection above): 2011 Strawberry Field Day/Berry Ag Expo; 2012 Berry Ag Expo.

Outcome 3, Specific Goal 3: *Evaluate the feasibility of alternative soilless culture methods to produce high-value vegetable and fruit crops under protective structures.*

Proposed target: Recommendations for at least one soilless system for production of high-value specialty crops will be developed.

Achieved target: At least one soilless culture system was evaluated and developed for vegetable crop production.

Proposed performance measure: Publication of one extension/outreach document, one scientific article, and presentations in two statewide conferences.

Achieved performance measure:

a) Scientific article (1): Salame, T.P. and B.M. Santos. 2012. Evaluation of soilless media for strawberry production in vertical and horizontal systems under a nethouse. Proceedings of the Florida State Horticultural Society 125:(in press).

b) Extension document (1): Santos, B.M. and T.P. Salame-Donoso. 2012. Protected culture for vegetable and small fruit crops: The soilless trench system. University of Florida/IFAS, EDIS Extension Fact Sheet HS1204 <http://edis.ifas.ufl.edu/pdffiles/HS/HS120400.pdf>. 3 pp.

c) Presentations (3 field tours with 275 attendees; see meetings in the Workshops, Seminars and In-Service Trainings subsection above): 2011 Florida Ag Expo; 2011 PAINet Minifield Day; 2012 Florida Ag Expo.

Outcome 4, Specific Goal 4: *Develop educational and training programs and demonstration units on the benefits and potential of producing high-value crops under protective structures in Florida*.

Proposed target: Ten educational workshops will be conducted at different locations to train at least 50 farmers through marketing, crop selection, structure options and management, growing systems, integrated pest management, post-harvest handling, and safe food practices, and one field tour per year will be prepared in all locations.

Achieved target: A total of 1443 participants attended the field days and tours during the project.

Proposed performance measure: Publication of one educational article, two handouts, and five newsletters.

Achieved performance measure: A total of nine articles/papers and 18 presentations in local, state, national and international conferences, seminars, and educations session were accomplished (see Workshops, Seminars and In-Service Trainings subsection above).

Outcome 5, Specific Goal 5: *Identify channels and develop strategies for established growers to market non-traditional vegetables and small fruit crops in local and statewide venues*.

Proposed target: Contacting at least 50 members for harvest schedules for CSA.

Achieved target: Little was achieved in this outcome due to lack of information from the interested parties and changing marketing climate for high value crops.

Proposed performance measure: Organize two meetings and two workshops per year.

Achieved performance measure: None.

Beneficiaries

Presentations of the material developed under this grant were given at the 2013 University of Florida Small Farms Conference. Approximately 200 growers attended this presentation. Additionally, attendance at field days at the UF Gulf Coast Research and Education center was approximately 150 attendees per event. Additionally, ten or more growers personally visited the center outside the regularly scheduled field days in order to learn more about protected culture. The "Tour de Farm" event brought an additional 400+ visitors to the GCREC.

Lessons Learned

We learned that although a 2-year project is a short time to measure long-lasting impacts, significant changes in grower and general public education and adoption of the technology can be achieved. Preliminary info indicates that protected crop area has increased from almost 100 acres in 2010 to more than 2050 acres in 2013, part of which can be attributed to the impact of this project and the work of the PI and co-PI on achieving the proposed goals.

Contact Person

Dr. Bielinski M. Santos, Associate Professor of Horticulture, Gulf Coast Research and Education Center, IFAS, University of Florida. E-mail: bmsantos@ufl.edu. Mailing address: 14625 CR 672, Wimauma, FL 33598.

Co-PI: Daniel J. Cantliffe, Jacque W. Breman, Alto Straughn, Bruce Templeton, Gary E. Vallad, Vance M. Whitaker, Pratap C. Pullammanappallil, Alicia J. Whidden, Scott Taylor, Edsel Redden, and Mark Warren. Phone: (352) 392-1928, extension 203

Additional Information: A publication list is included above. Figures and Appendix 1 (see attached file).

Project (23): University of Florida - A Safe Harvest: Reduction of Tomato Susceptibility to Contamination with Salmonella through Cultivar Selection, Optimized Fertilization Regime and Education

Funding Year: 2010
Funding Amount: $432,740.00
Reporting Period: Final

Project Summary

An increase in produce-associated gastroenteritis outbreaks demonstrates that under some conditions human fecal pathogens can contaminate fruits and vegetables. Furthermore, while conventional produce sanitation is helpful, it cannot be solely relied on to prevent outbreaks. To address these challenges, a comprehensive farm-to-fork program needs to be developed.

Experiments proposed here were aimed to contribute to the development of a farm-to-fork produce safety program. The research was carried out by a team of the University of Florida researchers, with the input from industry managers. We identified varieties of tomato that were less susceptible to *Salmonella* contamination and matched them with a fertilization regime under which tomatoes were less conducive to the proliferation of *Salmonella*. Even though a *Salmonella* -"resistant" tomato cultivar was not identified, several varieties and breeding lines were shown to have varying levels of susceptibility to *Salmonella.* An assessment of the fertilization practices revealed combinations of agronomic techniques that may positively or negatively affect the outcomes of post-harvest interactions between tomatoes and *Salmonella*. We also developed bi-lingual Extension Outreach program (consisting of web-based and on-site modules and publications), which further ensure that thousands of Florida farmers, producers, packers, retailers and consumers are empowered to make science-based food safety decisions.

Project Approach

(1) *Characterization of resistance of tomato varieties to post-harvest proliferation of Salmonella.* In a series of greenhouse and field experiments, we have tested the ability of *Salmonella* to proliferate in over a dozen commercial and heirloom varieties as well as breeding of tomatoes.

(2) *Testing a correlation between post-harvest proliferation of Salmonella in tomatoes and the N, K fertilization regimes.* These experiments were conducted over three field seasons in two major Florida tomato-growing regions (Northern Florida – Live Oak, Central Florida – Citra).

(3) *Development of on-site and web-based training modules to promote produce safety through cultivar selection and optimal pre- and post-harvest practices*. We have conducted 10 on-site workshops, developed 4 Youtube videos that highlight recent developments in food safety research and legislature, we also published two online peer-reviewed EDIS fact-sheets (in English and Spanish).

From left to right. View of the laboratory on a sampling day: thousands of tomatoes harvested in the field are staged for *Salmonella infections.* Students who were involved in the project: A. George (Ph.D. student), E. Carpinone and J.T. Noel (post-doc).

Summary of field activities:

Transplants of tomatoes cvs. Sebring and Solar Fire were produced in a greenhouse in Styrofoam trays with peatmix media and grown until ~4 inches tall. In the last two seasons, transplants were produced in house to reduce the cost of the experiments. Transplants were planted through the mulch by transplanting machine, tomato plants were spaced 18 inches apart in a single row on the bed. There were 12 tomato plants in a plot (experimental unit). Pre-emergence herbicides were applied carefully to the soil surface in the alleys between beds to control weeds. Fungicides, bactericides, and insecticides were applied as recommended by field scouting.

Tomatoes were grown under different fertilization regimes in two geographically distinct regions of Florida (Live Oak, North Florida and Citra, Central Florida), and upon harvest they were infected with the type strain of *Salmonella* as well as a cocktail of the 6 *Salmonella* strains recovered from tomato-related outbreaks of salmonellosis.

For all treatments, the crop area received a broadcast treatment of Telone soil fumigant at 12 gal/acre. Three weeks later the planting beds were formed on five-foot centers (5 ft between the centers of adjacent beds. Pre-plant fertilizer formulated to provide 30% of the

total nitrogen (N) and potassium (K), applied to the bed area, and rototilled into the soil. Preplant fertilizers consisted of ammonium nitrate, potassium chloride, and potassium-magnesium-sulfate. Drip irrigation tubing ('Ro-Drip' 8 mil; tubing with emitters spaced 8 inches apart applying 0.4 gal/min/100 feet) was applied to the surface of the beds to the side of the bed center for tomato. Black or white polyethylene mulch (depending on the growing season) was applied to the beds. A fertilizer injection system was set up to apply soluble fertilizer (N and K) in 6 bi-weekly amounts to supplement the pre-plant fertilizers. Injected fertilizers were ammonium nitrate and potassium chloride. Total-season N treatments were 150, 200, and 250 lb/A N and total-season K treatments were 150, 225, and 300 lb/A as K_2O. Irrigation was applied to maintain volumetric water holding capacity at 8 to 10%. Early in the season one irrigation event of 20 minutes per day was satisfactory. Irrigation run-time and frequency were increased to two 30-minute runs per days,

Research plot in Citra, Fl.

then finally to three 30-minute runs per day. The growing season was markedly dry with no significant rainfall for most of the season.

Plant N and K nutrient status was monitored through the season with sampling and analyses of dried whole-leaf N and K concentrations at three growth periods (first flower, early fruit set, and first harvest). In addition, fresh leaf petiole N and K concentrations were measured on the same sampling dates as for whole leaves. Whole-leaves (most recently matured leaf-6th leaf from the tip) were dried, ground in a Wiley mill, and analyzed for total Kjeldahl N with automated colorimetry. Petioles were removed from an addition 6 leaves, chopped, and crushed to retrieve the plant sap. Nitrate-N and K ion concentrations in the sap were measured with battery-operated, hand-held ion specific electrode (Cardy Meter, Spectrum Technologies, Plainfield, IL).

Fruits were harvested at the mature-green stage on two dates. Fruits were graded by size using the size standards of the Florida Tomato Committee (2011). The sizes were "extra-large", "large", and "medium." Mis-shapen and damaged fruits were graded as "culls." Fruits in each grade were counted and weighed. Early fruit yield consisted of the production from the first harvest and total-season yield consisted of the combined yield from the two harvests.

To test susceptibility of different genotypes of *Salmonella*, tomatoes were produced in the greenhouse during the off-season and some interesting heirloom varieties were also grown under transitional organic conditions in North Central Florida.

Summary of the Discoveries:

- In the field, weather conditions had a strong effect on the susceptibility of tomatoes to *Salmonella*
- Under greenhouse conditions, there were significant differences in proliferation of *Salmonella* in fruits of tomatoes of different varieties, similar trends were observed in the field for selected varieties.
- Fertilization levels affected susceptibility of some tomato varieties to *Salmonella* under the field conditions
- The maturity stage of the tomato had an important effect on the susceptibility of the fruit to the proliferation of *Salmonella*.
- There were statistically significant differences in the proliferation of *Salmonella* genotypes in mature (red) tomato fruits but not in immature tomatoes.

Goals and Outcomes Achieved

Economic consequences of produce-linked outbreaks. Salmonellosis caused by non-typhoidal salmonellae is the largest cause of foodborne gastroenteritis, estimated to infect over 1 million people per year in the United States alone [1]. Although the incidence of gastroenteritis linked to the consumption of meats and eggs has declined in recent years, the overall salmonellosis outbreak rate has remained steady. This is in part due to increased risk from non-traditional sources of the pathogen, including fresh fruit and vegetables, spices, and nuts: during the decade from 1998 to 2007, produce was linked to more outbreaks than either beef, pork or poultry [1-3]. According to the CDC and FDA, at least 5 major outbreaks of salmonellosis have been linked to tomatoes and/or peppers that were produced, packaged or re-packaged in Florida. Aside from devastating effects of the outbreaks on consumers who become ill, and the producers implicated in the outbreaks, there are industry-wide consequences of each outbreak. As shown in Fig. 1, dramatic decreases in purchase prices of tomatoes followed each major outbreak, sending ripples across the industry.

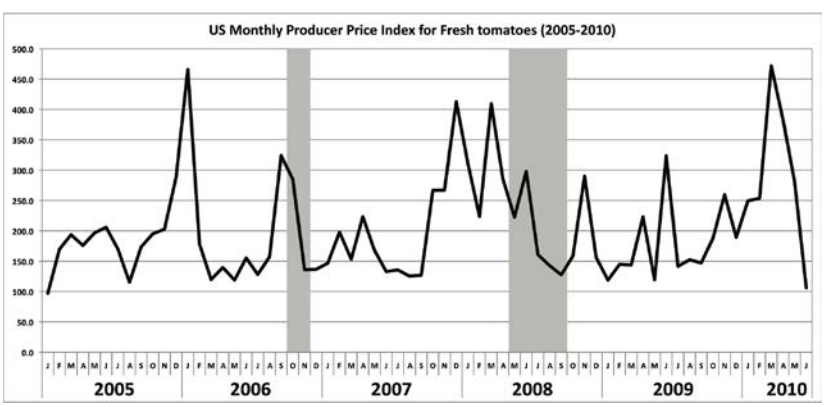
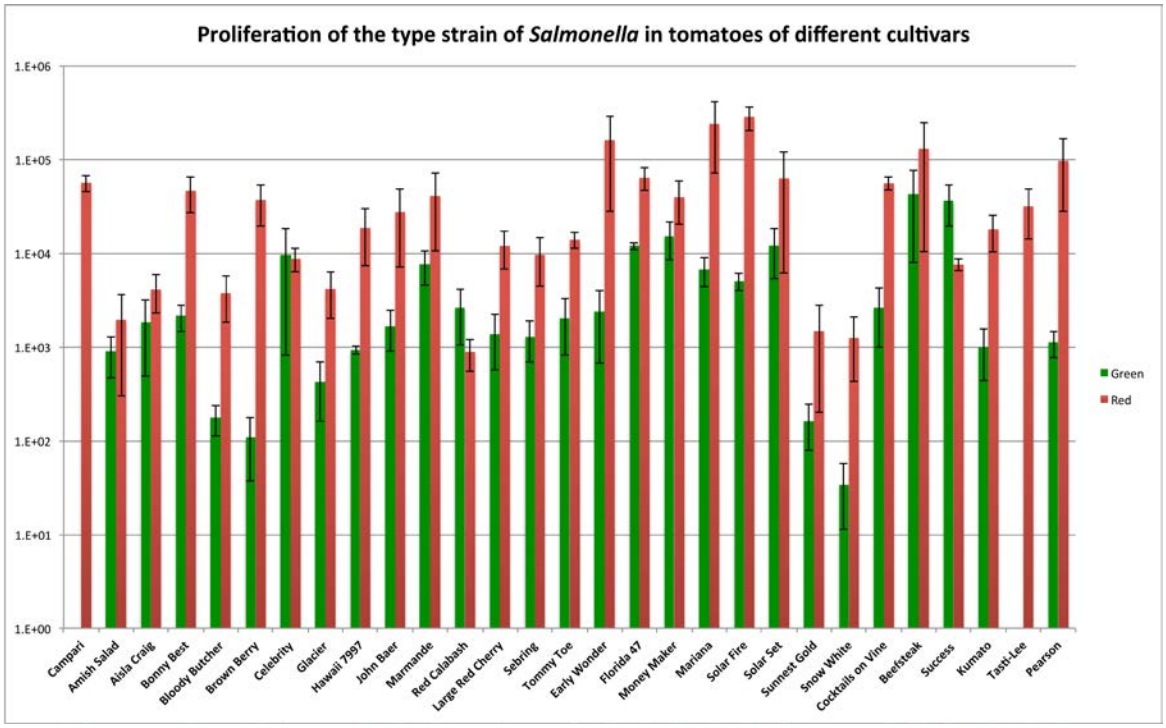


Fig.1. Decline in producer price index for fresh tomatoes following salmonellosis outbreaks. US monthly producer price indices were obtained from USDA ERS publications (indicated by a solid line). Major salmonellosis outbreaks are indicated by grey shading. Following each outbreak, tomato prices decline sharply compared to the 5-year average. This figure is adapted from Teplitski et al., 2011.

The role of the tomato genotype in susceptibility to Salmonella. Our screen of tomato varieties revealed that there already exist commercial and heirloom tomato genotypes that differ in the susceptibility to post-harvest proliferation of *Salmonella*. We chose to focus on the post-harvest susceptibility to *Salmonella* as it is the most likely route of contamination of tomatoes based on the currently available information. As shown in Fig. 2 (below), several tomato cultivars are well below average in terms of their susceptibility to post-harvest susceptibility to *Salmonella*.



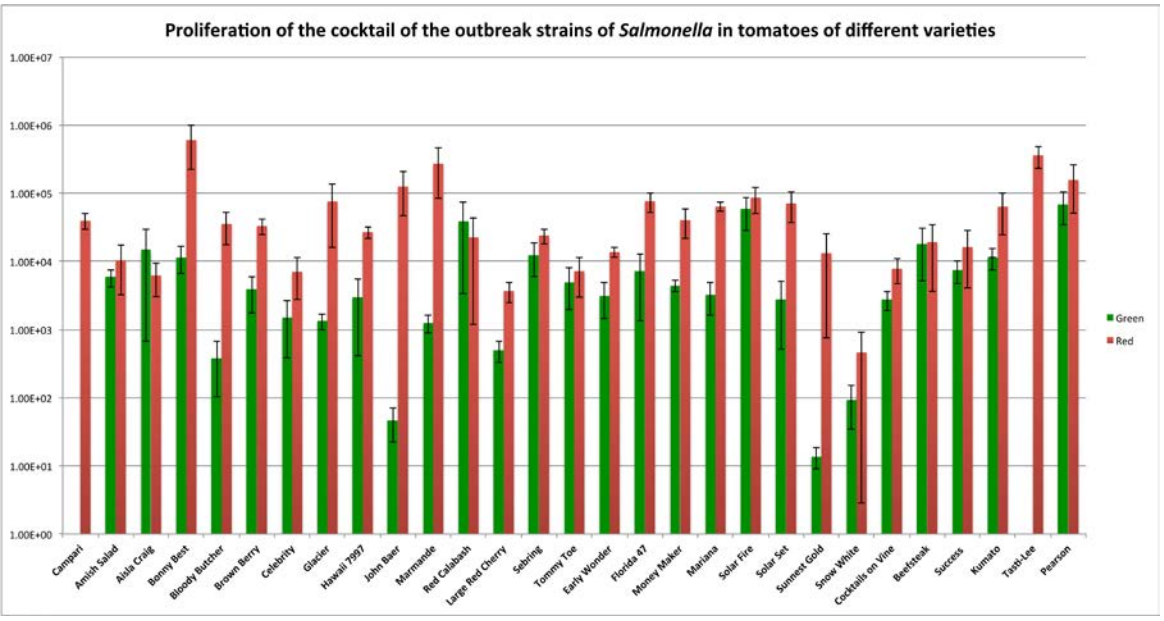


Fig. 2. Proliferation of *Salmonella* in tomatoes of different varieties. Tomatoes were grown in the greenhouse. Green and red tomatoes were inoculated with ~ 100-1,000 cells of *Salmonella* (either a type strain *Salmonella* Typhimurium 14028) or a cocktail of 6 strains of *Salmonella* recovered

from human outbreaks of salmonellosis linked to the consumption of tomatoes. The increase in proliferation (over the initial infection dose) is plotted. This is done to normalize for differences in the size/weight of fruits, and potential differences in the inoculum dose.

Global trends. We have collected thousands of data points, each defining how a particular condition affects susceptibility of tomatoes to post-harvest infections with *Salmonella*.

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

Type III Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
Nitrogen	2	1	0.03	0.9672
Potassium	2	152	0.61	0.5438
Nitrogen*Potassium	4	35.98	1.03	0.4028
Cultivar	1	188	0.62	0.4321
Cultivar*Nitrogen	2	37.1	0.57	0.5727
Cultivar*Potassium	2	37.35	0.72	0.4956
Cultiv*Nitrog*Potass	4	33.32	0.57	0.6849
Strain	1	2642	0.60	0.4386
Nitrogen*Strain	2	2633	0.41	0.6632
Potassium*Strain	2	2632	0.01	0.9947
Nitrog*Potass*Strain	4	2631	1.49	0.2013
Cultivar*Strain	1	2632	0.01	0.9040
Cultiv*Nitrog*Strain	2	2633	1.29	0.2745
Cultiv*Potass*Strain	2	2633	2.43	0.0885
HARVEST	3	2657	351.80	<.0001
Nitrogen*HARVEST	6	2657	0.37	0.8983
Potassium*HARVEST	6	2656	2.38	0.0268
Nitrog*Potass*HARVES	12	2654	1.84	0.0366
Cultivar*HARVEST	3	2656	0.40	0.7535
Cultiv*Nitrog*HARVES	6	2655	2.50	0.0205
Cultiv*Potass*HARVES	6	2654	0.15	0.9883
Strain*HARVEST	3	2640	9.03	<.0001
Nitrog*Strain*HARVES	6	2639	1.32	0.2459
Potass*Strain*HARVES	6	2639	1.93	0.0718
Cultiv*Strain*HARVES	3	2637	1.36	0.2522
MAT	2	2654	96.13	<.0001
MAT*Nitrogen	4	2657	1.24	0.2905
MAT*Potassium	4	2657	0.57	0.6872
MAT*Nitroge*Potassiu	8	2657	1.12	0.3495
MAT*Cultivar	2	2659	0.26	0.7685
MAT*Cultiva*Nitrogen	4	2657	1.86	0.1139
MAT*Cultiva*Potassiu	4	2658	1.36	0.2452
MAT*Strain	2	2645	0.12	0.8859
MAT*Nitrogen*Strain	4	2643	1.27	0.2785
MAT*Potassium*Strain	4	2642	0.68	0.6043
MAT*Cultivar*Strain	2	2642	0.07	0.9335

In this report, it will be impossible to discuss each outcome in detail. Therefore, we analyzed conditions and their interactions to determine whether any treatment (or combinations of treatments) is more or less consequential to the tomato safety outcomes. Table 1 (on the left) is a summary of this assessment. The higher the "F value", the more likely a particular factor is to affect the ability of *Salmonella* to multiple in tomatoes, the lower the value for the "Probability >F", the more likely the observed effect (or interaction of the factors) to be non-random.

Table 1. The effect of environmental factors and production conditions on post-harvest susceptibility to *Salmonella*. "Effect" refers to the imposed treatments (Nitrogen, Potassium fertilization; tomato cultivar, strain of *Salmonella*), observed variables (maturity at harvest, time of harvest) or their interactions. "Num DF" refers to the number of degrees of freedom in each experimental set-up. "Degrees of Freedom" is defined as the number of ways by which the system can fluctuate without violating imposed constraints. "F-value" was determined based on the F-test in one-way analysis of variance to assess whether the expected value of a variable differ from each other. The higher the F-value, the more important is the factor to the ability of *Salmonella* to multiply in tomatoes post-harvest. Pr > F is an assessment of how likely a particular effect is to be non-random. The lower the Pr > F value, the more likely the effect is to be non-random. For example, Pr > F of 0.05 indicates that the confidence in the non-randomness of the effect is 95%.

The single factors that were the most important in the determining the food safety outcomes are: time of harvest and maturity at harvest. By themselves, imposed treatments (nitrogen, potassium fertilization, cultivar selection) did not affect the ability of *Salmonella* to multiply in tomatoes. However, there were statistically significant interactions between the factors: level of potassium fertilization and time of harvest; nitrogen and potassium

The GLIMMIX Procedure

Type III Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
MAT*HARVEST	6	2656	10.41	<.0001
MAT*Nitrogen*HARVEST	12	2656	2.10	0.0141
MAT*Potassiu*HARVEST	12	2656	0.68	0.7726
MAT*Cultivar*HARVEST	6	2657	4.33	0.0002
MAT*Strain*HARVEST	6	2646	1.13	0.3399

fertilization and time of harvest; cultivar selection, nitrogen fertilization and time of harvest; *Salmonella* genotype and time of harvest; maturity at harvest and time of harvest; maturity, level of nitrogen fertilization and time of harvest; maturity at harvest, tomato cultivar selection and time of harvest. The more important of these interactions are discussed below. *This assessment is important in that it begins to define which pre-harvest factors contribute to the "perfect storm" scenario capable of leading to a major outbreak.*

Parameterizing the "perfect storm". Even though mounting recent evidence suggests that enterics can -- under some conditions -- use plants as alternate hosts [4,5], the seemingly random nature of the outbreaks argues for a "perfect storm" scenario for the outbreaks [3]. According to this scenario, environmental and production conditions, plant genotype, plant-associated microbes interact to facilitate the ability of certain genotypes of enterics to colonize plant surfaces and exploit plants as alternate hosts. Despite the magnitude of the problem, relatively little is known about traits and mechanisms that allow *Salmonella* to colonize plants and use them as potential alternate hosts. From a practical point of view, defining the mechanistic basis of *Salmonella* interactions with plants will open opportunities for either specifically disrupting those behaviors in human pathogens that are involved in their plant-associated lifestyle, or selecting for the plant varieties that are less conducive to the proliferation of these bacteria. Furthermore, understanding the parameters that lead to such a "perfect storm" is crucial for preventing such outbreaks in the future. Therefore, with this study we tested how fertilization regimes and tomato genotypes affect susceptibility of tomatoes to infections with *Salmonella* post-harvest.

Proliferation of Salmonella in tomatoes as a function of environmental conditions. Aside from maturity, seasonal effects were most obvious. Strong seasonal variability was also noted in the field studies with a strain of enterohaemorhagic *E. coli* and lettuce in studies conducted by other groups. *Salmonella* proliferation was the highest in fruits harvested in Season A (Live Oak, Spring 2011), the lowest in Season B (Live Oak, Spring 2012) and intermediate in Season C (Citra, Fall 2012) (Fig. 3). Therefore, neither the field site, nor the production season per se were solely responsible for these differences. Weather conditions within a month prior to harvests were different in each of the three experimental seasons and weather parameters suggested as consequential to the proliferation of human pathogens in the field are discussed below.

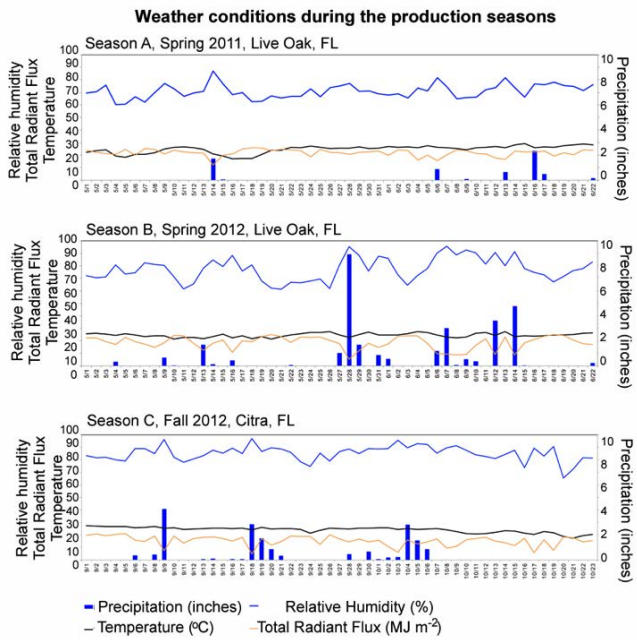


Fig. 3. Weather-related parameters during the production conditions. Weather data for each

location was downloaded from IFAS data loggers at the Research and Education Centers.

Average daily temperatures in Season A, B and was 24.8°C, 24.6°C and 23.3°C, respectively; average relative humidity in Seasons A, B, and C was 72.7°C, 78.3°C and 83.6°C. Average precipitation in Seasons A, B, and C was 0.25, 1.34 and 0.28 (inches m^{-2}). Average total radiant flux was 21.27, 18.04 and 15.19 (MJ m^{-2}) in Seasons A, B and C.

Therefore, the season in which the tomato crops were the most susceptible to proliferation of *Salmonella* was the driest, with the least cloud cover, with the lowest relative humidity and fewer precipitation events. The crops were the least conducive to proliferation of *Salmonella* in Season B. The amount of precipitation per se was probably inconsequential considering the fact that in none of the three seasons water supplied by drip irrigation had no significant effect on the susceptibility of the harvested fruit to proliferation of *Salmonella*. Considering the fact that *Salmonella* did not experience any of these field conditions, but rather their consequences, we hypothesize that the pathogen was able to proliferate post-harvest in tomatoes harvested in the driest season because such harsh environmental conditions inhibited native resident epimicrobiota, creating niches that were available for *Salmonella*. This hypothesis, however, needs to be tested further.

Proliferation of Salmonella in tomatoes as a function of tomato maturity. As shown in Table 1, tomato maturity was one of the strongest factors affecting susceptibility of the fruit to *Salmonella*. As highlighted in Fig. 4 (below) maturity at the time of harvest and at the time of infection with *Salmonella* were crucial to the ability of the pathogen to multiply in tomatoes.

Across all treatments, the maturity stage of the tomato had the biggest effect on the susceptibility of the fruit to proliferation of *Salmonella*. Essentially regardless of the treatment, green tomatoes were much less conducive to the proliferation of *Salmonella* (Fig. 4). This observation is consistent with what we have seen in the greenhouse trials. Therefore, it is reasonable to suggest that the common practice of harvesting tomatoes that are "mature green" also promotes microbiological safety.

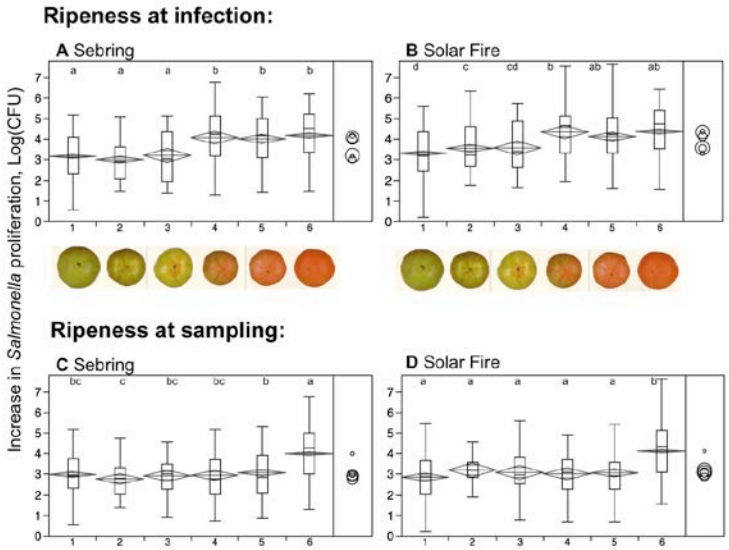


Fig. 4. Proliferation of *Salmonella* in tomatoes of different maturity in fruits of the cultivars Sebring and Solar Fire. The top panels show increase in the *Salmonella* proliferation from the original infection with 100-1,000 cells in tomatoes exposed to the pathogen at different ripening stages. The

inset depicts maturity stages (1→6) according to the USDA tomato maturity scale. The bottom panel depict proliferation of *Salmonella* in tomatoes at sampling (e.g. corresponding to the ripeness at the poin-of-sale).

These results are important and can be directly used to promote microbiological safety of tomatoes. *While consumers prefer "vine ripe fruit", picking red fruit may be less safe from the microbiological safety point. However, fruits can be harvested at "light red" without apparent reduction in the microbiological safety.* This could be an important cultural practice that will promote microbiological safety of tomatoes without requiring any additional investment.

The effect of fertilization regimes on susceptibility of tomato fruits to Salmonella proliferation. One of main purposes of the project was to determine how tomato susceptibility to *Salmonella* varies with the fertilization regime. As shown in Table 1, fertilization regime per se did not affect susceptibility of the crop to *Salmonella*. However, more subtle effects can be elucidated. For example, level of potassium fertilization and time of harvest; nitrogen and potassium fertilization and time of harvest; cultivar selection, nitrogen fertilization and time of harvest; *Salmonella* genotype and time of harvest; maturity at harvest and time of harvest; maturity, level of nitrogen fertilization and time of harvest; maturity at harvest, tomato cultivar selection and time of harvest were all identified as important variables that together affect susceptibility of tomatoes to *Salmonella*. These data are presented in Fig. 5.

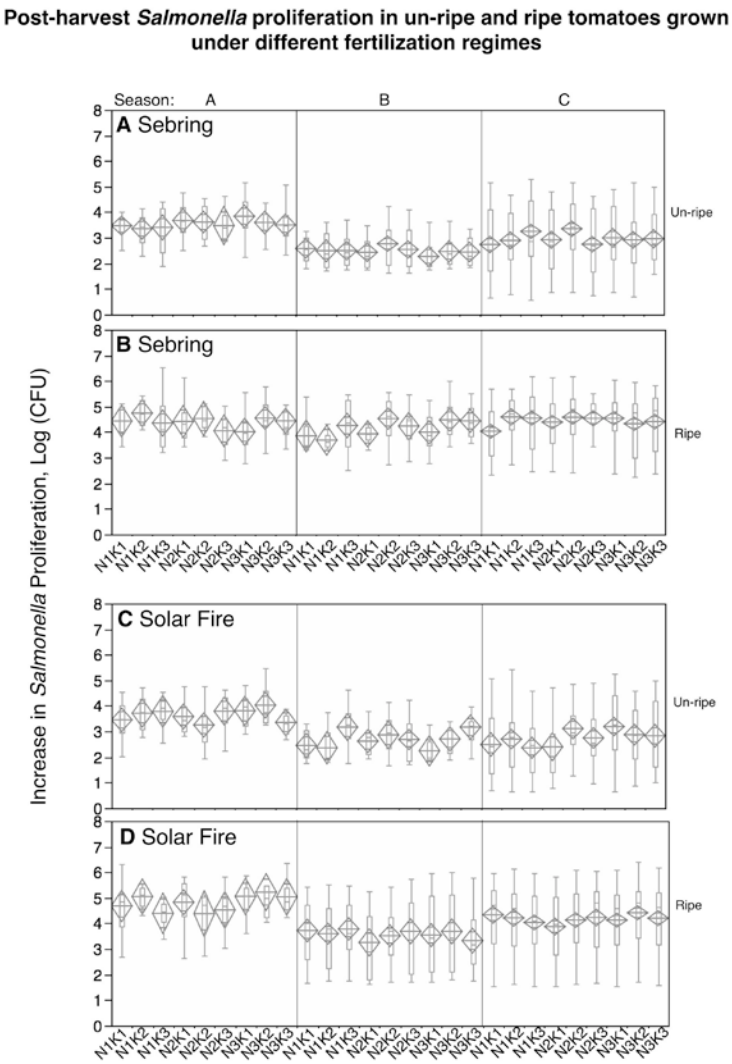


Fig. 5. *Salmonella* proliferation in tomatoes as a function of fertilization regimes. Tomatoes cv. Sebring and Solar Fire grown under different fertilization regimes were infected with *Salmonella* and the proliferation of the pathogen was determined after 1 week. Log of the increase is plotted on the y-axis. Maturity stage of the fruit is indicated on the right side of each panel. Fertilization treatments

are listed on the x-axis. N1 = low Nitrogen, K1 = low Potassium, N2 = suggested level of Nitrogen, K2 = suggested level of Potassium, N3= excessive Nitrogen fertilization, K3 = excessive Potassium fertilization.

A much stronger linear correlation was observed when we compared proliferation of *Salmonella* with the levels of Nitrogen in plant tissues (petiole sap or leaf). As shown in Fig. 6, increase in the numbers of *Salmonella* correlated directly with the levels of N in plant tissues.

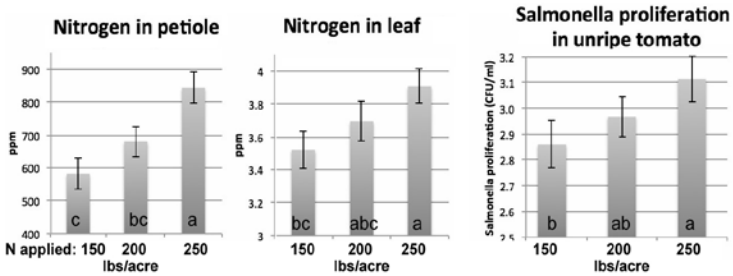


Fig. 6. Plant Nitrogen status and *Salmonella* proliferation. Data from all 3 field seasons were average. N fertilization levels: 150 lbs/acre (corresponds to N1), 200 lbs/acre ("N2"), 250 lbs/acre ("N3").

Fertilization regimes and disease pressure. In the course of the experiment, we also collected data which could directly or indirectly correlate with the susceptibility of tomatoes to *Salmonella*. We have observed a strong correlation between disease pressure and fertilization regimes (Fig. 7).

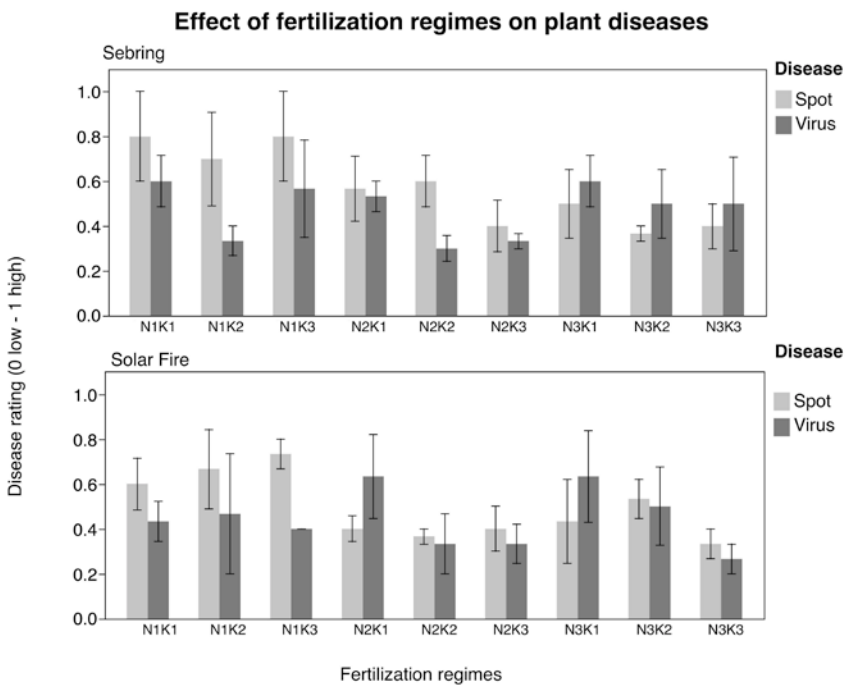


Fig. 7. Disease pressure and fertilization regime. The severity of the bacterial leaf spot and a viral disease were scored on a 0 (no disease symptoms) → 1 (severe symptoms) scale.

As shown in Fig. 7, at low levels of Nitrogen fertilization (N1), there was a significant increase in the symptoms of the bacterial spot in both tomato cultivars tested in this study. It is important to note that the disease progression appears slowest when tomatoes were grown under the recommend levels of Nitrogen fertilization, however excessive Nitrogen fertilization was not as detrimental as insufficient Nitrogen.

These observations are important because it has been reported that interactions between *Xanthomonas campestris* (the cause of bacterial leaf spot) and *Salmonella* result in increased proliferation of the pathogen in plants and promotes persistence of the human pathogen under the field conditions [6].

Actual vs planned accomplishments.

We have completed the three field seasons as per the grant schedule. Greenhouse experiments were also completed on time. Outreach materials are completed and training sessions and workshops were held.

Accomplishments:

On-site training sessions and presentations to stakeholder groups:

1. Farias, M., Jenkins, K., Marvasi, M., and Teplitski, M. (Presentation) Role of *Salmonella* capsular and virulence genes during colonization of tomato fruits. Florida Association of Food Protection 2013 Annual Education Conference. Wyndham Lake Buena Vista, Orlando, FL. June 5-7, 2013. *Attended by ~ 100 food safety specialists, academics*
2. George, A. , Noel, J., Teplitski, M. (Presentation). The role of *P. carotovorum* in the increased proliferation of *S.* Typhimurium in tomatoes (Poster Presentation). 2012 Annual Education Conference, Florida Association for Food Protection, Wyndham Lake Buena Vista, Orlando, FL. May 9-11, 2012 *Attended by ~ 100 food safety specialists, academics*
3. Carpinone, E. , Teplitski, M. (Presentation). The role of *Salmonella* Pathogenicity Islands in the colonization of tomatoes. Annual Education Conference, Florida Association for Food Protection, Wyndham Lake Buena Vista, Orlando, FL. May 9-11, 2012 *Attended by ~ 100 food safety specialists, academics*
4. Fatica, M.K., Teplitski, M., Schneider, K.R. (Presentation). The role of cellulose in the attachment of *Salmonella* Typhimurium to the tomato surfaces. 2012 Annual Education Conference, Florida Association for Food Protection, Wyndham Lake Buena Vista, Orlando, FL. May 9-11, 2012. *Attended by ~ 100 food safety specialists, academics*
5. Gause, E. , Noel, J., Marvasi, M., George, A. , Teplitski, M. (Presentation). Proliferation and performance of *Salmonella* in various cultivars of tomato. 2012 Annual Education Conference, Florida Association for Food Protection, Wyndham Lake Buena Vista, Orlando, FL. May 9-11, 2012 *Attended by ~ 100 food safety specialists, academics*
6. Teplitski, M. (Training Session) Microbiological safety of fresh produce: the factors that matter. Florida Association for Food Protection, Jacksonville Educational Luncheon. Jacksonville, FL. September 25, 2012 *Attended by ~ 30 industry food safety specialists*
7. Teplitski, M. *Salmonella*'s plant-associated life styles: current uncertainties. Training session at Advanced Topics in Microbial Safety of Fresh Produce. Organizers: Harris, L., Suslow, T., Schneider, K. UF-IFAS Gulf Coast Research and Education Center, Balm, FL. April 27-29, 2011. *Attended by ~ 30 industry food safety specialists*
8. George, A., J.Noel, E. Gause, M. Teplitski. The role of *Pectobacterium carotovorum* in increased proliferation of *Salmonella enterica* Typhimurium in tomatoes. (Oral Presentation) 97th Annual Meeting of Southeastern Branch of American Society for Microbiology, Gainesville, FL. October 20-22, 2011. *Attended by ~ 250 academic and industry scientists*

9. Teplitski, M. Highlights of produce safety research at UF-IFAS. Center for Produce Safety & UF-IFAS Produce Safety Tour. Tampa, FL. March 8 -10, 2011. *Attended by ~ 15 government scientists and regulators*

10. Teplitski, M. *Salmonella* and fresh produce: why sanitation alone has not reduced the number of the outbreaks? Meeting of Florida Association of Food Protection, Gainesville, FL, April 7, 2011 *Attended by ~ 12 industry scientists and food safety specialists*

Web-based outreach educational materials:

1. Teplitski, M., George, A., Hochmuth, G.J. 2012. *Salmonella* and pathogenic *E. coli* in the crop production environment: potential sources, survival and management. EDIS publication SL375/SS576 http://edis.ifas.ufl.edu/ss576 Dowloaded 119 times in 2012

2. Marvasi, M., Teplitski, M., George, A., Hochmuth, G. *Salmonella* y *Eschericihia coli* enteropatogena en el ambiente de produccion de cultivos: Fuentes potenciales, supervivencia y gestion. http://edis.ifas.ufl.edu/ss577

3. Food Safety Modernization Act and Small Farms: an overview http://www.youtube.com/watch?v=qQbHUrzJEFI Viewed 4 times since 4/2013

4. Food Safety Modernization Act and Small Farms: Focus on Tomato Good Agricultural Practices http://www.youtube.com/watch?v=qQs3gNugwO8 Viewed 3 times since 4/2013

5. Behind the Scenes at the Microbiology Lab: what happens to you sample after it is submitted for analysis http://www.youtube.com/watch?v=osv5wJON-HQ. Viewed 3 times since 4/2013

6. Discriminating *Salmonella*. http://www.youtube.com/watch?v=-ESwW3TccbQ. Viewed 226 times since 9/2010.

Beneficiaries

- We have conducted live training sessions and presentations for producers and also industry food safety specialists. We estimate that training sessions were attended by at least 500 individuals.
- Educational Youtbe videos were viewed by the general public over 200 times
- EDIS publication on produce safety in Spanish was accessed 886 times in 2013
- EDIS publication on produce safety in English was accessed 119 times in 2012 and 345 times in 2013.

Lessons Learned

- ☐ Field and laboratory experiments were conducted on time and without major problems, even though there were staffing problems mid-project
- ☐ In terms of outreach materials, Youtube videos were access significantly fewer times than the EDIS publications even though the content was overlapping. We are not certain what the cause of this disparity in the information demand is, but it is possible that the brand of EDIS is well established and it is a trusted resource for the stakeholders and the general public, while resources on Youtube are not curated and are generally less trusted (and probably accessed less when there is a need for a more authoritative source of information). In terms of budgeting, EDIS publications are significantly cheaper to produce than Youtube videos and have clearly reached a broader audience.
- ☐ There is a higher need for food safety literature in Spanish. We have published two EDIS documents in English and in Spanish, and the Spanish texts are accessed more often (https://edis.ifas.ufl.edu/stats/result.jsp).

Contact Person

- ☐ Name the Contact Person for the Project
    - Max Teplitski, Associate Professor, University of Florida/IFAS
    - 352-273-8189, maxtep@ufl.edu

Final Performance Report

Project Title: Building a Foundation for Florida Stone Fruit: Economic Analyses of Orchard Establishment and Production

Contract Number: 00016867

Specialty Crop Block Grant Funding Year: 2010

Project Summary:

Florida citrus acreage has severely declined because of diseases such as citrus greening (Huanglongbing) and bacterial canker (*Xanthomonas axonopodis* pv. citri (Xac)) reducing tree productivity and fruit quality. Many growers are searching for an alternative crop to diversify their agricultural operations to maintain profitability. As with other high-value specialty crops harvested in Florida during the off-season or early spring (e.g., strawberry and blueberry), peaches offer a significant opportunity for profitability in a favorable market environment.

Risk mitigation includes having a detailed business plan as production strategies shift. Compared to citrus production, peaches require greater investment in time, labor and inputs as it is a highly perishable crop. Although an existing publication on the economics of peach production for middle Georgia had information on production costs, several variables in the budget were either over- or underestimated for production in Florida. Thus, this project met the need of providing to potential and existing growers information on the economics of Florida peach establishment and production, as well as Microsoft Excel-based spreadsheets that they could use to determine costs and revenues specific to their agricultural operations.

The peach industry has expanded greatly within the past two years that this project was funded, from just under 500 acres to over 1,500 acres; thus the information provided from this grant was timely and important in the face of declining citrus productivity.

Project Approach

Our initial task was to gather information from various national and state-based sources to establish prices under various market scenarios, including early spring and summer pricing, regional vs. national peach fresh market prices, and yearly nationwide fresh peach supply (Q1, 2011). This data was used to develop interview questions conducted with a group of representative growers in 6 locations covering peach production areas in Florida (Dade City, FL; Dundee, FL; Sebring, FL; Fort Myers, FL; Fort Pierce, FL; and Hastings, FL; Q2, 2011). The data collected from these interviews helped to produce an online and paper-based survey which was available to growers from June 1, 2011 – December 31, 2011.

Our survey resulted in 25 respondents out of an estimated 40 growers in Florida, a 62.5% response rate. Those 27 growers reported a 630 acres of production in the state with approximately 250 more acres planted in 2012 (Table 1). This is significant, as this was the first updated survey of peach production since 2008 (Harrison et al., 2008).

Table 1: Reported Florida Peach Acreage in Production in 2011 (n=25 respondents) and Preferred Varieties

	Acres	% of Acres
Peach Acreage Owned	476	76%
Peach Acreage Leased	154	24%
Total 2011 Florida Peach Acreage	**630**	**100%**
Preferred Florida Peach Varieties		
UFSun	Flordaprince	UFBest
TropicBeauty	Flordaglo	
UFOne	UFBeauty	

The survey also asked questions about the where growers get their information (Figure 1) and what research priorities they deem most important for the future (Figure 2). Baseline data was collected on best management practices for fertilization practices, and we found that the majority of growers are using both fertigation and granular applications of macro- and micronutrients (N=10). Several growers are using solely using fertigation methods (N=5), while others are using solely granular applications (N=4). Various formulations of N-P-K are being used, and although a standard 12-4-8 or 10-10-10 is currently recommended by the University of Florida. The range of application rates range from approximately 80 lbs. N/ac/yr. to over 150 lbs. N/ac/yr. However, the low number of participants entered in data in respect to current rates of nitrogen applied, and this data was not suitable for publication.

Figure 1. Percentage of Peach Growers Utilizing Various Information Sources for Peach Production and Marketing Research.

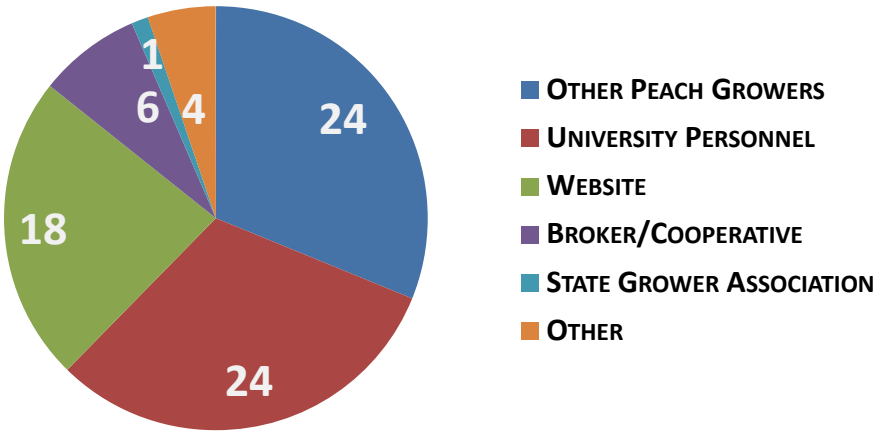
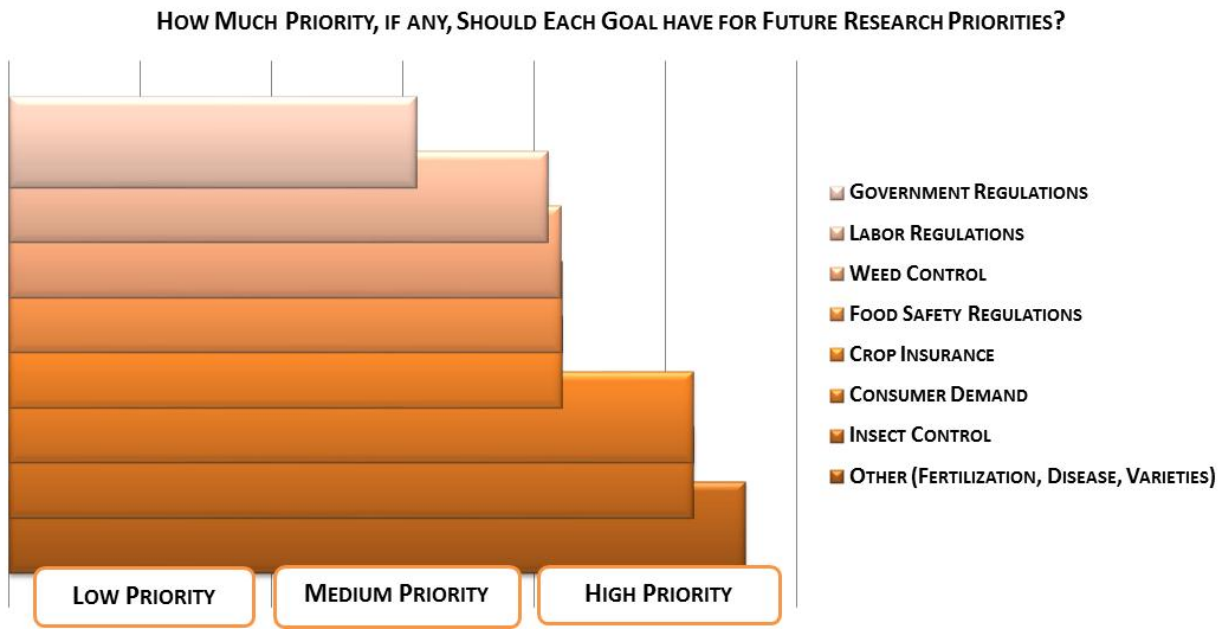


Figure 2. Respondent Priority Ranking of Suggested Future Research Goals.



In 2012, a subset of survey respondents that represented both large (50-100 acres), medium (10-50 acres) and small (<10 acres) were asked to provide feedback on an initial spreadsheet template of annual fixed and variable costs, as well as revenues in years 2-4 when trees were producing fruit. Good feedback was achieved and helped to drive changes in the spreadsheet categories and specific costs for various products.

As a result of grower interviews and targeted requests for feedback on our spreadsheet templates, we were able to publish a finalized spreadsheet with a sensitivity analysis (Figure 3) and a summary of costs and returns for years 1-4 (Figure 4). Initial feedback from growers using these data sheets is that having the sensitivity analysis linked to various lbs. per acre and being able to manipulate this and the price per pound is very useful to tailor the results for their individual operations. Both of the final pages in the spreadsheets are locked so that these numbers can be manipulated individual tabs (year 1 – 4) and changes are reflected in the final two tabs containing these charts.

Publication of this data and presentation of this to several groups and via various outlets was our final activity. This was achieved with publications online, in peer-reviewed print and online journals and advertisements of these publications on websites and blogs (http://ufstonefruit.wordpress.com).

Figure 3. Florida peach returns to total costs ($/acre) under varying farm gate values and marketable yield scenarios.

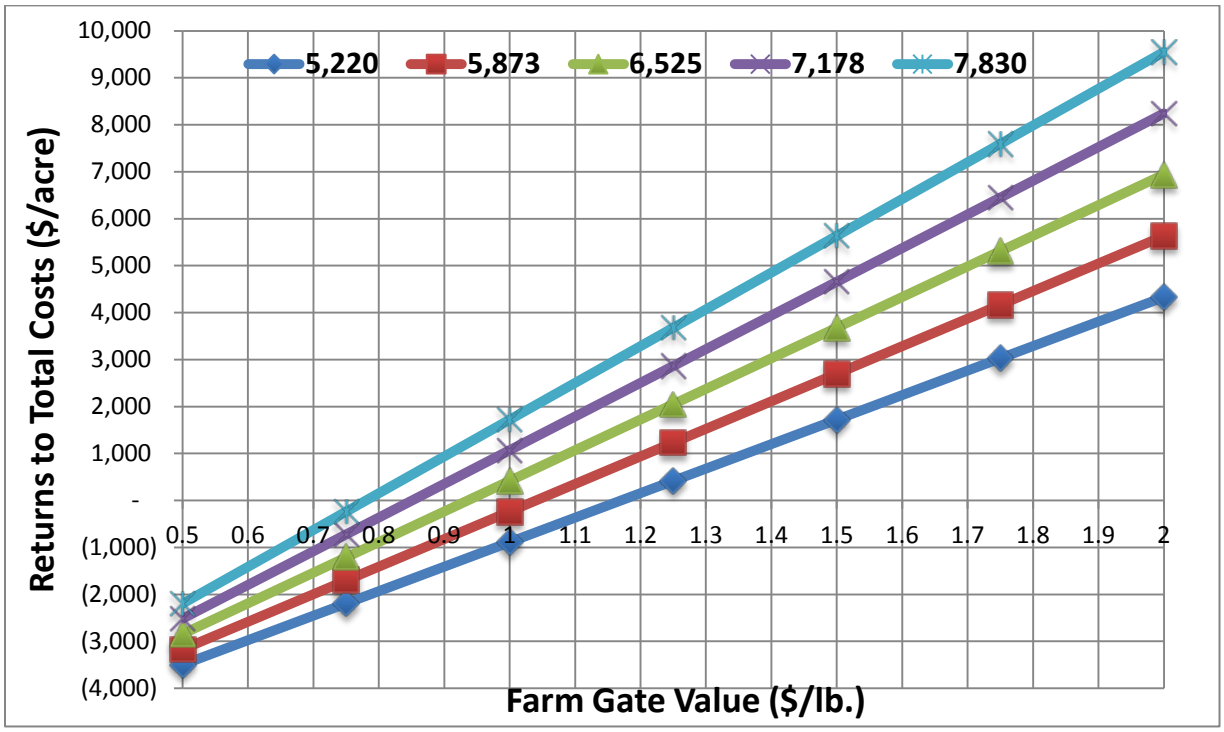
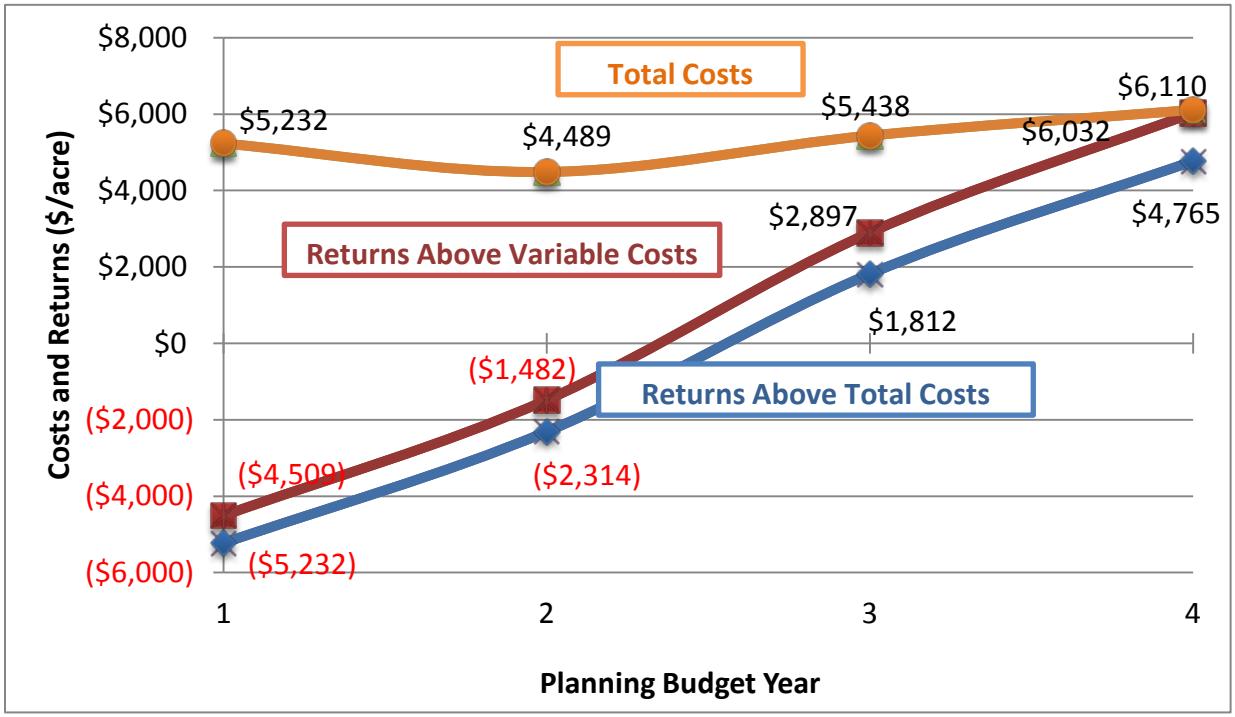


Figure 4. Florida peach planning budget summary: Years 1-4 estimated returns and cost ($/acre) above variable, fixed, and total costs.



Goals and Outcomes Achieved

The goal of this project was to conduct economic analyses to determine establishment and production costs related to establishment of stone fruit orchards using patented varieties developed by University of Florida researchers, and to engage in outreach and technology transfer with industry members.

We were successful in this endeavor to conduct the economic analysis by gathering information from growers to develop a survey instrument and deploy it for gathering data. From this information, we were able to take a subset of growers and get confidential in-depth information about their financial inputs for orchard establishment and production as to get an accurate reflection of input costs and revenue. This data was then used to author an extension publication on orchard establishment and production costs (http://edis.ifas.ufl.edu/hs1223), as well as accompanying budget spreadsheets for growers to modify for their operations.

We engaged in outreach through several presentations to growers, extension personnel and industry members including:

- Dr. Mercy Olmstead, 2011, Economics of Peach Establishment and Production, University of Florida Annual Stone Fruit Field Day, Citra, FL
- Dr. Mercy Olmstead, 2011, Economics of Peach Establishment and Production, SE Professional Fruit Workers Conference, Manchester, TN
- Dr. Mercy Olmstead, 2011, Economics of Peach Establishment and Production, Mid-Florida Citrus Foundation Field Day, Winter Garden, FL
- Dr. Kim Morgan, 2012, Economics and Marketing of Peach Production in Florida, University of Florida Annual Stone Fruit Field Day, Citra, FL
- Dr. Mercy Olmstead, 2013, Peach Orchard Establishment and Production Budgets for Florida, Florida State Horticultural Society, Sarasota, FL

We also transferred this information to grower and industry members by publishing the following:

- Peach orchard establishment and production budget spreadsheets. Growers can download these at: http://hos.ufl.edu/sites/default/files/faculty/maolmstead/documents/PeachBudgetWorksheets24Jun13.xlsx.

- Olmstead, M. and K. Morgan. 2013. Orchard Establishment Budget for Peaches and Nectarines in Florida. EDIS Document HS 1223, University of Florida/IFAS Extension. <http://edis.ifas.ufl.edu/hs1223>.

- Morgan, K. and M. Olmstead. 2013. Peach orchard establishment and production planning budgets for Florida. Proceedings of the Florida State Horticultural Society. *In review.*

- Morgan, K. and M. Olmstead. 2013. A Diversification Strategy for Perennial Horticulture in Florida. *HortTechology*. 23:482-489. Available at: http://horttech.ashspublications.org/content/23/4/482.full.html?ijkey=ZoN4pLRpbm2ktBu&keytype=ref.

Beneficiaries

At least 10 growers that have established orchards within the past year (2012) have been able to use the initial spreadsheets of budget information provided while in the prototype phase, but we have been able to reach over 500 people over the course of the two years. These individuals are predominantly Florida growers, but also include county extension agents and statewide specialists, industry members, and nursery operations. We expect that the budget publication and associated spreadsheet templates for new and existing operations will become a standard document in a risk mitigation plan.

Of particular value were the findings which document the regional differences in production and marketing risk best management recommendations between the Florida stone fruit industry and well-established Southeastern peach operations. For example, the low chill peach varieties can cost between $11 and $15 per tree, relative to an average peach tree price of about $6 a piece. A final highlight of this project was its success in seeking out and developing input to build a dynamic relationship between current and future peach orchard managers, university research and extension specialists, and representatives from supporting agencies such as input suppliers and the USDA Risk Management Agency crop insurance experts.

Lessons Learned

This project was a challenge to get a 100% response rate for our grower survey, much as it is for other research sectors. However, in many academic circles, achieving a 62.5% grower response rate as we did in this project is very successful. Survey respondents represented a fairly diverse segment of the existing peach producer population, ranging across acreage size, operator experience within the tree industry, and marketing outlets.

We feel that approaching the industry via e-mail, online survey availability and site visits really helped to achieve a high response rate, and we wished time had allowed us to get to 100% of the growers in the state. The response and input of key stone fruit growers in the state reflects the desire of our industry to be successful and to help develop tools to ensure success for future members.

Contact Person

Dr. Mercy Olmstead
352-273-4772
mercy1@ufl.edu

Additional Information

Harrison, E.H., J.X. Chaparro, and L. Harrison. 2008. Sub-tropical peach market improvement project. The Florida Department of Agriculture and Consumer Services, Division of Marketing and Development, Tallahassee, FL.

Morgan, K.L. (2012). "Peaches Profile – An Update." Agricultural Marketing Resource Center, Available at: http://www.agmrc.org/commodities__products/fruits/peaches/

Project (25): University of Florida - Sustainability of Fruit and Nut Crops in North Florida: Emergence of Small Farms, Enhancing Outreach and Facilitation of Direct Marketing

Funding Year: 2010
Funding Amount: $153,036.00
Reporting Period: Final

Project Summary

Agricultural sustainability has become increasingly relevant to both producers and consumers. It comprises all inputs (water, fertilizer, pesticides, tillage, trellising, etc.) and outputs (yield, commodity quality, gross and net profit and positive and negative environmental impacts). For fruit and nut crops, agricultural sustainability depends on the species/cultivar, and the climatic and soil conditions where the crops are being grown. The subtropical climate of Florida is suitable for the successful culture of a subset of species and cultivars of fruit and nut crops available from nurseries. This project mainly addressed small farms. According to a 2007 agriculture census, 91 % of all US farms are classified as small farms (Gross Cash Farm Income < $250,000 per year). The commodities addressed in this project includes pecan, peaches, nectarines, plums, apples, pears, highbush blueberries, rabbiteye blueberries, blackberries, muscadine grapes, Oriental persimmon, pomegranate, chestnuts, olives, and cold hardy citrus (Table 1). The accomplishments of this project were as follows: 1) research and demonstration sites have been expanded at the NFREC-Quincy and the Suwannee Valley AEC; 2) increased partnerships between growers and plant nurseries for the commodities listed above; 3) key factors limiting sustainability and profitability of fruit and nut crops in north Florida have been further identified, and; 4) enterprise budgets for many fruit and nut crops have been synthesized and published. The establishment of the Small Farms Academy in the Suwannee Valley AEC, new information continually posted on our Small Farms/Alternative Websites, and the University electronic data information system (EDIS) has greatly facilitated the dissemination of information.

Project Approach

Our overall goal was to maximize the sustainability and profitability of fruit and nut crops in north Florida. We hoped to facilitate the Producer acquisition of species/cultivars that are best adapted to north Florida through our research and demonstration plantings at the NFREC-Quincy

and Suwannee Valley AEC. Peter C. Andersen has led this effort. The potential success of an agricultural enterprise is determined by the selection of the proper species and cultivars. Certain species/cultivars can be grown in Florida with a minimum of inputs (adapted) or only with the utilization of numerous inputs (marginally adapted) whereas others cannot successfully be grown at all. Sustainable crops that are adapted to north Florida are amenable to Small Farms with limited resources, and are good candidates for organic culture. Proper crop selection results in minimal inputs such as pesticides, water, fertilizer and labor and minimal adverse environmental inputs. Our approach was to: 1) conduct research to establish which fruit and nut species/cultivars are most sustainable for Small Farms in Florida and to provide this information to growers; 2) research major limitations to sustainable crops and provide control methods for growers; 3) strengthen nursery-grower relationships so that producers can readily purchase the most sustainable cultivars of fruit and nut crops, and; 4) develop enterprise budgets for sustainable fruit and nut crops so that producers are aware of cost inputs as well as potential profit.

The Small Farms Academy was established in April 2010 and continues to be a major avenue for information dissemination to growers. The objective of the Small Farms Academy is to combine state, local and private resources to provide intensive hands on training to operators of Small Farms. Peter C. Andersen (Professor Horticulture), Bob Hochmuth (Multicounty Extension Agent, Live Oak) and Sean McCoy (Multicounty Economist, Live Oak) have led this effort. The featured topics have included cultivar selection, irrigation and nutrient management, cold protection, pruning, pest management, harvesting and postharvest practices, marketing and pricing. We have had numerous Mixed Orchard Field Days at the Suwannee Valley Agricultural Extension Center at Live Oak. Our goal was to demonstrate how Small Farms based on several different commodities can be efficiently operated by spreading production and labor requirements throughout the year. Our featured crops have included blueberries, blackberries, chestnuts, peaches, plums, muscadine grapes, satsuma and cold hardy citrus, Oriental persimmons, pomegranates, olives. One major emphasis was to showcase new cultivars/species that have the potential to be sustainable and profitable, but are not yet widely accepted.

Sean McCoy assisted greatly with the compilation of Enterprise Budgets for fruit and nut crops. We have completed many Enterprise budgets for the fruit and nut specialty crops. They appear on the Small Farms and Alternative Enterprise website and will be published in EDIS shortly. This same electronic data information system (EDIS) report has been utilized to publish documents concerning certified deciduous fruit and nut nurseries in Florida. This publication also contains a table listing Florida-adapted cultivars by species. We are in the process of creating an interactive web-based program that will allow users to customize their own Small Farms scenarios. All of these activities will culminate in the dissemination of important EDIS publications. Although the University of Florida once published enterprise budgets (about 15 to 20 years ago) on fruit and nut crop specialty crops, prior enterprise budgets are largely irrelevant and out of date. Similarly, there have been no recent attempts to provide a comprehensive list of

nurseries in the state of Florida. This is especially important because growers have had a very difficult time locating Florida-adapted cultivars. The limited availability of Florida-adapted cultivars has been a bottleneck to the expansion of the fruit and nut specialty crop industry in Florida. By listing nurseries alongside the recommended cultivars by species, we expect increased "Grass Roots" demand for Florida-adapted cultivars.

Russ Mizell handled the integrated pest management components of this grant including the monitoring and trapping of insects, biological control and ecosystem services. The accomplishments are listed below in the "Goals and Outcomes Achieved".

Goals and Outcomes Achieved

Our four major goals (Project approach) were achieved by the research and demonstration of new and existing fruit and nut plantings at NFREC-Quincy and Suwanee Valley AEC. Many new plantings have been established at the NFREC-Quincy during 2011-2012 and are currently being maintained in 2013. These plantings have been showcased during field days, Master Gardener training, and during visits be current and prospective growers. A low input sustainable planting of pecan trees was initiated. Pecan scab (*Cladosporium caryigenum*) is the most serious impediment to the culture of pecans in the Deep South. This planting contains Amling, Apalachee, Caddo, Cape Fear, Creek, Curtis, Desirable, Elliott, Excel, Forkert, Gafford, Gloria Grande, Kanza, Kiowa, Lokota, Melrose, Moreland, Oconee, Pawnee, Stuart and Sumner. Many of these cultivars have excellent scab resistance, and have not been evaluated in Florida. A new blackberry trial consisting of Apache, Arapaho, Chester, Kiowa, Natchez, Ouachita, Triple Crown and Tupi was initiated and maintained. Most of the blackberries in the trial were released from the University of Arkansas breeding program. We were particularly interested in the performance of the blackberry cultivars in the winters of 2011/2012 and 2012/2013 because we had an unusually low amount of chilling temperatures (400 chill hours) during the last two winters. During 2012 and 2013, data on yield, berry weight and soluble solids have been collected. The blackberries were planted using landscape fabric for weed control. Many of these new blackberry cultivars (Apache, Arapaho, Kiowa, Natchez, Ouachita and Tupi) fruited well. The performance of Natchez was particularly impressive. Triple Crown and Chester did not receive enough chilling and did not fruit. A trial consisting of three plum cultivars (Gulfbeauty, Gulfblaze and Gulfrose) released from the University of Florida was successfully established in 2012. An experimental planting of twenty different cultivars of pomegranate was established and maintained. Additional pomegranates were planted in 2012 and 2013. Pomegranates have become increasingly popular due to health benefits derived from their high antioxidant levels. Five cultivars of olive (Arbequina, Arbosana, Koreneki, Manzanillo and Mission) have been planted and appear to be adapted to north Florida. Our citrus block has expanded in size with the addition of Tango (mandarin), Sugar Belle (mandarin hybrid), Early Pride (mandarin hybrid), Minneola Honey Belle tangelo and several Satsuma cultivars (Owari, Brown Select, Xie Shan, FF-137-12). All the above citrus are grafted on Swingle rootstocks. All citrus species and

cultivars survived the 2012/2013 winter. Dr. Fred Gmitter (UF citrus breeder) and Dr. Greg McCollum (USDA citrus breeder) have contributed to new genotypes in the trial. Irrigation systems were installed and fertilizer was supplied as needed. Insecticides, fungicides and herbicides were also applied as needed. Lastly, a new planting of Southern highbush blueberry was established Jan. 2012/2013 and consists of many new promising UF cultivars (Bobolink, Chickadee, Emerald, Farthing, Flicker, Jewel, Kestrel, Meadowlark, Raven, Scintella, Snowchaser, Springhigh, and Sweetcrisp).

Information concerning the approximate acreage, the reason(s) for an increase or decrease in acreage, the recommended cultivars for trial, key limitations to agricultural sustainability, the commercial potential, the direct to consumer potential and an assessment of overall agricultural sustainability of fruit and nut crops is presented in Table 1. These data were compiled from direct observation of our cultivar trials and by discussions with UF research and extension personnel. The key limitations to successful culture and management are species/cultivar dependent, and for some species/cultivars the limitations are so great so as to preclude successful culture. The recommended cultivars, culture and management practices and integrated pest management for each commodity are also discussed in detail in our UF Electronic Data Information System (EDIS) publications. Twelve EDIS publications that were developed during the duration of this project are presented at the end of the report (See Additional Information) and many more are available on-line.

Peter C. Andersen has conducted numerous grower site visits and made presentations to Master Gardener's Groups and Field Days highlighting Deciduous Fruit and Nut Crops and Cold-hardy Citrus at NFREC-Quincy and the Suwannee Valley ARC. Electronic data information system (EDIS) publications are listed at the end of the report under "Additional Information". At the Small Farms and Alternative Enterprise Conference P. C. Andersen has presented talks entitled, "Grapes for North and North Central Florida" on August 2011 and "Blackberries for North and North Central Florida" on August 2013. Stone fruit virtual field day modules (http://vfd.ifas.ufl.edu/stonefruit/index.shtml) produced by P. C. Andersen and R. F. Mizell were viewed over 2000 times in 2013. This on line virtual tour featured sustainable cultural practices and integrated pest management. Our Small Farms and Alternative website, managed by the Suwannee Valley AEC staff, received 4,000 publication down loads in 2013 alone. The most popular requests were for information concerning stone fruit, persimmon, chestnut and Florida nurseries.

For the Live Oak facility, this grant has also facilitated the establishment of new fruit plantings and contributed to the maintenance of existing plantings. New plantings consist of a citrus rootstock trial (replanted due to freeze damage), a pomegranate cultivar trial, and a small olive planting. Winter injury occurred on both stone fruit and pomegranate. Blueberries, persimmons, grapes, blackberries, peaches, nectarines, plums and citrus will continue to be evaluated. Scouting for insects by using various traps and was conducted this spring in the stone fruit orchard and grape vineyard.

In reference to the Small Farms Academy, the specific courses offered and attendance are listed at the end of the report under "Additional Information".

Farm budgets for Florida-adapted species/cultivars were established. We recruited Sean McCoy (multi-county agent) as the lead Economist for the project. We met with Sean McCoy in Live Oak in several times to refine enterprise budgets. Prior to these efforts the University of Florida farm budgets had not been updated since the retirement of Tim Hewitt over 10 years ago. Enterprise budgets have been published for many of the fruit and nut crops in north Florida. We have published the "Directory of Certified Fruit and Nut Crops in Florida" as on on-line EDIS report (http://edis.ifas.ufl.edu/hs1218). We published farm budgets for Satsuma, blackberry, muscadine grape and chestnuts, and we are currently synthesizing farm budgets for different specialty crops. Direct marketing channels such as farmers markets, roadside stands and U-Pic operations will be supplemented by Florida Market Maker (developed by the University of Illinois). The University of Florida IFAS is one of 14 Universities that have purchased this on-line program that connects food producing farmers with economically viable markets. Our ultimate goal was to create user friendly, interactive web-based EDIS programs that would allow users to customize their own small farm scenarios. Sean McCoy published Who's buying Blueberries, Center Pivot, April-June 2013; Cold Hardy Citrus, Center Pivot, October-December 2013. He also presented, "Economic Assessment of Fruit Crops in North and North Central Florida at both the Small Farms and Alternative Enterprise Conference in August 2013.

The entomology components of this grant were handled by Russ Mizell III. Monitoring protocols for major and minor pests of pecan and fruit crops were discussed and demonstrated at four field days and 6 grower workshops to about 400 clientele. Trap crops in and around the blueberry and stone fruit plantings were established to demonstrate a reduction in stink bug pressure. We have also installed traps for monitoring grape root borers in the muscadine grape vineyard. Alternative practices such as trap cropping were also demonstrated and discussed at 6 field days and workshops hosted at NFREC-Quincy, in Jay and Live Oak Florida. Research on native pollinators and biological control agents continued towards developing and understanding of the major pollinators in north Florida crops as well as toward methods of augmenting these ecological services. To that end, development of a database was initiated that contains about 200 plant species and cultivars that are important in horticultural zones 8-9 for augmentation of butterflies, pollinators, predators and parasites and wildlife. This database will soon be available on the web for the public to use in selecting appropriate plant species by season, functions and other horticultural qualities.

Beneficiaries

The beneficiaries are the entire population of Florida including established and prospective growers, Master Gardener's and homeowners of fruit and nut crops. We have continually

updated the Fruits and Nuts Crops page of the Small Farms and Alternative Enterprises web site (http://smallfarms.ifas.ufl.edu/crops/fruits_and_nuts/index.html). The updates for 2012-2013 include updating newly available cultivars and the addition of information on olives and pomegranates, and certified Florida nurseries. This website receives several million hits per year. The customers have access to the most current information is available in Florida on specialty crops concerning varieties, culture and management and integrated pest management. Unfortunately, we do not have accurate data on the number of people impacted by this grant and the number of new farms established for each of the 10 or so commodities. However, based on the number of hits on the website and by the download of thousands of publications from this website, a conservative estimate of public participation would be in the thousands.

The development of outreach components of this project has included the initiation of several contacts and partnerships. The people, organizations, nurseries and growers mentioned below are considered beneficiaries of this grant. The nature of the benefit will be described below. The Suwannee Valley County Extension agents have strengthened the fruit crops planning team. This team met twice in the past year to develop a strategy of implementing upcoming programs. The active members of the team of Extension agents include: Carolyn Saft, Jim DeValerio, Jacque Breman, Nichelle Demorest, Sean McCoy, Brad Burbaugh, Dan Fenneman, and Bob Hochmuth. This group is also members of the UF Northeast Florida Small Farms Working Group and this is a partnership that helps promote programs throughout northeastern Florida to small specialty crops farmers. The team has developed relationships with the newly emerging olive industry in both Georgia (http://georgiaolivegrowers.com/) and Florida (http://www.floridaolivecouncil.org/). A second emerging crop of interest has been pomegranates and this crop has been added to the demonstration orchard in Live Oak. The leading expert in the pomegranate research program in Florida is Dr. Bill Castle (http://www.crec.ifas.ufl.edu/extension/pomegranates/). A partnership has been developed with Dr. Castle who has visited the Live Oak site, developed a plan to evaluate pomegranate cultivars, and provided plant material for the trial. This grant project is also linked strongly to a USDA Integrated Pest Management project known as a Living Extension IPM Field Laboratory. The co-leaders of the IPM project are Bob Hochmuth, Russ Mizell III and Norm Leppla, and the two projects have been act synergistically to strengthen the outreach programs to growers. In addition to the partnerships mentioned above, the team at Live Oak has developed linkages with several industry suppliers including Chestnut Hill Nursery (Bob Wallace), Rainbow Star Nursery (Paul Miller), and Murphy's Citrus Nursery (Billy Murphy). Cherokee Farms (Mack Glass) and Just Fruits and Exotics (Brandy Cowley Gilbert) were also visited. Over 40 businesses have subscribed to and are utilizing Market Maker for fruits and nuts in Florida. We have featured businesses that sell fruit crops and have provided recipes. Our Small Farms Academy has conducted a class entitled, "Best Market Strategies for Diversified Fruit and Nut Operations".

Lessons Learned

The continuity of the project was maintained despite the delays associated with the resignation of Co-PIs Linda Landrum (Marketing Specialist), Dr. Mike Gunderson (Economist), Dr. Al Wysocki (Economist) and Maggie Goldman (Graduate student). Sean McCoy was recruited in 2012 to handle the synthesis of Enterprise Budgets and Marketing. It was too late into the project to recruit another graduate student for this project. The money budgeted for the graduate student has been reallocated to pay labor costs for field maintenance and for data collection that the graduation student would have performed. All farm activities are charged a labor cost at the NFREC-Quincy. Maintenance labor costs were previously state funded, but now because of budgetary constraints all field labor must be paid by Principal Investigators. The lesson learned was that we need to be prepared with contingency plans since they were often needed in this research/extension project.

Contact Person

Peter C. Andersen
Phone: (850) 875-7122
Email: pcand@ufl.edu

Additional Information

Electronic Data Information System (EDIS) publications:

1. Andersen, P.C., T.E. Crocker and J.A Mortensen. 2011. The Bunch Grape. Univ. of FL EDIS publication HS17A. http://edis.ifas.ufl.edu 4 pp.

2. Andersen, P.C. and T.E. Crocker. 2011. The blackberry. Univ. of FL EDIS publication HS104. http://edis.ifas.ufl.edu 18 pp.

3. Mizell III, R.F., P.C. Andersen, C. Tipping and B.V. Brodbeck. 2012. *Xylella fastidiosa* and their leafhopper vectors. Univ. of FL EDIS publication ENY683. http://edis.ifas.ufl.edu 7 pp.

4. Andersen, P.C. 2012. Pecan cultivars for north Florida. Univ. of FL EDIS publication HS106. http://edis.ifas.ufl.edu 18 pp.

5. Andersen, P.C., J.G. Williamson, and M.A. Olmstead. 2012. Sustainability assessment of fruit crops for north and north central Florida. Univ. of FL EDIS publication HS 765.

http://edis.ifas.ufl.edu 20 pp.

6. Andersen, P.C. and T.E. Crocker. 2012. The pecan tree. Univ. of FL EDIS publication HS 982. http://edis.ifas.ufl.edu 17 pp.

7. Andersen, P.C., J.J Ferguson, and T.M. Spann. 2012 The Satsuma mandarin. Univ. of FL EDIS publication HS195. http://edis.ifas.ufl.edu 7 pp.

8. Breman, J. and P.C. Andersen. 2012. Commercial fresh market wine juice and jelly grapes for Florida. Univ. of FL EDIS publication HS1152. http://edis.ifas.ufl.edu 3 pp.

9. Miller, E.P., P.C. Andersen, J.G. Williamson, J.J. Ferguson and J. Bitter. 2012. Growing plums in Florida. Univ. of FL EDIS publication HS895. http://edis.ifas.ufl.edu 12 pp.

10. Andersen, P.C., T.E. Crocker and J. Breman. 2013. The muscadine grape Univ. of FL EDIS publication HS763. http://edis.ifas.ufl.edu 15 pp.

11. Crow, B., J. Rich and P.C. Andersen. 2013. Nematodes of backyard deciduous fruit crops in Florida. Univ. of FL EDIS publication ENY 055. http://edis.ifas.ufl.edu 5 pp.

12. Andersen, P.C., R.C. Hochmuth, S.R. McCoy and L.L. Davis. 2013. Directory of certified deciduous fruit and nut crop nurseries in Florida. Univ. of FL EDIS publication ENY 1218. http://edis.ifas.ufl.edu 8 pp.

Small Farms Academy Workshops Related to this Project:
2011
Feb. 11 Winter Orchard Management, 10 attendees.
May 20 Spring Orchard Management, 18 attendees
August 11 Summer Orchard Management, 15 attendees

2012
May 14-15 Integrated Pest Management, 21 attendees
August 21 Growing Muscadine Grapes for Fun and Profit, 19 attendees
Nov. 20 Drip Irrigation School, 30 attendees

2013
May 14 Encouraging Pollinators, Beneficial Insects and Other Good Guys, 10 attendees
June 15 Mixed Orchard Field Day, 46 attendees
Sept. 28 Mixed Fruit and Nut Orchard Field Day, 28 attendees
Oct. 22 Postharvest Handling and Wholesale Marketing, 12 attendees
Nov. 15 Drip Irrigation School, 18 attendees

Table 1. Approximate acreage, reasons for change in acreage, the best cultivars for trial, limitations to sustainability, potential for expansion, and assessment of agricultural sustainability of fruit and nut crop species for north and central Florida.

Fruit/Nut Crop	Approximate Acreage[z]		Reasons for Increase/Decrease in Acreage	Best Cultivars for Trial [y]	Limitations to Agricultural Sustainability	Commercial Potential	Direct-to-Consumer Potential	Assessment of Agricultural Sustainability[x]
	2010	1985						
Pecan [*Carya illinoensis* (Wangenh.) C. Koch	8,650	10,000	Disunity among growers; stagnant prices; long period required for return on investment; Much acreage is not well managed.	*Amling*, *Apalachee*, Cape Fear, Curtis, Elliott, *Excel*, *Gafford*, *Lakota*, Stuart, *Moreland*, Sumner (most are scab-resistant)	Susceptibility to pecan scab and other foliage diseases and insect pests (pecan nut case bearer, pecan weevil, stink bug)	Moderate	Moderate	5
Peach/Nectarine [*Prunus persica* (L.) Batsch]	300	2,500	Early spring frosts; poor choices of cultivars until recently; reduced consumer demand; competition from California after mid-May.	Melting Flesh peaches (*Flordadawn*, *Florda crest*); Non-melting Flesh peaches (*Gulfking*, *Gulfcrest*, *Gulfcrimson*, *Gulfprince*) Melting Flesh nectarine (*Sunbest*, *Suncoast*, *Sundollar*)	Susceptibility to disease (brown rot, mushroom root rot, *Botryosphaeria dothidea*) and insects (plum curculio, stink bug, borers, scales).	High	Moderate	3
Plum (*Prunus salicina* L.)	10	5	New leaf scald-resistant plums are now available.	*Gulfbeauty*, *Gulfblaze*, *Gulfrose*	Same limitations as peaches and nectarines.	High	Moderate	3
Southern highbush blueberry (*Vaccinium hybrid*)	3,000	200	Excellent market window nationally/internationally in April and early May for production in central and north central Florida; high labor requirements	*Bluecrisp*, *Emerald*, *Georgiagem*, *Jewel*, *Millennia*, *Oneal*, *Sharpblue*, *Star*, *Sweetcrisp*, *Windsor*	Early spring frosts; Require low pH soils and pine bark; Susceptibility to diseases (*B. dothidea*, Phytophthora, *Xylella fastidiosa*, mummy berry) and gall midge.	High	High	5
Rabbiteye Blueberry (*Vaccinium virgatum* Aiton)	1000	1000	Acreage has not increased due to competition from highbush production in North Carolina; high labor requirements.	*Austin*, Brightwell, Bluegem, Bonita, Climax, Powder blue, Premier, *Savory*, Tifblue	Highly sustainable crop; requires low soil pH, and pine bark is often beneficial. Amenable to organic culture.	Moderate	High	9
Muscadine Grape (*Vitis rotundifolia* Michx.)	400	700	Low demand; low prices Offered for wine or juice. Only large-fruited cultivars	Fry, *Delicious*, *Granny Val*, *Ison*, *Majesty*, *Polyanna*, *Supreme*,	Highly sustainable crop; establishment costs are fairly high due to the	Low	Moderate	8

			for fresh market are profitable.	*Southern Jewel*, *Early Fry*, *Black Fry*, *Black Beauty*, *Sweet Jenny*, Noble, Carlos, Welder	need for trellising.			
Oriental persimmon (*Diospyros kaki* L.)	200	100	High consumer demand for fresh market non-astringent cultivars; demand for astringent types is not high.	*Izu, Fuyu*, *Matsumoto Wase Fuyu*, *Jiro*, *Makawa Jiro* (all are non-astringent cultivars)	Susceptibility to *B. dothidea*, and insect borers	Moderate	High	5
Blackberry (*Rubus* spp.)	30	20	New thornless cultivars from Arkansas breeding program offer potential for north Florida growers. .	*Apache*, *Arapaho*, *Natchez*, *Ouachita* (all thornless); *Kiowa* (thorny)	Susceptible to rust and anthracnose. Minor insect pests include cane borers and stick bugs.	Moderate	High	7
Chestnut (*Castanea mollisima* Blume x *C. dentata* (Marsh.) Borkh.)	150	10	Specialty crop with high consumer demand; Resistant to most insects and diseases.	Auburn Cropper, Carolina, Heritage, Williamette and seedlings (All are resistant to chestnut blight)	Graft-incompatibilities have occurred, thus lately seedlings have been recommended. Nuts are very perishable.	Moderate to High	Moderate to High	7
Satsuma (*Citrus unshiu* Marcovitch)	100	2	Cold-hardy citrus that is relatively pest free. Fruit are mostly seedless with ripening in November.	Owari, Brown Select, Kimbrough, Silverhill, *Xie Shan*	Leaf miner and whitefly are the greatest insect pests. Citrus scab (fungus) is important in some years.	High	High	8

[z] Approximate acreage and potential for expansion based on estimates in EDIS report (http://edis.ifas.ufl.edu) HS765 "Sustainability Assessment of Fruit and Nut Crops in North and North Central Florida" by P.C. Andersen, T.E. Crocker and J.G. Williamson.
[y] Italicized cultivars are new cultivars (less than 15 years old).
[x] Assessment of agricultural sustainability by P.C. Andersen, T.E. Crocker and J.. Williamson. Assessment of agricultural sustainability incorporates all necessary inputs (water, pesticide, fertilizer, trellises, mulches, etc.) for successful production based on a scale of 1 - 10 with 1 = least sustainable and 10 = most sustainable.

Project (26): University of Florida - Florida Small Farms - Capacity Building, Training and Outreach

Contract Number: 16801
Funding Year: 2010
Funding Total: $132,549.00
Reporting Period: Final

Project Summary

For over a decade, the emerging small farms specialty crops industry in Florida has been facing major economic and communicative challenges regarding trade opportunities, regulatory issues, and customer expectations. It has become increasingly clear that this clientele has unique needs that require new extension delivery methods. Hence, *the purpose of this project* was twofold: 1. improving dialog among farmers, policy makers, and allied industry members regarding *critical needs* such as food safety, risk management, and direct marketing; 2. working collaboratively with small farms stakeholders to deliver relevant, science-based information via effective and impactful extension and outreach programs. To achieve these goals, the project comprised three components: 1. capacity building to identify programmatic needs, concerns, and resources to strengthen the small farms industry in Florida; 2. training extension agents to establish a statewide Small Farms Food Safety Implementation Team and to develop a Guide to Direct Marketing; and 3. outreach via recently established channels to improve communication between all stakeholders and to provide effective educational programs.

This project was important and timely because it was designed to enhance the competitiveness of the small farms specialty crop industry concurrent to major USDA small farms initiatives and federal legislation. It directly addressed the following priorities identified in the Federal Register (USDA AMS) Specialty Crops Block Grant Program because it:

- Assisted entities in the specialty crop distribution chain in developing "Good Agricultural Practices" and "Good Handling Practices" (C #2)
- Invested in specialty crop research (C #1)
- Enhanced food safety (C #2 and 3)
- Increased competitiveness of specialty crop farmers including minority and disadvantaged farmers (C #2 and 3)
- Contributed to the development of local and regional food systems (C #1,2,3)

The project built on three previously funded Specialty Crop Block Grants (SCBGs). The 1st Florida Small Farms and Alternative Enterprises Conference, held August 1 & 2, 2009 in Kissimmee, FL and hosted by UF-IFAS and FAMU-CESTA, was supported in part by a FL SCBG ($25,000). Funds also were awarded to support the 2nd conference ($15,000), held July 31 and August 1, 2010. This sustaining partnership has been critical to the success of the Small Farms Program. Furthermore, food safety educational materials developed by Dr. Keith Schneider and his team (SCBG, 2009) served as the foundation of food safety trainings (Component Two) in this project. The outcomes of this training component, i.e., the establishment of a Small

Farm Food Safety Implementation Team of 21 county extension faculty and agricultural professionals and subsequent statewide delivery of trainings to 73 farmers, significantly complemented and enhanced previous program efforts and promoted statewide recognition of UF-IFAS and FAMU-CESTA Extension from agricultural leaders. Partial funds for this project were allocated directly to the 3rd Florida Small Farms and Alternative Enterprises Conference ($25,000, Component Three), held July 15-17, 2011. An additional $5,000 were used during the grant extension period to facilitate participation of underserved specialty crop farmers in the 4th Florida Small Farms and Alternative Enterprises Conference, held July 27-29, 2012. Moreover, funds utilized for Component One of this project ($36,373) allowed the Small Farms Program to improve the educational elements of the conference in direct response to identified needs of the small farms industry. Generation and evaluation of quantitative and qualitative data from Project Components One-Three, supported by funds covering the costs for software and
staff salaries ($36,176), facilitated immediate adjustments enhancing the overall impact of the
Small Farms Program.

Project Approach

Activities and tasks performed during the grant period as well as *contributions and role of project partners* are presented according to the three components of the project. Because small farms are often diversified operations that include crops and animals, this team took special measures to ensure funds were allocated appropriately to the spirit and letter of the funding legislation. The majority of Florida's small farmers grow only special crops and do not integrate livestock in their operations due to limited infrastructure for livestock processing and complications surrounding food safety certification on limited acreage. Specifically, Food Safety extension programs were designed to solely address the needs of specialty crop farm operators, and were marketed uniquely to them. Food safety toolkits were only distributed to specialty crop producers. The Small Farms Conference has a livestock track and animal exhibition area, but at least 75% of the conference programming addresses the unique needs of specialty crop producers, as our state's small farms industry is primarily specialty crop products and commodities. The contribution of funds from the SCBG program is approximately 25% of the total cost of the conference. Our conference is managed by a professional event coordinator at the University of Florida and all transactions are traceable and auditable using good management practices. We are careful to allocate funds to those activities that solely benefit specialty crop producers. Activities in component one were limited to specialty crop producers through a thorough pre-screening process. Additional details of the methods used by this team are summarized below.

2.1. Component One: Capacity-Building among Industry Partners

To build strong and diverse partnerships among Florida small farm stakeholders, educators and lawmakers need to identify the specific challenges faced by the small farms sector. With the majority of Florida's direct-to-consumer sales (57%) being from small farms, Land Grant Extension programs need to prepare farmers to provide nutritious, safe, and affordable products to consumers efficiently. Activities for this capacity-building project component were completed in the third quarter of 2011. Overall, the contributions of Tracy Irani and her staff the Center for Public Issues Education in Agriculture (Center PIE) were incredibly helpful to the Small Farms Extension Team and stakeholders alike. Highlights of the activities are as follows:

- Three Florida locations (Marianna, Sarasota, and Gainesville) were selected for a total six focus group sessions, and participants were pre-screened by telephone to ensure they met criteria of a small farm stakeholder.
- With inputs from project Co-PIs (Brad Burbaugh, Robert Hochmuth, Vonda Richardson, Danielle Treadwell), a moderator's guide was developed to standardize questions among sessions.
- Six sessions with a total of 59 participants were conducted, recorded, and transcribed to an Executive Summary (19 pages) and Topline Report (48 pages), both submitted as attachments with the 2nd Quarter Project Report.
- Results of the stakeholder focus group sessions were shared with an invited group of 11 focus group participants at the "Small Farms Stakeholder Capacity Building Meeting" held by Tracy Irani and the Center PIE staff on Friday, July 15, 2011 from 1:00 pm to 3:00 pm at the 3rd Florida Small Farms and Alternative Enterprises Conference. Attendees at that meeting further iterated the value of small farms conference programming and echoed programmatic areas that need additional attention including water management, food safety, business planning and management, understanding federal and state regulations, and having opportunities to express regulatory concerns and suggestions to state policy makers.

2.1.1. Center PIE Conclusions and Recommendations

Based on the results from this study, the Center PIE recommended the following:

- *Follow-up surveys to confirm county-specific stakeholder demographics.* Demographic data collected on the focus group participants suggested that small farmers in Florida represent a diverse array of individuals with a broad range of age and farming experience and, thus, with vastly different communication requirements. Follow-up surveys will allow continuous comparison of stakeholder demographics between counties and help identify appropriate, county-specific tools for effective communication and education.
- *Utilizing appropriate delivery channels.* Due to the diversity of responses on programming delivery, the Small Farms Team should continue to seek multiple and new channels (social media, for example) to deliver educational programming and information according to the cultural, geographical, and agricultural needs in different parts of the state.
- *Fostering peer-delivered learning opportunities.* Focus group participants indicated they like to learn from others in their social environment. This not only validates the success of the small farms conference approach but also suggests development of additional social learning platforms, such as mentoring programs, "master farmer" type programs, etc.

2.1.2. Implementation of Results

The focus group session report was used immediately to make adjustments to existing extension programs (such as the conference programming described in section 2.3.2) and was considered in the design of future programs (e.g., novel modules for farm food safety self-audits, advanced on- farm trainings, etc.) to improve the quality of service that extension is providing to small farm stakeholders. Because this report established a baseline, we are not able to compare these results with any past equivalent. The team determined that the originally planned follow-up quantitative survey of focus group attendees would not yield any additional or more valid data than those collected during the focus group sessions.

2.1.3. Publications

Joy Goodwin, the graduate student receiving partial support from this grant working under the guidance of Tracy Irani, gave an oral and a poster presentation at the Southern Region Association of Agricultural Scientists in February 2012 and won awards. These sessions were attended by approximately 40 primarily state extension specialists, county extension faculty and graduate students. The citations for this work follow:

Gouldthorpe, J. L., Goodwin, J. N. (2012, February). "Small" farmers, big challenges: A needs assessment of Florida small farmers' production challenges and training needs. Paper presented at the annual meeting of the Southern Association of Agricultural Scientists, Birmingham, Alabama.

- This paper won the Outstanding Graduate Student Research Paper award in the Rural Soc Section.

Goodwin, J. N., Gouldthorpe, J. L., & Settle, Q. (2012, February). Addressing the divide: A comparison of the needs and preferences of small farmers. Poster presented at the annual meeting of the Southern Association of Agricultural Scientists, Birmingham, Alabama.

- This poster won 1st Place Research Poster (student category) in the Ag Ed Section.

2.1.4. Attachments (3):

Moderator's Guide
Focus Groups Executive Summary
Focus Groups Topline Report

2.2. Component Two: Training

Farmers face a number of regulatory programs (pesticide application, BMPs, labor requirements) but food safety is arguably the most pressing current need. Hence, the Small Farms Team has made a concerted effort to engage growers in educational programs on farm food safety.

2.2.1. Train the Trainers

During the second quarter of 2011, the in-service training (IST) "Teaching Your Farmers How to Build Your Own Farm Food Safety Manual", led by Robert Hochmuth, Linda Landrum, and Danielle Treadwell on May 12 and 13, 2011, established the UF-IFAS Small Farm Food Safety Implementation Team (SF Food Safety Team).

Pre- and post-test evaluations of the 19 trained county extension agent and two graduate student trainees were developed and analyzed by Sebastian Galindo and showed the following results:

- Agents significantly ($p<.05$) increased their knowledge index (from 60% to 70%) and skills index (from 2.16 to 3.12 on a 0-5 scale) regarding farm food safety.
- Although not statistically significant, small increases were identified on attitudes index and commitment index (3.8 to 4.1 on a 0-5 scale, in both cases).
- About half of the agents had previously attended some type of farm food safety training, but 95% had never developed a food safety manual, and only 17% had conducted training for farmers on the topic.
- The hands-on nature of the training was deemed a requirement by 88% of attendees, and the other 12% thought maybe it was required.
- When asked to compare this IST to previously attended ISTs, 82% indicated it was in the top 20% of all ISTs, and 18% indicated it was in the top 40%.
- All of the trainees were either "satisfied" (6%) or "very satisfied" (94%) with the expertise of instructors. Likewise, 100% of agents were very satisfied with the quality of educational materials and would recommend the training to other agents.

2.2.2. Train the Target Clientele

During 2011, eight "Build Your Own Food Safety Manual" trainings for a total of 73 farmers were implemented by newly trained agents of the SF Food Safety Team and held in Live Oak, Kissimmee, Jay (2 trainings), Bushnell (2), Gainesville, and Madison. A standardized "knowledge gain" type evaluation tool for each class, developed by Sebastian Galindo, was installed beginning in August 2011. The first five trainings, conducted in Escambia (2), Alachua, Sumter, and Osceola Counties, included an on-line post-training evaluation conducted immediately after the trainings were completed. Of the 73 training attendees, 63 farmers participated in these evaluations. Results were submitted in the 4th Quarter Project Report and included the following highlights:

- Attendees had between 0 and 58 years of farming experience and currently were farming from <1 to 585 acres, the majority farming less than 50 acres of fruits or vegetables.
    - Overall, the farmers valued the training, viewed a food safety plans as very important, and planned to implement a food safety program on their farm even though most were not required to do so by their buyers or markets.
    - Thirty three farmers indicated the plan to conduct a third party, customer, or regulatory audit. For a farm the size of those in these trainings an estimated charge to establish an auditable food safety plan is $5,000 to $10,000. Even at the lower figure, these trainings provided a savings of at least $165,000 to those 33 farms.

In addition to the educational training, each program participant also received the following resources: Food Safety Begins on the Farm (Spiral-bound book), Food Safety Begins on the Farm (English and Spanish versions; Stapled booklet), Proper Hand Washing Poster (English and Spanish versions; Large poster), Fruits, Vegetables, and Food Safety: Health and Hygiene on the Farm (DVD), Worker Health and Hygiene Program for Produce Industry (DVD) Please Wash Your Hands Often (Laminated sign), Please Use Toilets Provided in the Field (Laminated sign), Please Put Used Toilet Paper in the Toilet (Laminated sign), and Food Safety Field Training Kit for Fresh Produce Handlers (Large spiral-bound book). Federal food safety regulations require posting of these posters and signs on the farm and in the packing facility. Additional handouts on GAPS were sourced from North Carolina's Food Safety Program (http://ncsu.edu/foodscience/extension_program/publications.html#goodagpractices) and the introductory and overview power presentations were developed by Keith Schneider, Linda Landrum and Bob Hochmuth. The educational material supplied to farmers was valued at $150 per farm for a total value of $18,600.

As of December 2011, since this educational extension effort began as a pilot in 2010, over 120 farms now have developed their own food safety plans. The success is two-fold: firstly, more agents now have the expertise and skill to teach this program, and secondly, many more farmers are being taught as a result of the expanded expertise statewide. The program has garnered great respect and recognition statewide for UF-IFAS Extension from agricultural leaders. Below is a summary of the post-program evaluation conducted for the first five trainings in 2011.

Evaluation Summary of Five "Build Your Own Food Safety Manual" Extension Trainings for Florida Farmers

Evaluation Question	Farmer Responses

Overall knowledge score from post-test.	76%				
Every farm should have a food safety plan in place.	Strongly agree 33	Agree 22	Neutral 5	Disagree 2	Strongly disagree 1
Have you previously developed a food safety plan for your farm?	Yes 5	No 57			

If this class had not been held, would you have attempted to develop a food safety plan for you farm?	Yes 21	No 38	N/A 1		
As a result of this training how confident are you in designing a food safety plan?	Totally confident 29	Somewhat confident 29	Undecided 4		
How likely is it that you will implement a food safety plan on your farm?	Very likely 37	Likely 22	Unlikely 0	Undecided 1	
Who will be responsible for the implementation of your food safety plan?	Self 48	Manager 8	Other 3	N/A 2	
Once your food safety plan is in place, what type of audit(s) do you intend to do?	Self 54	Third party 18	Regulatory 4	Customer 11	
How confident do you feel to identify when changes are needed in your plan?	Totally confident 11	Somewhat confident 37	Somewhat unconfident 3	Totally unconfident 1	
Who are you selling your produce to?	Direct to consumer 42	Restaurant 17	Wholesaler 21	Other 9	
Are you being required by any of your customers/markets to get your food safety plan audited?	Yes 7	No 47	N/A 8		
Did this workshop meet your overall expectations?	Yes 59	No 3			
Compared to other workshops you have completed, how would you evaluate the quality of this one?	Top 20% 37	Top 40% 20	Middle 40% 1	Bottom 20% 2	
Do you feel the hands-on nature of the training at a computer is necessary	Yes 53	No 4	Maybe 6		
How satisfied were you with the expertise of the instructors?	Very satisfied	Satisfied	Not satisfied		

	45	18	0		
Would you recommend this workshop to other farmers?	Yes 61	No 2			

2.2.3. Publications
Results from evaluation surveys conducted at the IST and subsequent farmer training workshops currently are being prepared for publication in a peer-reviewed journal by Sebastian Galindo.

2.2.4. Attachments (1)
Qualtrics Survey Instrument for Farm Food Safety Training Clientele

2.3. Component Three: Outreach

2.3.1. Conference Planning
Planning for the Florida Small Farms and Alternative Enterprises Conference occurred year-round. Since its inauguration in 2009, the conference has been designed and organized by a group of UF and FAMU state and county faculty plus numerous industry stakeholders (including farmers) who serve on one of the event's 14 committees. Activities include monthly, day-long, face-to-face executive committee meetings, face-to-face and conference call committee meetings throughout the year, with higher frequency as the event's date approaches. In addition, the executive committee meets with the stakeholder advisory council at least once as a group early during the planning year to review the past year's event, discuss the next year's plans, and identify opportunities for improvement. The stakeholder advisory council has and will continue to contribute in a meaningful manner, and we appreciate the time and expertise they bring to the table. All of these activities are possible because of the program support we receive from Mandy Stage, our event coordinator from the UF Office of Conferences and Institutes. A complete listing of the committees, members, educational sessions, speakers, special guests, and award winners is located in the 2011 Conference Program. The program, high-resolution images taken by UF-IFAS photographer Tyler Jones, and educational materials shared by presenters are available at http://smallfarms.ifas.ufl.edu. A copy of the 2011 Conference Program was attached to the 3rd Quarter Project Report.

2.3.2. Conference Delivery
The 3rd annual Florida Small Farms and Alternative Enterprises Conference was held in Kissimmee, FL on July 15-17, 2011. The event attracted 83 exhibitors and over 700 attendees total. A number of changes were made to this year's conference format in response to last year's attendees' evaluations, focus group evaluations (Component One of this project), and ongoing communications with our stakeholders and advisory board members. Changes included:

Friday

- Pre-conference sessions including the Beginning Farmer Workshop (focused on specialty crops and supported by a USDA Beginning Farmer and Rancher grant, Rose Koenig, PI) and Farm Food Safety Training (hosted by the UF-IFAS Small Farms Academy and supported by this grant) for intensive, day-long training in areas of critical need.

- Pre-conference farm tours to showcase innovative and successful practices in specialty crop systems.
- Statewide committee meetings including the Florida Food Policy Council Meeting, an invitation-only NRCS/IPM Agency Roundtable meeting, and an invitation-only Small Farms Stakeholder meeting to present the findings of the statewide focus group work conducted by Tracy Irani (Component One above).
- Addition of a Friday evening Exhibitor Preview for attendees with refreshments.

Saturday

- Addition of a Saturday evening Networking Social featuring a live band, samplings of Florida-grown/produced food and beverages (some prepared by chefs on the floor), and door prizes.

Sunday

- Elimination of the Sunday trade show (historically a low-traffic period for exhibitors).
- Addition of six three-hour intensive sessions on Sunday to meet requests for additional opportunity for farmer-to-farmer interaction. These sessions featured presentations followed by at least one hour of moderated discussion.

As in previous years, the event featured welcome addresses from UF and FAMU administrators and faculty, Innovative Farmer Awards, and specialty crop educational sessions in the areas of Protected Agriculture, Business and Marketing, Horticulture, Organic and Sustainable Farming, and Policy and Regulations. Breakfast was served both Saturday and Sunday, and a hot lunch ("A Taste of Florida") featuring products from Florida small farms was enjoyed on Saturday. Meals were funded by sources other than the Specialty Crop Block Grant Program and are an integral part of the agenda. The only meals supported by this grant were reimbursements for meal costs to speakers who traveled to attend the event on behalf of the university.

2.3.3. Conference Evaluation

An evaluation plan, designed by Sebastian Galindo with input from the project team, was implemented to establish the effectiveness and quality of different activities conducted at the 2011 conference. Both Qualtrics software and hard copies were utilized to administer the evaluation to conference attendees. Results currently are being compiled for publication by Sebastian Galindo, and highlights include the following:

- Participants reported high levels of confidence (4.4. on 0-5 scale) to perform activities related with skills affected by their participation in the conference.
- Most participants (60%) intend to develop better business skills as a result of attending the conference, and almost 40% also wish to investigate alternative markets.
- Most respondents (80%) would like to see the meeting organized every year.
- Furthermore, 85% plan to attend the conference again in the future.

Fifty six participants provided feedback on the conference tours (34 and 22 for Horticulture and Livestock, respectively). In general, responses were very positive for both tours.

- Respondents identified these experiences as valuable to enhance their knowledge on startup and marketing considerations and day-to-day operation of such enterprises.
- Most respondents (93%) plan to use the information they received during the tours.

Finally, 94% of surveyed exhibitors were either "satisfied" or "very satisfied" in the sense that

the exhibition met their needs. All exhibitors considered that they were successful in reaching their target audiences and provided high overall ratings for the conference (75% rated it as "excellent", 20% as "good", and 5% as "satisfactory").

2.3.4. Facilitation of Conference Participation (no-cost extension period January to September 2012)

With FDAC's approval, partial grant funding was dedicated to a programmatic effort to increase the involvement and education of underserved and socially disadvantaged specialty crops clientele in Florida. Based on previous interaction with University of Florida and Florida A&M University Extension faculty, we identified 12 farmers who were interested in increasing their knowledge in specific topic areas that were to be presented at the 2012 Florida Small Farms and Alternative Enterprises Conference. This effort was led by FAMU extension faculty Covey Washington (Jefferson County Extension) and supported by Vonda Richardson (FAMU Small Farms Team Co-Leader) and Norma Tillman (Conference Stakeholder Advisory Board member). Re-allocated funds were used to cover their travel and registration costs. The priority sessions and topics these farmers attended included: food safety, starting a new specialty crop enterprise, developing a marketing plan, understanding the regulations regarding value added specialty crop products, extending the season with protected culture, sustainable production systems, and integrated pest management.

2.3.5. Attachments (1)

Conference Program

Goals and Outcomes Achieved

Performance goals and measurable outcomes of the project were *achieved within the duration of this project through the following completed activities*:

3.1. Component One (Capacity-Building)

Challenges, goals, and needs of Florida's small farms stakeholders were identified during six moderated statewide focus group sessions. Quantitative and qualitative data collected during these sessions were analyzed and evaluated using scientific statistical methods, and results were compiled into two final reports, an Executive Summary (19 pages) and a Topline Report (48 pages). Based on the results, the Center PIE team made specific recommendations (see section 2.1.1 of this report) that were incorporated immediately into the design of educational programs by the Small Farms Team.

3.2. Component Two (Training)

The overall expertise of the Small Farms Team was expanded statewide by training 19 county extension agents for delivery of "Build Your Own Food Safety Manual" workshops to Florida's small farm operators. Since the initiation of this training program in 2010, over 100 specialty crop producers and packers have completed the training. Knowledge and skill gain of both agents and farm workers were confirmed through pre- and post-evaluations, the results of which are being prepared for publication (see Sections 2.2.1 and 2.2.2 for a summary of collected data). Significantly, establishment of this food safety program resulted in 100% of small farm owners who attended the training to design and implement farm food safety plans. Follow-up phone calls and/or visits to 90% of these farms have confirmed continued adherence to their safety manuals

during the following months. Furthermore, the materials developed through this program are available to the public through the internet including UF's Food Safety website (http://fshn.ifas.ufl.edu/FoodSafety/), the UF/FAMU Small Farms Website (http://smallfarms.ifas.ufl.edu/).

3.3. Component Three (Outreach)

Success of the 2011 statewide conference programming was evidenced by high numbers of both return and new attendees. In total, and over 800 stakeholders including 83 exhibitors participated in the 3rd Florida Small Farms and Alternative Enterprises Conference. Educational methods used to train farmers and extension professionals during the event included electronic media (video, dynamic/interactive websites, and electronic fact sheets), farm demonstration tours, and hands-on intensive training. This year, special emphasis was placed on enhancing networking between stakeholders and helping them understand implications of state and federal regulations on food safety, risk management, and direct marketing. All educational materials shared by presenters are available to the public through the Small Farms Website (http://smallfarms.ifas.ufl.edu). Moreover, analyses of evaluation data collected from conference participants are completed and results are being prepared for publication (see Section 2.3.3 for a brief summary of baseline data).

Finally, the no-cost extension period throughout September 2012 allowed us to utilize travel funds ($5,000) to facilitate the education of underserved and socially disadvantaged specialty crop farmers in North Florida. Funds were used to cover travel and registration costs for 12 selected farmers to attend the 2012 Florida Small Farms and Alternative Enterprises Conference. A personal survey confirmed that all of them would not have been able to participate in the educational event without the support provided by this grant. The participants were interested in increasing knowledge on a wide variety of topics at the conference (see section 2.3.4).

Although outcome measures of this project were immediate, the developed educational materials and established training programs have had and will have *continuous long-term impact* on the small farms crop industry in Florida. In 2012, the 4th Florida Small Farms and Alternative Enterprises Conference, held July 27-29 in Kissimmee, FL, was attended by 750 stakeholders and demonstrated the ongoing importance of the SFAE conference programming. The conference program in 2012 was supported by FDACS Specialty Crop Block contract # 18017 and is reported in detail in Quarterly Reports under that grant.

Beneficiaries

Beneficiaries of this project include small specialty crop farm operators and owners, allied industry partners, educators, and consumers. The Florida small farms audience consists of 44,000 farm families, each interacting with others in their communities. Proper training on food safety, risk management, and direct marketing strategies, supported by the implementation of farm food safety plans may help some of these farmers expand their businesses from small to mid-sized farms, so that their potential to make a positive impact on local economies and the health of Florida citizens and communities will be even greater. The three project components produced the following benefits:

- Results from the statewide focus group discussions identified farmer's opinions about their limitations to success, how and from whom they source information, and the kind of support needed to change behavior positively.

- These key findings were compiled into a "state of the state" report and directly benefitted statewide extension faculty by facilitating the design of educational programs that best meet the needs of this clientele group.
- Nineteen extension agents and two agricultural professionals from 17 counties in Florida received the in-service training (IST) "Teaching Your Farmers How to Build Your Own Farm Food Safety Manual". As a result, these agents now have the knowledge, skills, and tools to provide "Build Your Own Food Safety Manual" classes statewide to small farm operators. Since the completion of the IST in May, 2011, nine trained agents have conveyed training to farmers.
- A total of 73 farmers benefitted from this increased pool of educators as they completed "Build Your Own Food Safety Manual" classes between January and December 2011. During these classes, each attendee received valuable materials including posters and signs that are required for posting on the farm and in the packing facility in order to be compliant with federal food safety requirements. This educational material was valued at $150 per farm (total $10,950).
- As a direct result of this project, 73farmers have developed and installed a food safety plan in 2011. In addition to cost savings (which will be reported in detail for SCBG contract #18017 by our new team member, economist Alan Hodges, who joined the program in 2012), these project accomplishments benefit trained farmers by ensuring compliance to current food safety regulations.
- Twelve farmers identified as underserved and socially disadvantaged specialty crops clientele received a total of $5,000 in travel funds. This financial support enabled these farmers to participate in a variety of critical educational events during the 2012 Florida Small Farms and Alternative Enterprises Conference.
- Florida consumers buying specialty crops from small farmers have benefitted from increased access to safe, high-quality agricultural products.
- Continuous SFAE conference programming has provided significant benefits for the specialty crops industry including stronger relationships among stakeholders, increased knowledge, reduced economic risk, and increased preparedness for future program opportunities and new legislation.
- Finally, activities completed during this project promoted statewide recognition of UF-IFAS and FAMU-CESTA Extension as well as the Specialty Crop Block Grant Program from agricultural leaders.

Lessons Learned

Offer insights into the lessons learned by the project staff as a result of completing this project. This section is meant to illustrate the positive and negative results and conclusions for the project Provide unexpected outcomes or results that were an effect of implementing this project.
Ideas:

- While the statewide interest in the SFAE Conference Programming is increasing, the facilities at Kissimmee limit the numbers of potential participants to a maximum of 1,000

attendees. The limiting factor here is the seating capacity during lunch hours. Although maximal 900 seats are available, a staggered lunch should allow us to book 1,000 participants. Despite the limitations, there is overwhelming support for maintaining the event at this particular site due to its central location in the state and the combination of amenities that allow us to conduct varied programming.

- The Food Safety Implementation Team discovered it is important to keep their innovative farmers and early adopters actively engaged in learning. To meet the educational needs of farmers who attended the food safety training and who were interested in how to best prepare for a third party audit, the team collaborated with the UF Office of Sustainability to fund an advanced program. Support was provided to implement a unique field day at a farm in Madison recently successful in passing a third party food safety audit. The "Taking the Mystery Out of a Third Party Food Safety Audit", hosted by Fraleigh Farms and Extension Agent D. Fenneman was attended by 30 participants. This training was very successful, and additional trainings are planned for 2012. The lesson here was that we need to be prepared to train clients that are at various stages of expertise. While our initial training was well-designed for farmers new to farm food safety plans, we underestimated the rate of adoption and needed to respond quickly with more advanced training.
- This team has consistently made a visible effort to engage our clientele. Working with Tracy Irani and Sebastian Gallindo made it even more clear how important clientele feedback is. We were surprised at the candor of some the farmer comments in the focus group reports and conference evaluations; it seemed as if clientele were either very pleased with the efforts by university faculty and FDACS, or they were not pleased at all. We relied on the expertise of our social scientists to analyze these comments into the important take home messages –keep engaging clientele, be good listeners, and respond to those needs with action.

Contact Person

Danielle Treadwell, Associate Professor
UF-IFAS Horticultural Sciences PO
Box 110690, 1243 Fifield Hall
Gainesville, FL 32611-0690.
Telephone Number: (352) 273-4775
Email Address: ddtreadw@ufl.edu

Additional Information

Attachments referred to in the preceding text are included on the following pages.

Farm Credit of Central Florida, ACA

115 South Missouri Ave., Suite 400 (33815)
P.O. Box 8009
Lakeland, FL 33802-8009
Telephone: (863) 668-7444
Fax: (863) 668-8145

- **Project Title** - Florida Agriculture Financial Management Conference
- **Contract Number** – FDACS Contract #20058
- **Specialty Crop Block Grant Funding Year** – Upon execution through October 31, 2013
- **Reporting Period:** Final Report

Project Summary

With the assistance of prior years specialty crop block grants, there was a strong model for the 2013 conference and based on participation surveys, participants expressed a high level of interest for continuing this type of educational program. The Florida Department of Agriculture and Consumer Services, Four of Florida's top specialty crop commodity groups and seven allied companies specializing in working with specialty crop producers signed on for the 2013 conference to be a part of the planning process during the development stage, sponsorships and encouraging their constituents to attend.

As planned the 2013 conference had a strong financial education component. With the help of Florida's specialty crop commodity groups, this program set out to reach a broader audience specifically targeting young, beginning and small farmers. With the aging population of agricultural producers, farmers younger than 35 years old or with less than 10 years in business or less than $250,000 in gross revenues were offered scholarships to waive the registration fee for the conference. In its third year, the program provided over 150 specialty crop commodity producers and stakeholders with key information on managing their financial risk. Of these, 14 growers fell into the young, beginning or small farmer category based on the above parameters.

The resources of industry to financially support programs like this through sponsorships has decreased, so we sought other means to maintain high quality speakers for future programs. This proposal requested funding to support a proven educational concept for a third year. Education is valued among Florida's specialty crop industry and it's also critical to the survivability of many Florida Ag businesses in the current national economic environment.

Purpose of the program

The purpose of this program is to provide financial risk management training for Florida's agricultural commodities. The goal is to deliver training in production, marketing and financial risk to specific segments of the industry. The program was offered to specialty

crop commodities in Florida and provided general financial information as well as address commodity specific issues.

The program was designed to be low or no cost to the participants because of the critical program content that needed to be communicated to producers who are striving to do their best to survive these tough economic conditions.

The need for sound agricultural financial management, especially in this economic environment, is not limited to specialty crops but the planning committee was aware that the funding provided by this grant is to be used for the purpose of enhancing specialty crops in Florida. Financial stability of the Ag Commodities as a whole will directly influence and benefit the specialty crop commodities in Florida. A conference of this stature requires fixed costs for speakers, conference materials and the facility rentals no matter how many people attend. Registration fees or outside sponsors will be used to cover the cost of food and beverages associated with conference and to support any promotion of conference to non-specialty crop producers. There was differentiation between fees for specialty crop commodities and non-specialty crop producers. A higher fee structure for non-specialty crop producers will support any promotion or conference materials used for Ag commodities other than specialty crops producers.

<u>Significant contributions and role of project partners in the project.</u>
There was $32K raised in sponsorships from the following organizations. These funds were used to offset expenses that would not be covered by a grant such as food expenses for receptions, breaks or networking opportunities.

Project Approach

Florida Agriculture Financial Management Conference was held October 20-22 at the Omni Resort and Spa near Orlando, FL. See attached program below for complete program information and speaker credentials.

Florida Agriculture Financial Management Conference

OCTOBER 21– 22, 2013, OMNI ORLANDO RESORT AT CHAMPIONS GATE

Sunday, October 20

2:00pm – 6:00pm
Golf On Own The Omni Champions Gate

4:00pm – 6:30pm
Early Registration Opens

7:00pm – 10:00pm
Welcome Reception - Omni Suite 1646

Monday, October 21

7:00am
Registration Opens

8:15am – 8:30am
Welcome

8:30am – 9:30am
Prediction, Policy and Panic: What does a global focus mean for US Agriculture -
Dr. Michael Swanson, Wells Fargo
In many key commodities for Florida agriculture, global trade will be the key to rising prices and profits. However, global trade operates through the "lens" of currency exchange rates and trade policy. It will be important to track the key drivers of these factors.

9:30am – 10:30am
The Future of Florida Transportation and Infrastructure
Noname Downs, P.E. — Florida Department of Transportation, District Five
An overview of what is currently approved, "in the works", and more importantly, the inside scoop on what is planned and proposed for Transportation and Infrastructure in Florida in regard to the expansion of the ports and Florida's development as a hub to the world.

10:30am – 10:45am Break

10:45am – 12:00pm
Leveraging Emerging Media in an Agriculture Business Environment: Beyond Branding - *Summer Crenshaw — 8Media LLC*
Emerging media is recognized as today's front and center star in the branding and marketing arena, empowering organizations to communicate directly with their audiences. The new open dialog marketplace (#ODM) provides those within the agriculture business environment with immediate opportunities to enhance their results in many areas of their businesses including sales, customer service, public relations, recruitment, and research and development. In this 60 minute presentation, Summer takes participants on a deep dive into using social media as a business-to-business and business-to-consumer tool, addressing the most critical new media issues faced by the agriculture business sector.

12:00pm – 1:00pm

Lunch – Food Safety: Costs and Causes
Ben Merchant — NCSI Americas
Fad is defined as any form of behavior that develops among a large population and is collectively followed with enthusiasm for some period, generally as a result of the behavior's being perceived as novel in some way. So the question should be asked "Is Food Safety a fad?" And if not, what is behind the drive for buyer requirements falling in line with food safety standards? Is there any evidence that food safety audits make your product safer? This discussion over lunch will focus on these points and others.

1:00pm – 2:45pm
Finance for the Non Finance Manager I
Dr. Daryl Allen — UCF
Business owners and CFOs are tasked with making the tough calls when it come financial decision. Dr. Darryl Allen's presentation will explore cash conservation techniques that gauge wealth creation more efficiently than using the basic net income measures. This thought provoking session will challenge the way you look at finance with Dr. Allen's interesting and analytical style. You'll be sure to walk away with new tangible tools to better measure your financial decisions.

2:45pm – 3:00pm Break

3:00pm – 4:00pm
Tax Planning for Agribusiness – Navigating Recent Tax Law Changes and Reaping the Benefits of Tax Credits & Incentives
Tom Windram — McGladrey
Tom Windram, Partner in McGladrey's Washington National Tax Office and leader of the firm's federal tax credits & incentives practice will discuss several tax topics that have a current impact on agribusinesses, including: planning to minimize the impact of the new section 1411 Medicare tax, Affordable Care Act considerations for farm workers and federal tax credit/incentive opportunities for alternative fuels, renewable energy, research & development, domestic food production and agricultural chemical security.

4:00pm – 4:30pm
Field to Fork – A Chef's Wish List
Kevin Ryan — Corporate Chef's Association
The latest trend of farm-to-table is both a benefit and has proven to be problematic for the chefs who have been driving this movement for years. My session will bring the opinions of both independent restaurant chefs who are leading the way and large chain operators who are struggling to make it work in their environment. There are three key issues, communication, follow-through and costs. Handling of the product, packaging and shipping are vital to the success of a program for both the farmer and the chef in the kitchen. Food safety is also a huge concern that will be discussed in great detail.

4:30pm – 5:00pm
Overcoming Barriers and Achieving a Goal
Jodie Bernter — Author and Speaker

5:00pm – 6:30pm
Reception

6:30pm – 8:00pm
Dinner On Your Own

8:00pm – 10:00pm
Networking
Hospitality Room - OmniSuite - Room 1646

Tuesday, October 22

8:00am – 9:00am
State of the Fresh Produce Industry: Connections to Drive Innovative Thinking
Bryan Silbermann — PMA
The conversation will pose such questions as, "What are the global marketplace factors driving our business? How can we use innovative marketing techniques to increase demand for our products? How will foodservice help shift demand for fresh in our favor? And how will more women in positions of corporate leadership help us connect better to our customers and further drive profitability?" Bryan will rouse your curiosity, spark your imagination, fuel you with data and engage and challenge you. Come prepared to learn, share and grow.

9:00am – 9:30am

Numeric Nutrient Standards: Potential Risks/Potential Rewards
Mr. Rich Budell — FDACS
From the Everglades to the Panhandle: An overview of the water quality and quantity challenges facing Florida's diverse agricultural industry.

9:30am – 9:45am Break

9:45am – 11:45pm
Finance for the Non Finance Manager II
Dr. Paul Gregg — UCF
Part two of Finance for Non-Financial Managers will build on the concepts taught in Part 1. In this session, we'll cover topics including Introduction to Ratio Analysis, Forecasting and Cost of Capital/Capital Budgeting. Paul Greg will cover some higher level financial concepts with his wealth of knowledge in the areas of both accounting and finance. This course will go through the key financial statements and breaks down these concept to help financial managers make relevant and financially informed decisions. This session will also include a real world case study to illustrate how to analysis financial performance and determine the whether or not a business decision makes economic cents.

11:45am – 12:45pm
Lunch — Washington Update
John Sawercool — UBS
It seems that no economic sector, including agriculture, is safe from Washington these days. John will give a behind-the-scenes look at what we should expect from Washington policymaking in both the near- and short-term. Is Washington capable of showing some bipartisan spirit in addressing a wide range of issues, including a farm bill, fiscal policy, health care and immigration reforms, among others? Is there an end to the gridlock and what are its impacts on investors and those interested in Washington policymaking? John will cover a variety of policy and political issues as a part of his outlook on Washington.

12:45pm – 2:00pm
When Will the Fed Remove the Punch Bowl: Can Economic Growth Return to Trend Without Monetary Stimulus?
Dr. Ed Seifried — Seifried & Brew
The Fed has been trying to improve US economic growth and reduce our unemployment rate since the financial crisis of 2007-09. Zero interest rates, massive bond buying, and other monetary policy tools have all been used with varying degrees of success. The consensus among financial analysts and pundits held that the first move to reduce the monetary stimulus would occur at the September, 2013 policy meeting. The Fed elected at that point to not change course and continue to support the battle against unemployment. Many felt the Fed had correctly judged the fiscal slowdown to growth that was right around the corner in the form of a government shutdown. What comes next? Dr Ed will discuss these issues an more at our conference.

2:00pm – 2:15pm Break

Succession Planning: The Next G

2:15 pm – 3:15 pm
Nuts & Bolts
Ms. Lauren Detzel — Dean Meat
Studies show that less than half of all family businesses survive to the second generation and even less survive to the third generation. The importance of succession planning during the principal's life is critical to the survival of the business. This presentation will focus on a variety of issues that must be addressed to successfully transfer ownership and control of an Agriculture business to the next generation, including minimizing the impact of taxes, structuring ownership and control to protect the business during the principal's life and after retirement or death, managing family conflicts and maintaining financial security for the principal post-retirement or after ownership is transferred. Current and future business owners and leaders should not miss this presentation!

3:15 pm – 4:15 pm
Foundations for the Next Generation Leadership
Ms. Wendy Sage-Hayward — eFamilyBusiness.com
Keeping a family together as a working ownership group requires goodwill and hard work on all sides. Family firms need to build a strong family leadership team within each generation to respect and protect established family business traditions while recognizing the new opportunities that emerge in changing times and markets. We will explore the best practices for building strong leadership capacity in the next generation.

- Discover and expand our notions of what leadership means in a family business
- Explore recent discoveries about the brain and how this influences our understanding of leadership
- Examine leadership styles and challenges relative to the stages of family business ownership
- Appreciate the differences in style and leadership from the Baby Boomer generation to Gen Xers and Gen Ys
- Explore best practices in developing leadership capability in the next generation

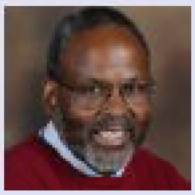
4:15 pm – 4:30 pm
Wrap up/Door Prizes

Florida Agriculture Financial Management Conference

OCTOBER 21– 22, 2013, OMNI ORLANDO RESORT AT CHAMPIONS GATE

MEET OUR SPEAKERS

Darryl Allen



Prof Darryl Allen teaches advanced managerial accounting in the Kenneth G. Dixon Graduate School of Business at the University of Central Florida. Prior to entering his PhD program, Prof Allen worked 28 years in the corporate environment. After graduating from the University of Cincinnati, he joined the Uniroyal Tire Company in Joliet, Illinois, where he worked on the internal audit staff until 1971. He joined Mobil Oil in 1971 as a construction team auditor in Joliet, Illinois, and moved through several positions over the next 25 years. Prior to retirement from Mobil, he was the Accounting Executive for Nigeria, Indonesia, and Qatar, and actually lived in Nigeria for six months.

Prof Allen received his PhD from George Washington University in June 2003. He received his MBA from Marymount University of Virginia in May 1992 and his BBA in Accounting from the University of Cincinnati in June 1967. He has been a member of The American Institute of Certified Public Accountants in Virginia since 1987.

Jodi Bainter

Jodi started sharing her family's story through speaking engagements in 2006 and in December of 2012, she published the book, Make It Morning, chronicling her family's journey. In 2011, she co-founded the A3 Foundation, Amputees Active Again a nonprofit organization to provide prosthetics and resources to amputees. Jodi is a graduate of Central Michigan University and has enjoyed a great career for the last 15 years at the Walt Disney Company. Jodi, Brett and their son Jake live in Orlando, Florida. Their inspirational story has been featured in People Magazine, ESPN, NPR, St. Pete Times and more.

Summer Crenshaw

An innovator in business development with over a decade of experience in emerging media, marketing and public relations, Summer has driven exposure for businesses diverse in both industry and size. Coupled with a passion for driving consumer affinity and creating interactive buzz in the marketplace, Summer drives her clients' messages to their target audiences.

As a part of the leadership team at Hi Frequency Marketing, Summer developed unique tactics to drive online and offline brand engagement. In this role she worked with major and independent record labels, consumer product firms, video game manufacturers and major motion-picture studios. Her efforts contributed to media exposure featured on outlets such as CNN News, Inc. Magazine, Brandweek, Billboard, Advertising Age, Adweek, and The Economist. Leveraging this experience, Summer joined Career Builder.com as part of a leadership team that created and developed a new multi-million dollar enterprise market for the company. Working with a high-performing sales team and Fortune 500 clients, Summer brought a unique perspective and approach to employment branding and execution that energized recruitment campaigns.

As Director of Marketing at Relish Restaurant Group, Summer pioneered transmedia campaigns that propelled brand awareness for 9 distinguished fine dining brands. Her strategies attracted national notoriety from such restaurant outlets as Zagat, American Farm-to-Table Association and McCormick's Taste Makers. Summer also served as a board member for Greater Cincinnati Independent Restaurant Association and Farmers' Fair, and was also a founding member-at-large for Christ Heart Healthy Restaurant Partnership program that placed heart-healthy menu items in local restaurants that were endorsed by Christ Hospital, one of the top cardiac hospitals in the country.

Lauren Y. Detzel

Ms. Detzel is a shareholder and chair of Dean Mead's Estate and Succession Planning Department. She is Board Certified in Wills, Trusts and Estates by The Florida Bar Board of Legal Specialization. Ms. Detzel specializes in techniques to reduce or avoid paying estate tax such as family limited partnerships, grantor retained annuity trusts (GRATs), sales to intentionally defective trusts, charitable trusts, lifetime gifts and generation skipping trusts. Much of her practice involves planning for the succession of closely held or multi-generational family businesses.

Ms. Detzel also handles many contested tax matters in the transfer tax area, ranging from audits of returns and administrative appeals with in the IRS to Tax Court and Federal District Court litigation.

Noranne Downs

Noranne Downs is a graduate the University of Massachusetts, formedly called Southeastern Massachusetts University, with a degree in Civil Engineering. She was the first female to receive a Civil Engineering degree from Southeastern Massachusetts University. Ms. Downs is a Registered Professional Engineer in the state of Florida.

Ms. Downs started with the Florida Department of Transportation in 1991 as a project manager and became the District Five Secretary in October 2006, managing up to a $1 billion annual district budget. As District Secretary, she is responsible for all Florida Department of Transportation operations for the nine-county Central Florida area.

Ms. Downs also serves as:

- Chief Executive Officer (CEO) for SunRail (Central FL Commuter Rail)
- Board Member for LYNX, Central Florida's regional transit system
- Board Member for the Orlando-Orange County Expressway Authority (OOCEA) and also serves as:
- Member of the OOCEA Audit Committee
- Member of the OOCEA Operations Committee
- Former Treasurer of the OOCEA Board & former member of the OOCEA Finance Committee
- Board Member for Osceola County Expressway Authority (non-voting)
- Board Member for MyRegion.Org

Paul R. Gregg

Paul Gregg is a faculty instructor and co-Chair of the Department of Finance in UCF's College of Business. He teaches Personal Finance, Intermediate Corporate Finance, and Financial Statement Analysis. Prof. Gregg started his career with Price Waterhouse, where he rose to Senior Audit Manager. He audited a variety of Fortune 500 clients and also served an international tour of duty. He subsequently joined CNG Producing Company, an oil-and-gas exploration company owned by Consolidated Natural Gas. While there, he became Senior Vice President and CFO, with responsibility for all financial, planning, and marketing functions—including hedging and derivative trading activity. After CNG was acquired, he joined Road Runner High Speed Online, where he was Senior Vice President, responsible for all accounting, information technology, HR, tax, and procurement functions.

Prof. Gregg earned the B.S.B.A. (summa cum laude) and M.S.A. degrees from UCF. He is a Florida CPA and also specifies CPO consulting work. He is currently CFO for Rini Technologies, Inc., a former UCF incubator company involved in engineering research for the Department of Defense. He is also a 2004 inductee into the UCF College of Business Administration Hall of Fame and was the FMA Finance Professor of the Year at UCF in 2006/2007. He also serves on the UCF Foundation Investment Advisory Committee.

Ben Merchant

An economist by trade, Ben became fascinated with the food industry 4 years ago when he moved to the US when relocated by his work. All told, Ben has been working within the certification industry for the past 7 years, and his presentation today will be a look at the causes and costs of food safety.

Kevin L. Ryan

Kevin L. Ryan is the current CEO/Executive Director of the International Corporate Chefs Association plus is the founder and president of MARKETING A LA CARTE. MARKETING A LA CARTE is a Marketing and Public Relations firm specializing in the foodservice industry and exclusively representing the culinary profession and foodservice associations for more than 22 years. Clients have included the American Culinary Federation, U.S. Culinary Team USA, World Association of Cooks Societies, National Restaurant Association, Florida Restaurant Association, EPCOT Food and Wine Festival, Chefs Collaborative, The Culinary Institute of America and the International Corporate Chefs Association. As of September 2013, Ryan is starting another new association for the next 200 chains. The Chain Menu Innovators Association is designed for the growth chains who rank from 201 to 400 in annual sales on Technomic's top 500 chain listing.

Wendy Sage-Hayward

Wendy is a consultant at the Family Business Consulting Group. She has 25 years of experience working with business leaders, family firms, and boards. She serves clients across industry facilitating meaningful conversations with multi-generational families on matters relating to firm continuity, next generation preparation, governance and, when needed, conflict resolution.

Wendy has a Masters Degree in Family Systems Counseling Psychology from the University of British Columbia and is currently completing an Executive Masters Degree in the Neuroscience of Leadership from the Neuroleadership Institute. She is an adjunct professor at the University of British Columbia's Sauder School of Business guiding programs for business families and advisors in the Business Families Centre.

Wendy is a member of the board of directors for her family agribusiness firm which consists of approximately 45 cousin

partner and recently celebrated its 128th Anniversary. She lives in Vancouver, British Columbia with her husband and two children.

John Savercool

John Savercool serves as Senior Lobbyist and Managing Director of UBS Americas Inc., which covers all of the primary business units within UBS, including the Investment Bank, Wealth Management and Global AM. John directs the firm's lobbying, political and policy advocacy efforts at the federal level. John's lobbying targets to date have included all major banking and securities issues, regulatory reform in financial services and tax legislation, among others.

John is a veteran of Washington of 31 years. He began his career with U.S. Congressman Mike Oxley of Ohio and former chairman of the House Financial Services Committee. John then embarked on a 17-year career with Texas Senator Phil Gramm, the former chairman of the Senate Banking Committee. John also served as chief of staff for Texas Senator Kay Bailey Hutchison in 1998. From 1999 to 2003 he served as Vice President for federal affairs for the American Insurance Association. John lives in Washington, DC with his wife and two daughters.

Dr. Edmond J. Seifried

Over the years, Dr. Ed Seifried has touched the hearts and minds of almost every director and CEO of community banks across the nation. While recognized for his keynote speeches, Dr. Ed is a valued educator for community bank directors, CEOs, senior management, and up and coming community bankers.

Carrying on his tenure as Professor Emeritus of Economics and Business at Lafayette College, Dr. Ed has led the educational programs as Dean for the West Virginia Banking School and the Virginia School of Banking. He has been on the faculty of many banking schools, including Stonier and the Graduate School of Banking at LSU.

Most recently, Dr. Ed is the Executive Director of the Shebunoff Affiliation Program. This highly acclaimed program provides high performance education and idea exchanges for community bank CEOs, Lenders, and Technology/Operations Officers.

Having served as a community bank director, Dr. Ed believes that one has to experience the dynamics of being a community bank director to fully understand their needs to create the bank's strategic plan, assess risk, set risk parameters, monitor risk, and to be thoroughly educated.

Bryan Silbermann

Mr. Bryan Silbermann serves as the Produce Marketing Association's (PMA) Chairman and Chief Executive Officer and served as the President from 1996 until August of 2013. Since joining PMA in 1999 Mr. Silbermann has been instrumental in launching and developing new programs and services for the fresh produce and floral industry including: Produce for Better Health Foundation, PMA's Foundation for Industry Talent, Center for Produce Safety at UC Davis, PMA's first affiliate PMA Australia-New Zealand, Research into consumer demand and groundbreaking trends, Standardized coding systems (PLU and UPC), Produce Traceability Initiative and Food safety communication campaigns. He is a frequent and sought-after speaker. He has been interviewed by media worldwide. Supermarket News recognized Mr. Silbermann as one of the top fifty "power players" whose actions drive the food industry. Mr. Silbermann studied from the University of Chicago and Oxford University, England.

Michael Swanson Ph.D.

Michael Swanson is an agricultural economist and consultant for Wells Fargo, the largest commercial agricultural lender in the United States. Based in Minneapolis, his responsibilities include analyzing the impact of energy on agriculture, forecasting for key agricultural commodities, such as wheat, soybeans, corn, and cotton, and livestock sectors, such as cattle, dairy, and hogs. Additionally, he helps develop credit and risk strategies for Wells Fargo's customers, and performs macroeconomic and international analysis on agricultural production and agribusiness. Michael joined Wells Fargo in 2000 as a senior economist.

Prior to joining Wells Fargo, he worked for four years at Land O' Lakes, a large national dairy cooperative supervising a portion of the supply chain for dairy products, and four years in South America with Cargill Cafetera de Manizales S.A. His areas of responsibilities included grain imports and value-added ingredient sales.

Michael received undergraduate degrees in economics and business administration from the University of St. Thomas in St. Paul, Minn., and both his master's and doctorate degrees in agricultural and applied economics from the University of Minnesota.

Tom Windram

Tom is a Partner in the Washington National Tax office of McGladrey LLP and also the national leader for the Federal Tax Credits and Incentives specialty line which includes extensive work in renewable energy credits & incentives – qualification / investment structures for Solar, Wind, Biomass, etc.

Tom often gets involved in tax credit projects for key clients. Prior roles that Tom held at McGladrey include leading the accounting for income taxes practice and tax technology lead.

Prior to joining McGladrey, Tom spent eight years at Deloitte where he led the national software research tax credit practice. Before that, Tom was at KPMG for three years, where he specialized in accounting for income taxes and corporate tax. He holds a MS in Taxation from Robert Morris College and BS in Accounting from Indiana University of Pennsylvania.

Goals and Outcomes Achieved

- The planning committee met regularly to plan the details of activities that would take place during the program as well as develop the content of the program. Once the program was determined, time was spent contacting speakers, coordinating travel and planning the details at the Omni Resort and Spa.

- Solicitation of sponsorships, development of the website to promote the program and registration format was created. A large publisher of a specialty crop magazine signed on to develop the website and assist on promoting the program.
- Promotion of the program took place consistently from June until the October conference.

In order to achieve the performance goals and measurable outcomes for the project, evaluation forms were generated and distributed to attendees to receive their feedback. Attendees were asked to provide three key take-a- ways that they learned and would be able to take back to their businesses.

Conference Evaluations: Not all 150 attendees returned surveys but based on the ones that were returned; we felt it important to share the evaluation results and comments about this and future programs. Approximately 30% of the attendees provided a response to the question regarding a takeaway that they were going to try and implement in their businesses. The conference has not done follow up to see if those things were implemented. Their responses are listed in the evaluations.

RATE THE SESSION

	Excellent	Good	Average	Fair	Poor
Monday Program					
Prediction, Policy and Panic: What does a global focus mean for US Agriculture Dr. Michael Swanson — Wells Fargo	26	19	4		
The Future of Florida Transportation and Infrastructure Noranne Downs, P.E. — Florida Department of Transportation, District Five	5	15	18	8	3
Leveraging Emerging Media in an Agriculture Business Environment: Beyond Branding Summer Crenshaw — tMedia LLC	27	17	3		
Lunch – Food Safety: Costs and Causes Ben Merchant — NCSI Americas	6	16	20	4	
Finance for the Non Finance Manager I Dr. Daryl Allen — UCF	9	24	10	3	1
Tax Planning for Agribusiness – Navigating Recent Tax Law Changes and Reaping the Benefits of Tax Credits & Incentives Tom Windram — McGladrey	21	15	5	1	2
Field to Fork – A Chef's Wish List Kevin Ryan — Corporate Chef's Association	13	18	9	2	
Overcoming Barriers and Achieving a Goal Jodi Bainter — Author and Speaker	23	14	4	2	

TUESDAY PROGRAM					
State of the Fresh Produce Industry: Connections to Drive Innovative Thinking Bryan Silbermann — PMA	37	7	1		
Numeric Nutrient Standards: Potential Risks/Potential Rewards - Mr. Rich Budell — FDACS	14	24	3		
Finance for the Non Finance Manager II - Dr. Paul Gregg — UCF	13	19	12	2	
Lunch — Washington Update - John Savercool — UBS	26	17	4		
When Will the Fed Remove the Punch Bowl: Can Economic Growth Return to Trend Without Monetary Stimulus? Dr. Ed Seifried — Seifried & Brew	42	7			
Nuts & Bolts - Ms. Lauren Detzel — Dean Mead	30	16	2		
Foundations for the Next Generation Leadership Ms. Wendy Sage-Hayward — eFamilyBusiness.com	31	15			

Please give us your overall thoughts on the concurrent educational sessions:

	Very Satisfied		Satisfied		Not Satisfied
Rate your level of satisfaction…Did handouts add value and quality to the sessions	5 **(20)**	4 **(15)**	3 **(9)**	2 **(0)**	1 **(2)**
Would you attend a financial management conference like this in the future?	YES **(45)**	NO **(2)**			
Every year?	YES **(31)**	NO **(9)**			

GENERAL INFORMATION:

Please provide three key take-a-away's that you have learned and will be able to take back to your businesses.

Economic indicator – Dr. Seifried *overcoming obstacles * Transportation info was pertinent & timely for me * Social Media * Social Media-how important! * Uncertainty regarding government's ability to correct itself * family business planning tactics/strategy * only a fool can be certain, it takes wisdom to be confused *Watch unemployment rates to affect rates (lending)* Next generation leadership * Social Media Lecture gave some good points
* Applicable tax credits * Build my online presence & join social media platforms. * caution moving forward due to uncertainty for next 5 years *The research which will continue * Tax planning ideas * check to see if all tax credits are being used *media presentation gave me some information to use back at work. * Buy equipment you have been waiting to purchase soon rather than later. (interest rates) *save a dollar now *Packaging * better understanding of obstacles/challenges facing our farmers (water transportation) * Interest rates accounting* Interest Rates will rise when unemployment reaches 6.5% * Marketing strategies including social media & changing attitudes about production. * watch economic indicators for clues to economy * Tax credit will review * Ag has bright future but will tax innovation * Emerging Media was surprisingly pertinent * future trends/food safety of agriculture * Tax planning/Estate planning is crucial * Seifried economic indicators *Google Alerts *succession planning * I'm going to look @ solar as

an income stream. * Social Media skills * Value of finding your people-asked for help * networking a must (find your people) *Forecast ideas using multiple factors * better understanding of Ag trends * PMA presentation * Branding on website – We need to include consumer experience * use social media * Save a dollar * marketing strategies including new attitude (being more involved) & social media * farming for Chefs * Google.com/Alerts *various tax credits available for agribusiness. * Hire on accountant! * Social Media strategies * economy getting better * Florida has done an Excellent job re: NNS considering the fact that we are surrounded by ocean * Tax credits * Social marketing is becoming essential *leadership types * tax planning * Look to partner with celebrity that wants to Farm. * (that would be fun) *Estate planning awareness * State has truly taken on the responsibility for our water future. * Rethink my leadership role in our family business. * packaging * Google alerts * farther insight into family business including strategies to combat the obstacles of passing a business down to the next generation. *Transparency is a must * options for business structure in regards to estate planning * Big movement for farm to table * You get what you pay for * Chefs need to work on farm to be able to better understand the issues they have with local ag. * Conference stimulated and reinvigorated me for my business. * Made new business contacts. * Got more information on projects we are currently working on. * Become more familiar with water management. * Information on buying local to help my farmers. * Social media access. * Cash flow planning. * How to approach durable goods acquisition. * Better awareness of industry groups I can use in my jobs. * I have extended my rolodex – better connections.

What was the main reason you attended this program? Estate planning, tax strategies * Education and contacts *Understand legal & financial structures *connect with others in Ag * for information regarding transportation contracts available for my landscape contracting firm * Bank sponsorship Gain as much knowledge as we can for the agriculture field that we represent to become better grower, packer, & shipper * Work related * Learn about an arrange of topics affecting today's Ag businesses * good continuing education for my role in the family business (CFO) *education *Network * Topics were relevant to me. * Networking * Succession/ generational information * Continued business/personal development. * looking to the future of Ag. And to a new future of existing agriculture business. *networking * To learn Agricultural succession plan * I'm new to Ag and this was a way for me to learn some of the industry while keeping my finance focus * Check it out - did not know what to expect * I attended for the family business aspect and family succession. * Continued hearing –hearing about current events. (Financial/government) * Continuing education. * To be more effective in financial management at our farm. * To learn more about new ideas for agriculture in FL. * Networking; then second CPE * To stay current on items affection the Ag industry to better help serve clients. * Ag Tax Incentives & Credits, Ag Accounting Issues * FFVA * Gain Industry Knowledge * Networking & gaining knowledge * gain more insight on the current & future social, environment, financial & economic issues surrounding agribusiness.* Relevant for job seemed interested* Increase financial knowledge in the agriculture section. * .*Want to be up to date on current agriculture concerns, especially with public policy, world markets, water, etc in order to make land buying/selling decisions. * Increase knowledge for my business. *Networking and client facing. * Gain tools for planning/ongoing new farm operation. * I work and serve clients in this industry.

What topics would you like to see on the program for future programs? More practicality, tax updates, health insurance, immigration issues. *Understand legal & financial structures *Legal, financial, marketing. * More financial help that is practice not theoretical * what does a bank look at in financing the agricultural industry. * Estate Planning wills, Farm Liability (Ins.) Social Media * production costing * A real life lender prospective. Maybe a couple case studies & what banks look for * Pathways to more information relevant to my business * Continued business/personal development. * Labor cost/attracting labor/HZA * Foundations for next generation leadership. Numeric Nutrient family secession (going to contact Wendy) *Nursery related topics. (industry recovery – ideas for helping us move forward). * more outlook into future economic conditions. * option & Future* tax, economy, Energy * I thought topics were good*
How to monitor prices: fruit (citrus, blueberries, strawberries, etc.)*Finance 101, Basic overview for small to large business. * Ag lending products. * Leveraging social media market-estimation of width and depth. *

Do you have any speaker recommendations for the topics that you mentioned above? Adam Putnam – Fresh from Florida and food to school program * please bring Ed Seifried back w/ a longer time allocation *Local Lenders who have good speaking presence * Joel Salaton and someone from Legal Defense fund. Weston a price co-ops is another connection for small scale farmers. There was a reference to a Millennial Mom you could have a panel of moms for people to ask questions to. * Marketing * really enjoyed Bryan Silbermann's presentation – he definitely made me see a new way of viewing marketing. * Dr. Kohl, Actual Ag Producer that has been successful.

What new concept that you learned do you value the most? Tax strategies, credits available *Valuation, succession planning * good general knowledge but limited specifics *emerging Media's ability to put consumer in control of markets & I am sitting on a gold mine and construction money in transportation yes going after transportation minority % in construction.
* water management, marketing of food products from the farm, social media use, economic update * hard to choose specific area – All were very helpful and interesting *Economic indicators *still sinking in… * Having a clear picture forward before acting * seeing the global movement and how we are once again following Europe *tax planning around Ag * The PMA presentation was thought inspiring for me and where to go in the future w/our family business. * forecasting, more about family planning – moving leadership, ownership to next gen. * The better understanding of the economic/social/environment obstacle focusing farmers and strategies to overcome. * Future of Natural gas, tax planning *Generational planning Family Dynamic *Tax & Estate planning (the importance of) & current economic issues facing FL agriculture* Many new good things to think about.* Lake Okeechobee water issues.
* The better understanding of how the Fed. Values and manipulates the economy and how that relates to my own farm management. * The global impact agriculture has on Florida.

Are you going to change the way you do a specific task in your business? If so, what? Social Media * social media-telling our story * normalize analysis of F/S prior to analyzing * Yes generational planning * working on developing attributes of leadership styles that

don't come natural to me * Nope, but will add to it * No * Work on branding and connecting with customers * yes, marketing and planning the business. * Yes Evaluation of needs.

Comments: more Dr. Seifried! Two parts? Overview of eco indicators, then applied to business? Ag? breakout to apply what was learned on more specific basis Email out power points too. * Give Seifried more time, take away lunch speakers so that we can network during lunch * Would like electronic slides as reference/resource in consulting clients (U.S. SBA) p.rivera@unf.edu *The room was very cold * Hard to see slides & even harder to read slides provided but thank you-Regina for allowing me this great opportunity. This conf. has inspired me to focus my business on what I can accomplish following the transportation dollar available in the near future. * The program should conclude after Tuesday lunch. The overcoming barriers segment was not very valuable in terms of takeaways. *Had to leave early morning of the 22nd would like to be able to purchase the video or even audio of the event for other staff to see or hear for reference material * Need more social Media info/instruction *excellent program, maybe one or two less speakers w/ additional time for each. * Thank you! * Day 2 better than day 1, still lots of room to make things better * I heard others saying that the conference was lacking in networking opportunities. * Good job negotiating ratio at hold. * You might want to change date only because a lot of opens in agenda are in their busy time during late Oct. maybe August? Take a poll. Also we are promoting agriculture and we serve donuts for snacks...maybe fresh fruit would be better. Room was too cold. I must say the Finance for non finance was not a value add to me. I gained nothing from the presentations. Financial forecasting from Dr. Gregg I enjoyed the most, but entire presentation a little long hard to keep tuned in. Loved the final presentation by Wendy. * I like the two day format. * Please do print the hand out in color & or larger font. Even better video the conf. and make it available to us online. * Thank you! * Overall – good conference – suggestions: sponsor infomercials in between speakers; not sure the accounting presentations were appropriate-too lite for accounting professionals and maybe irrelevant for business owners?? * Excellent location! Food was superb! Really enjoyed Wendy Hayward – This topic is very critical for all us to understand. * Keep 2 days* good location, facility & food. * Larger printer slides, be able to use AMEX for registration. * There was adverse set of topics and speakers which I found interesting. Nervous about traffic leaving so late in afternoon.
* Future of Florida transportation – How is this relevant to Agriculture Producers? It came off as a Scott pep rally. Paul Gregg > Excellent and Invaluable info! * A few speakers were not exactly relevant for the advice. * Perhaps breakout groups by commodity – sharing of best practices.

Beneficiaries

The following associations/organizations were participating partners:

- Linda Reindl, Florida Nursery, Growers and Landscape Association, lreindl@fngla.org
- Regina Thomas, Farm Credit of Central Florida, RThomas@FarmCreditCFL.com
- Clay Worden, McGladrey, Clay.Worden@mcgladrey.com
- Liz Felter, University of Florida/Lake County Extension, jpopenoe@UFL.EDU
- Florida Citrus Mutual – mikes@flcitrusmutual.com
- Florida Fruit and Vegetable Association – Mike Stuart, mike.stuart@ffva.com
- Florida Sod Growers Cooperative – Betsy McGill, flsodgrowers@aol.com
- Dean, Mead, Egerton, Bloodworth, Capouano & Bozarth, P.A., Karen Keene, KKeene@deanmead.com
- MetLife, Chuck Cruse - ccruse@metlife.com
- Josh Culpepper, Prudential Insurance – Ag division - josh.culpepper@prudential.com

Each of the above organizations participating in supporting the conference either by sharing the information to their members, providing financial support or taking an active role in participating in the program.

Anytime you strengthen the financial positions of industry members, the potential for a strong economic impact is present. There is not quantifiable data to prove that industry members have taken the information back to their businesses and utilized what they have learned. There is only the acknowledgement from attendees that they have identified three key take-a-way's from the conference.

Lessons Learned

The lesson learned from holding this conference multiple times is that the registration fee is a major factor in whether someone attends – especially our young, beginning farmers with more limited resources. The fee for this conference was a little higher than prior conferences and may have deterred a few attendees that might have come if the price point was lower.

There was a challenge in determining how the meet all the needs of all specialty crop commodities. Each commodity has slightly different issues to address and the conference planning committee had to determine if the conference would stay more generally focused in the content. It also had to determine how much global and national economic information was important to Florida commodities. Break out sessions on management topics specific to individual commodities would be good to incorporate in future conferences.

Positive outcome would be very similar to the challenge. Because the commodities all have slightly different issue, putting all of them in the same room and giving them an opportunity to interact with other commodities that maybe they would normally interact with…proved to be very positive.

Additional Information

The conference was marketed through various channels including the following:

Website – www.fafmc.org was secured to promote the program. Southeast Farm Press and other industry electronic publications promoted the conference and also provided coverage at the program. Ag commodity associations also promoted to their members. Farm Credit did a special mailing promoting the conference to all of their membership as well.

Farm Credit – a special mailing was sent to over 2900 Farm Credit customers throughout Florida at the expense of the Farm Credit Associations of Florida. Also, extended personal invitations.

FFVA – Special email blasts were sent directly to FFVA members and also included information in The Harvester email publication. The FFVA Emerging Leadership Development Group was offered scholarships to cover conference fees for attending. Promoted to members at the annual FFVA convention.

FNGLA - Special email blasts were sent directly to FNGLA members and also included information in Ben's Babbles email publication.

Dean Mead – Personal invitations and emails sent to encourage clients to attend.

McGladrey - Personal invitations and emails sent to encourage clients to attend.

Florida Department of Agriculture and Consumer Services – Included in email blasts of Adam Putnam's Friday news blast.

Also, included in publications from the following sources:

- Florida Farm Bureau magazine
- Central Florida Ag News
- Florida Citrus Mutual and affiliated citrus groups
- Meister Media publications – Florida Grower
- Prudential Insurance

Contact Person

- Regina W Thomas 407.721.4687 RThomas@FarmCreditCFL.com
- Sonia Tighe 813.975.8377 Sonia.Tighe@FFVA.com

Appendices to FDACS 2010 Specialty Crop Block Grant Final Report

Appendix to Project (2): Florida Sweet Corn Exchange - Florida Sweet Corn Exchange: Consumer Research and Case Management	2
Appendix to Project (13): University of Florida - Management of Citrus HLB by Overcoming the Salicylat Hydroxylase	122
Appendix to Project (14): University of Florida - Bring Marketmaker to Specialty Crop Growers in Florida and Extend it into Ornamental Crops	134
Appendix to Project (15): Miami-Dade County, Florida - Redland Raised – "Fresh from Florida Project"	218
Appendix to Project (20): Florida Certified Organic Growers and Consumers, Inc. - Organic Systems Management Education Initiative for Florida Specialty Crop Producers	222
Appendix to Project (22): University of Florida - Protective Structures for Crop Diversification, Improved Fruit Yield and Quality and Appropriate Water Management and Freeze Protection	251
Appendix to Project (23): University of Florida - A Safe Harvest: Reduction of Tomato Susceptibility to Contamination with Salmonella through Cultivar Selection, Optimized Fertilization Regime and Education	266
Appendix to Project (26): University of Florida - Florida Small Farms - Capacity Building, Training and Outreach	553

Appendix to Project (2): Florida Sweet Corn Exchange - Florida Sweet Corn Exchange: Consumer Research and Case Management

sunshine sweet

Fresh from the Sunshine State

Enjoy Fresh Sunshine Sweet Corn!

From our family to yours!

Did You Know?

Sunshine Sweet Corn stays sweet and tender when refrigerated!

Keep It Fresh!

Store in tray packs or husk and wrap loosely in plastic.

Did You Know?

Sunshine Sweet Corn is a good source of Vitamin C, Thiamin Fiber & Folate.

Good For You!

Only 75 calories per medium ear.

Grilled Fresh Sunshine Sweet Corn
It's so good!
sunshine sweet
Fresh from the Sunshine State

Grilling Sunshine Sweet Corn

A great accompaniment to any meal.

- ***Out of the Husk:*** for a slightly charred, smoky flavor. Brush ears with melted butter or flavored oil; grill turning often until kernels are golden, 7 to 10 minutes.
- ***In the Husk:*** for a more intense corn flavor. Pull back the husks and remove silks; replace husks and tie in place with a strip of husk or string. Soak in water for 10 minutes. Grill, turning often, for 7 to 10 minutes.
- ***In the Foil:*** for a particularly moist corn that can be prepared ahead. Place each husked ear on a square of foil; brush with butter (plain or seasoned with garlic and/or herbs), barbecue sauce or flavored oil; wrap ears. Grill turning often for 7 to 10 minutes.

To keep Sunshine Sweet Corn sweet and tender refrigerate in plastic bags.

For more information and cooking ideas visit www.sunshinesweetcorn.com

Super Spreads

Herbed

Combine 1/4 cup olive oil or softened butter, 2 tablespoons grated Parmesan cheese and 1/2 teaspoon dried oregano or, omit cheese and add 1 tablespoon chopped dill.

Mustard Glaze

Blend 2 tablespoons Dijon-style mustard with 4 tablespoons softened butter or 1/4 cup apple cider. Or just brush cooked ears with honey mustard.

Sesame Brush-on

Brush cooked ears with a light coating of toasted sesame oil.

Pesto

Brush ears lightly with homemade or prepared pesto before cooking; after cooking, moisten ears with pesto.

BBQ Glaze

Heat 1/4 cup butter with 1/4 cup barbecue sauce; spread on corn before or after cooking.

Southwest Spread

Combine 1/4 cup mayonnaise with 3/4 teaspoon Southwest seasoning blend or chili powder and 2 teaspoons lime juice; brush on corn before cooking.

Fat-Free Rub

Mix 1 teaspoon each ground cumin and dried crushed cilantro leaves, 1/4 teaspoon salt and 1/8 teaspoon ground black pepper with 1-1/4 teaspoons water. Rub on corn before cooking.

Quick Corn Suppers

Corn & Shrimp Stir-Fry

Cut corn ears crosswise in 2-inch rounds and stir-fry with snow peas and chopped green onions in a little vegetable oil. Stir in shelled shrimp; cook just until pink. Season to taste with a prepared stir-fry sauce.

Microwaved Sausage, Corn & Cabbage

Cut corn ears crosswise in sections and combine with thin cabbage wedges and chunks of fully cooked sausage (such as kielbasa) in a microwave-safe dish. Season to taste with salt and pepper. Loosely cover; microwave on high until ingredients are hot and the cabbage is just tender, about 5 minutes.

Barbecued Chicken with Fresh Corn

Arrange corn ears and fully cooked chicken quarters or breasts in a broiler pan. Brush with barbecue sauce or salad dressing. Cook at 425°F until chicken is heated through and kernels begin to brown, about 10 minutes.

Kernel-Cutting Hints

- On a cutting board, lay a husked ear of corn horizontally. Starting at one end, guide your knife along the length of the corn ear letting the kernels fall to the board. Rotate the ear slightly, resting it on the area just cut. Continue until you remove all kernels.
- For a creamier mixture, cut only the tips of the kernels then stand ear upright and use the back of the knife blade to scrape the milk from the cob. Simmer the cobs in cooking water or soup to extract all the good corn flavor.
- If you enjoy fresh corn kernels frequently, consider buying a kernel-cutting utensil in a kitchenware store or your supermarket. They're fun and easy to use!

Fresh Corn Salsa

1 medium ear yields about 3/4 cup kernels

Cut kernels from 2 ears of fresh Sunshine Sweet Corn and toss with 1 can (about 14 ounces) rinsed, drained black beans, 1 diced mango, 3 tablespoons lime juice, 1 tablespoon olive oil, a thinly sliced scallion (green onion), 1 teaspoon chopped fresh or pickled jalapeño and 1/4 teaspoon salt. Serve with fish, chicken cutlets or tortilla chips.

sunshinesweet℠
Fresh from the Sunshine State

SUNSHINE SWEET CORN
Marketing Department
320 W. 13th Street, 7th Floor
New York, NY 10014

www.sunshinesweetcorn.com
info@sunshinesweetcorn.com

Sunshine Sweet Corn

Any time, any place!

- Grilling & other quick methods
- Best corn on the cob spreads
- Three one pot, suppers
- Corn-ucopia of kitchen tips

sunshinesweet℠
Fresh from the Sunshine State

Cornerstone *of Civilization*

Everyone's loved corn for ages. That's not just a figure of speech—it's been a staple throughout the Americas for thousands of years.

Sunshine Sweet varieties have come a long way from traditional crops of maize and even from the corn grown 20 years ago. Sunshine Sweet Corn is sweeter to begin with and stays sweet longer—up to a week when refrigerated. It's a hybrid variety grown through traditional breeding methods, not genetically modified.

Best of all, because Sunshine Sweet Corn is harvested in Florida from October through May, we can enjoy the sweet taste of summer all year long!

sunshinesweet℠
Fresh from the Sunshine State

Shopping & Kitchen Tips

Pick the color you like best-yellow, white or bicolor—they all taste equally sweet. There are other choices, as well. Sunshine Sweet Corn is sold in the husk, loose or in mesh bags; husked or semi-husked ears can be purchased in tray packs or microwave-ready packs.

Refrigeration preserves the freshness of Sunshine Sweet Corn by slowing down its respiration rate. If you're not serving the corn today, husk the ears and place them loosely in a plastic bag or damp paper towels before refrigerating.

Grilling, Outdoors and In

If you haven't tried grilled corn, you're in for a treat! Here are three ways to do it.

Place husked ears directly on the grill for better bronzing of the kernels and deliciously smoky flavor.

Outdoors: Grill, turning often, until kernels start to turn golden brown.
Indoors: Cook corn on a stove top grill pan or broil 6 inches from the heat source.
Tip: To prevent corn from sticking on the grill, brush corn or grill with oil.

Grill corn in the husks for intense flavor and perfectly tender kernels. To prepare the ears, pull back the husks and remove silks; replace husks and tie in place with a strip of husk or string. Soak in water for 10 minutes.

Outdoors: Grill, turning often, until husks are charred and corn is hot, 7 to 10 minutes.
Indoors: Broil, turning occasionally, until husks are charred and corn is hot, 7 to 10 minutes.
Tip: For easy eating, pull back the husks and tie ends together to form a handle.

Wrap husked ears in foil for ultra-moist corn that can be prepared ahead. Lightly brush corn before or after grilling with melted butter, oil or seasoned spread.

Outdoors: Grill, turning often, until heated through, 7 to 10 minutes.
Indoors: Bake corn at 400°F.
Tip: Great on the go for picnics, tailgating and camping

More Super-fast Methods for Sunshine Sweet Corn

7 minutes

- Roast corn in a shallow baking pan at 500°F, turning once.

3 minutes

- Steam corn over boiling water in a covered saucepan.
- Skillet-steam corn in a covered skillet filled with 1 inch of boiling water.
- Cook corn in boiling water.

2 minutes

- Microwave corn on high after wrapping individually in damp paper towels or rinsing in water.

2 seconds

- Toss raw kernels into salads, relishes, salsas, soups and stews.

Microwave Sunshine Sweet Corn

Ready in minutes!

sunshine sweet

Fresh from the Sunshine State

Tips for Microwaving Supersweet Corn

Yellow, bicolor and white varieties are equally sweet and can be microwaved for 2 minutes per ear using any of the following methods. Seasoned butters and oils can be added before or after cooking.

- ***In the Husk:*** Cook as is, or with silks removed.
- ***In a Paper Towel:*** Husk, rinse and wrap each ear with a damp paper towel.
- ***In Wax Paper:*** Husk, rinse and wrap each ear in wax paper.
- ***In a Microwave Dish:*** Husk, rinse and place ear (s) in microwave-safe dish covered withwax paper or paper towel.
- ***Tip:*** If your microwave does not have a rotating tray, turn ears over and rearrange half way through cooking.

FAT-FREE SOUTHWESTERN RUB is a delicious seasoning blend for Supersweet Corn. Combine 2 tablespoons lime juice, 1 teaspoon chili powder and 1/4 teaspoon salt. Brush on corn ears. Cook wrapped in husk, paper towel, wax paper or in a microwave dish.

For more information visit www.sunshinesweetcorn.com

sunshine sweet

Fresh from the Sunshine State

Price Goes Here

From Our Family to Yours!

www.sunshinesweetcorn.com

Scan for recipes!

sunshine sweet®
Fresh from the Sunshine State

Available Exclusively From *Sunshine Sweet Corn* Farmers of Florida

Sunshine Sweet Corn from Florida was introduced in the spring 2012 to rave reviews. We have hand selected premium seed varieties to deliver a consistent product that is sweet, tender and delicious. They have been naturally bred and family farmed to provide your customers with the quality they deserve! Sunshine Sweet Corn benefits you and your bottom line, delivering a great eating sweet corn that will keep customers coming back for more.

When you order fresh Sunshine Sweet Corn you are guaranteed:

- Highest eating quality
- U.S. fancy grade
- Quality Assurance at ship point backed by USDA Inspection Program
- Third-party food safety certification

To ensure our high standards for every crate labeled Sunshine Sweet, FSCE has taken the following steps:

- Selection Committee reviews and approves late-maturing seed varieties that can be grown and shipped as Sunshine Sweet Corn
- Growers work with their seed company to develop exclusive, premium varieties
- Daily inspections by an independent FSCE inspector ensure quality of every crate labeled Sunshine Sweet

Florida's Cornerstone

Florida has been the cornerstone for the category and its largest supplier for over 50 years. Growers and shippers work together to continue improving quality and driving the category. It starts with the seed, grown in the Florida sun in the rich soils of Palm Beach County and continues to carefully-considered harvesting techniques and advanced post-harvest handling. For the past decade we have invested heavily in product development and marketing efforts: to join forces with our retailer partners to increase tonnage, drive sales and add sustainable value to the Fresh Sweet Corn category. For more information, sales tools, and a list of FSCE shippers please visit online at: www.SunshineSweetCorn.com.

SUNSHINE SWEET CORN
Marketing Department
320 W. 13th Street, 7th Floor
New York, NY 10014

www.SunshineSweetCorn.com
Info@SunshineSweetCorn.com

Actual FSCE Volume Movement: 2011 vs. 2012 vs. 2013

2011			2012			2013		
On hand April 4	175,060		On hand April 2	85,323		On hand April 1	101,602	
On hand April 11	275,822		On hand April 9	160,189		On hand April 8	112,136	
Difference	100,762		Difference	74,866		Difference	10,534	
Total Harvested	549,622	(April 4-10)	Total Harvested	743,037	(April 2-8)	Total Harvested	338,055	(April 1-7)
Total Shipped	**448,860**		Total Shipped	**668,171**		Total Shipped	**327,521**	
On hand April 11	275,822		On hand April 9	160,189		On hand April 8	112,136	
On hand April 18	261,821		On hand April 16	298,418		On hand April 15	65,090	
Difference	-14,001		Difference	138,229		Difference	-47,046	
Total Harvested	686,587	(April 11-17)	Total Harvested	901,121	(April 9-15)	Total Harvested	409,360	(April 8-14)
Total Shipped	**700,588**		Total Shipped	**762,892**		Total Shipped	**456,406**	
On hand April 18	261,821		On hand April 16	298,418		On hand April 15	65,090	
On hand April 25	369,422		On hand April 23	240,479		On hand April 22	159,794	
Difference	107,601		Difference	-57,939		Difference	94,704	
Total Harvested	744,987	(April 18-24)	Total Harvested	861,974	(April 16-22)	Total Harvested	565,199	(April 15-21)
Total Shipped	**637,386**		Total Shipped	**919,913**		Total Shipped	**470,495**	
On hand April 25	369,422		On hand April 23	240,479		On hand April 22	159,794	
On hand May 2	467,347		On hand April 30	295,786		On hand April 29	165,348	
Difference	97,925		Difference	55,307		Difference	5,554	
Total Harvested	805,631	(April 25-May 1)	Total Harvested	947,329	(April 23-29)	Total Harvested	779,659	(April 22-28)
Total Shipped	**707,706**		Total Shipped	**892,022**		Total Shipped	**774,105**	
On hand May 2	467,347		On hand April 30	295,786		On hand April 29	165,348	
On hand May 9	493,407		On hand May 7	422,236		On hand May 6	244,301	
Difference	26,060		Difference	126,450		Difference	78,953	
Total Harvested	888,630	(May 2-May8)	Total Harvested	980,396	(April 30-May 6)	Total Harvested	1,036,421	(April 29-May 5)
Total Shipped	**862,570**		Total Shipped	**853,946**		Total Shipped	**957,468**	
On hand May 9	493,407		On hand May 7	422,236		On hand May 6	244,301	
On hand May 16	678,726		On hand May 14	382,455		On hand May 13	320,222	
Difference	185,319		Difference	-39,781		Difference	75,921	
Total Harvested	1,109,739	(May 9-May 15)	Total Harvested	894,177	(May 7-13)	Total Harvested	1,109,291	(May 6-12)
Total Shipped	**924,420**		Total Shipped	**933,958**		Total Shipped	**1,033,370**	
On hand May 16	678,726		On hand May 14	382,455		On hand May 13	320,222	
On hand May 23	521,710		On hand May 21	303,651		On hand May 20	323,775	
Difference	-157,016		Difference	-78,804		Difference	3,553	
Total Harvested	986,973	(May 16-22)	Total Harvested	960,752	(May 14-20)	Total Harvested	1,461,605	(May 13-19)
Total Shipped	**1,143,989**		Total Shipped	**1,039,556**		Total Shipped	**1,458,052**	
On hand May 23	521,710		On hand May 21	303,651		On hand May 20	323,775	
On hand May 27	51,096		On hand May 28	31,246		On hand May 27	450,790	
Difference	-470,614		Difference	-272,405		Difference	127,015	
Total Harvested	339,626	(May 23-27)	Total Harvested	766,331	(May 21-27)	Total Harvested	1,600,114	(May 20-26)
Total Shipped	**810,240**		Total Shipped	**1,038,736**		Total Shipped	**1,473,099**	
						On hand May 27	450,790	
						On hand June 3	125,794	
						Difference	-324,996	
						Total Harvested	298,268	(May 27-June 2)
						Total Shipped	**623,264**	
Total Shipped	6,235,759		Total Shipped	7,109,194		Total Shipped	7,573,780	

May Shipments		
2012	2013	
3,866,196	5,545,253	0.434292

Markets	Retailers (Grocery Chains)	2012					2013					% Chg, Yr-to-Yr				
		Dollars	Eaches	Price/EA	Distribution	$/MM ACV	Dollars	Eaches	Price/EA	Distribution	$/MM ACV	Dollars	Eaches	Price/EA	Distribution	$/MM ACV
Atlanta - MULO	KROGER CO PUBLIX TARGET WALMART	$2,316,385	5,316,157	$0.44	88.0%	$765	$1,919,194	4,304,786	$0.45	90.4%	$576	-17.1%	-19.0%	2.3%	2.7%	-24.7%
Baltimore/Washington - MULO	FOOD LION GIANT FOOD/LNDVR GIANT/CARLISLE SHOPPERS FOOD TARGET WALMART WEGMANS WAREHS SAFEWAY HARRIS TEETER	$4,529,320	11,072,724	$0.41	80.1%	$902	$4,253,096	9,832,408	$0.43	79.5%	$794	-6.1%	-11.2%	5.7%	-0.7%	-12.0%
Birmingham/Montgomery - MULO	KROGER CO WINN DIXIE TARGET WALMART PUBLIX	$1,730,753	3,910,377	$0.44	84.1%	$747	$1,625,963	3,757,353	$0.43	84.8%	$639	-6.1%	-3.9%	-2.2%	0.8%	-14.4%
Boston - MULO	DEMOULAS/MARKET SHAWS SHOP N SAVE/HANN STAR MARKET STOP & SHOP TARGET WALMART WEGMANS	$3,027,077	6,623,436	$0.46	77.4%	$894	$2,810,927	6,785,863	$0.41	76.8%	$761	-7.1%	2.5%	-9.4%	-0.9%	-14.9%
Buffalo/Rochester - MULO	TOPS MARKETS TARGET WEGMANS WALMART	$1,247,188	2,820,000	$0.44	82.1%	$691	$1,386,188	3,018,277	$0.46	82.3%	$706	11.1%	7.0%	3.8%	0.2%	2.1%
Charlotte - MULO	BI LO INC FOOD LION HARRIS TEETER PUBLIX TARGET WALMART	$1,190,838	2,545,466	$0.47	85.2%	$693	$1,127,835	2,348,960	$0.48	86.2%	$622	-5.3%	-7.7%	2.6%	1.1%	-10.3%
Chicago - MULO	DOMINICKS STORES JEWEL FOOD 4 LESS/FOODS CO TARGET WALMART	$2,878,559	8,700,582	$0.33	75.5%	$535	$2,630,118	7,373,100	$0.36	76.2%	$447	-8.6%	-15.3%	7.8%	0.9%	-16.3%
Cincinnati/Dayton - MULO	KROGER CO MARSH TARGET WALMART	$2,217,745	4,395,469	$0.50	86.7%	$1,095	$2,190,878	2,813,729	$0.78	87.5%	$872	-1.2%	-36.0%	54.3%	0.9%	-20.4%
Columbus - MULO	GIANT EAGLE KROGER CO TARGET WALMART	$1,347,260	4,489,776	$0.30	88.4%	$981	$1,142,440	2,913,993	$0.39	88.3%	$676	-15.2%	-35.1%	30.7%	-0.1%	-31.1%
Detroit - MULO	KROGER CO TARGET WALMART SPARTAN	$2,755,629	6,826,361	$0.40	78.5%	$1,080	$2,464,654	5,407,823	$0.46	80.0%	$829	-10.6%	-20.8%	12.9%	1.9%	-23.3%
Grand Rapids - MULO	FAMILY FARE/SPARTAN KROGER TARGET WALMART	$1,202,651	3,009,262	$0.40	83.9%	$1,112	$1,130,937	2,587,854	$0.44	83.8%	$948	-6.0%	-14.0%	9.4%	-0.2%	-14.8%

Harrisburg/Scranton - MULO	GIANT/CARLISLE WEIS MARKETS INC TARGET WALMART PRICE CHOPPER	$2,162,548	5,001,636	$0.43	83.8%	$672	$2,187,936	4,470,921	$0.49	84.5%	$634	1.2%	-10.6%	13.2%	0.9%	-5.7%
Hartford/Springfield - MULO	BIG Y PRICE CHOPPER STOP & SHOP TARGET WALMART	$2,351,233	4,708,581	$0.50	78.3%	$1,084	$2,025,303	4,163,579	$0.49	76.8%	$801	-13.9%	-11.6%	-2.6%	-1.9%	-26.1%
Indianapolis - MULO	KROGER CO MARSH TARGET WALMART	$1,693,151	4,261,595	$0.40	85.7%	$1,208	$1,343,707	2,857,220	$0.47	86.1%	$777	-20.6%	-33.0%	18.4%	0.6%	-35.7%
Miami/Ft. Lauderdale - MULO	PUBLIX TARGET WALMART WINN DIXIE	$2,603,244	5,138,996	$0.51	82.5%	$899	$2,572,591	4,680,969	$0.55	86.6%	$805	-1.2%	-8.9%	8.5%	5.0%	-10.4%
New York - MULO	A & P COMPANIES ACME MARKET BIGY FOODTOWN/TWIN CN KINGS SUPER PATHMARK SHOPRITE/WAKEFERN STOP & SHOP WALDBAUMS FOOD BASICS TARGET WALMART WEGMANS	$9,115,500	19,447,941	$0.47	76.0%	$971	$7,633,445	15,656,101	$0.49	71.0%	$680	-16.3%	-19.5%	4.0%	-6.6%	-29.9%
Northern New England - MULO	DEMOULAS/MARKET PRICE CHOPPER SHAWS SHOP N SAVE/HANN STOP AND SHOP TARGET WALMART	$2,430,765	5,750,047	$0.42	82.6%	$812	$2,191,139	5,552,185	$0.39	82.7%	$715	-9.9%	-3.4%	-6.6%	0.1%	-12.0%
Orlando - MULO	PUBLIX TARGET WALMART WINN DIXIE	$1,966,615	4,747,965	$0.41	85.5%	$965	$1,904,108	4,645,216	$0.41	88.1%	$803	-3.2%	-2.2%	-1.0%	3.1%	-16.8%
Philadelphia - MULO	A & P COMPANIES ACME MARKET FOOD LION GIANT/CARLISLE PATHMARK SAFEWAY SHOPRITE/WAKEFERN STOP AND SHOP TARGET WALMART WEGMANS WEIS MARKETS	$3,687,260	8,704,213	$0.42	77.5%	$887	$3,539,897	7,386,374	$0.48	76.3%	$750	-4.0%	-15.1%	13.1%	-1.6%	-15.5%
Raleigh/Greensboro - MULO	FOOD LION HARRIS TEETER KROGER CO TARGET WALMART	$1,640,060	3,834,172	$0.43	86.6%	$730	$1,563,501	3,101,790	$0.50	88.9%	$657	-4.7%	-19.1%	17.8%	2.6%	-10.0%
Richmond/Norfolk - MULO	FARM FRESH FOOD LION GIANT/CARLISLE HARRIS TEETER KROGER TARGET UKROPS/MARTINS WALMART	$1,616,646	4,385,934	$0.37	84.7%	$777	$1,512,573	3,507,900	$0.43	82.7%	$661	-6.4%	-20.0%	17.0%	-2.4%	-15.0%

Roanoke - MULO	FOOD CITY FOOD LION GIANT/CARLISLE KROGER CO TARGET WALMART	$1,588,468	3,637,688	$0.44	85.6%	$906	$1,348,372	2,845,022	$0.47	83.6%	$700	-15.1%	-21.8%	8.5%	-2.4%	-22.6%
San Francisco - MULO	SAFEWAY SAVE MART	$3,288,668	9,214,915	$0.36	74.7%	$1,112	$3,003,903	7,123,157	$0.42	74.4%	$989	-8.7%	-22.7%	18.2%	-0.4%	-11.1%
South Carolina - MULO	BI LO INC FOOD LION HARRIS TEETER KROGER CO PUBLIX TARGET WALMART	$2,548,410	5,823,178	$0.44	83.1%	$837	$2,257,713	5,285,051	$0.43	86.0%	$663	-11.4%	-9.2%	-2.4%	3.5%	-20.8%
Tampa - MULO	ALBERTSONS PUBLIX WINN DIXIE SWEETBAY	$2,125,720	5,162,459	$0.41	84.5%	$973	$2,121,558	5,037,094	$0.42	88.1%	$833	-0.2%	-2.4%	2.3%	4.3%	-14.4%
All Geographies		$63,261,692	149,528,930	$0.42	89.5%	$817	$57,887,977	127,456,725	$0.45	90.6%	$673	-8.5%	-14.8%	7.4%	1.1%	-17.6%

Florida Sweet Corn Exchange
2012 Survey

1. How long have you been in the produce business?
2. How many of those years have you been buying sweet corn?
3. How was your Florida corn season this year? (April 1 – June 1)
4. Did you buy Sunshine Sweet Corn this year?
5. If so, what did you think? If not, why not?
6. Did you participate in any of the marketing activities with Sunshine Sweet?
7. If so, were they effective?
8. Are you aware of the high quality SSS corn program that was introduced this past season? (I will explain the standards)
9. Did Sunshine Sweet meet your expectations for flavor? Consistency? Overall quality?
10. Did you take advantage of the FSCE early season ad allowance? If so, how did it work for you?
11. Did you promote sweet corn more or less this year in the April-May period?
12. Do you offer packaged sweet corn? In store packed? Vendor packed?
13. Was this year more or less profitable than last year in the sweet corn category?
14. On a scale of 1-5 (5=best), how satisfied are you with working with the FSCE sales organizations?
15. Do you have any suggestions on how the FSCE could better support you?
16. Has your company established a policy on selling GMO fresh produce?
17. Do you anticipate carrying GMO sweet corn within the next 3 years?

Florida Sweet Corn Exchange
Buyer Survey
January 4, 2012

Respondents

Over the last 2 months, I surveyed produce buyers in the eastern half of the United States who buy sweet corn. In all, the retail group represents over 60% of the volume in this region. Titles of the respondents varied from buyer, field buyer, category manager, director, and vice president. Most respondents had been buying produce for over 15 years and sweet corn for at least 5 years.

Impression of 2012 Florida Sweet Corn Season

Almost all buyers indicated that the 2012 Florida Sweet Corn season was much improved over 2011. Quality in terms of grade and flavor of product was mentioned as a driving factor in their evaluation of the season. Steady supply was also mentioned by several buyers as being substantially better than the prior year.

The only "significant" complaints about the season had to do with ear counts in the box and the box itself. Two large companies indicated that they rejected or processed charge backs for counts less than 48 in the carton. Several companies mentioned their distaste for the wire bound carton. The new Eco carton appears to be gaining traction. RPC's are preferred over the wire bound carton. One prominent retailer mentioned that they will not be accepting wire bound crates starting in 2013.

Impressions of the Florida Sweet Corn Exchange

The buyers were **not** asked about their impressions of the Florida Sweet Corn Exchange. However, nearly half of the respondents did interject strong feelings as to how the Exchange controls price. Some wondered if the Exchange was acting legally. Others lamented that the Exchange's pricing policy was hurting their margins.

Sunshine Sweet Program

Fewer than half of the respondents were aware of the Sunshine Sweet Program. Of those aware, I did not encounter any buyer who fully understood the standards associated with the program. Many buyers lack a real understanding of corn varieties and their impact on eating quality. There is a perception among some buyers that eating quality is tied to the color of the kernels.

When I explained the program to the buyers, they responded favorably.

Response to the Marketing Activities

Most respondents were not aware of any marketing activities available. When I explained what was available, most indicated they would not have participated. A few mentioned carrying the POS in store, but had little feedback as to the effectiveness.

Early Booking Allowances

About 80% of the respondents took advantage of the early booking allowances. A few mentioned that they were not aware of them or they chose not to promote sweet corn early. Of those who took advantage to the allowance, most felt that the program encouraged them to think through their ad strategy more carefully. A few mentioned that they had run more ads including early season ads than past years.

Pricing & Promotion Strategy

Many respondents indicated displeasure with the floor price and minimal ad allowance. A few reluctantly suggested that they would move more corn if the everyday price was a bit higher and the allowances were deeper. Many said they just couldn't hit a good price point to move volume.

Many respondents indicated that the floor pricing strategy of the Exchange is forcing them to rethink their overall sweet corn marketing. Some have chosen to back away from deep discounts and focus on profitability. They cited that a key factor was that the level pricing in the market took the incentive away to promote aggressively. Not surprisingly, most buyers felt that they could buy better than the market for ad buys with the old pricing structure.

Packaged Sweet Corn

Nearly half the respondents felt that package sweet corn was growing in importance. The group varied in method of preparing the corn from store made, locally processed and source processed. A few respondents indicated they were expanding packaged corn by adding pack styles including 3ct, 4ct, 5ct and "cobettes" in 8cts. Several respondents indicated that effectively selling package corn was the key to category profitability. In other words, the more package corn sold gave them margin dollars to offset losses in bulk sweet corn.

Category Profitability

The respondents were mixed as to how their category performed this past year in terms of profitability. Those who said profits were improved cited higher ad pricing and more focus on packaged corn as key drivers. Those stating profits were down this year cited the Exchange's pricing program and competitor's pricing strategies as contributors.

FSCE's Sales Organizations

All respondents rated the sales organization as good or excellent (3+ on the 5 point scale). The sales organizations are mostly seen as effective at executing the transaction. No companies indicated that the sales organizations were helping them drive their category. I did not ask about any specific companies.

When asked how the sales organizations could improve their value to their companies, respondents indicated that they wanted more market information, better

transparency on volumes and quality, improved pricing and strategies to help grow the category.

Genetically Modified Organisms (GMO's)

Respondents were asked if they had an established policy on GMO produce including sweet corn and whether they felt they would be carrying GMO produce within the next 3 years.

Most respondents demonstrated a lack of understanding of the concept of GMO's. One prominent industry veteran believed that 95% of the sweet corn he received was probably genetically modified. Many believed that they have never sold any GMO produce in their departments.

In terms of a formal GMO policy, respondents fell into two areas. About half the group did not have a policy. The other half of the group had a "No GMO" policy, but had no formal assurance or auditing program. Most respondents indicated that consumers were inquiring about GMO's more than ever and asking stores not to carry them.

About half of the respondents felt GMO's were inevitable and felt their company would carry them. Most respondents wanted to label GMO's at the shelf. Some were adamant that they would never carry GMO fresh produce.

Recommendations

1. **Improve the awareness of the Sunshine Sweet program through more direct communication with buyers.** Prepare a high quality "one sheet" in print and electronic version. Mail the print version directly to buyers at all levels of the retail organizations including vice presidents, directors, category managers, buyers, field inspectors and field buyers. Require all sales organizations to send the "e-version" to their customers before the season starts. Require all sales organizations to place Sunshine Sweet posters in their sales offices to remind sellers of the importance of explaining the program.
2. **Add an assurance of accurate counts (48) in the box to the Sunshine Sweet standards.** By doing this, you will enhance the credbility of the SS program. You will also be addressing a key complaint from buyers.
3. **Introduce a new shipping carton for all sweet corn packed by exchange members by April 1, 2014.** It is clear that the industry is dissatisfied with the current carton. Exchange members risk the proliferation of multiple carton styles as buyers insist on changes. By acting proactively and in unison, Exchange members can maintain efficiency in carton costs among its members.
4. **Identify 3-4 members of the exchange to meet with key retail industry leaders to explain the rationale behind the exchange's pricing policies.** In many respects the Exchange is a "faceless" organization among buyers. While it is doubtful you will fully win over retailers regarding your policies, you will soften their animosity toward the FSCE. It is a risky strategy to be seen as villains buy

the retail community. Eventually, retailers will take strong actions that will negatively impact the FSCE members.

5. **Eliminate any in-store marketing efforts supported by the FSCE funds.** This includes POS, consumer contests and display contests. These have not been effective.
6. **Adjust the floor price upward slightly (ex: .20), and increase the early season ad allowances ($1.00) for ad activity.** By doing this, you will respond to the retailer's desire to run hotter price points while not compromising your overall return to growers. Early booking allowances were effective and should be continued. In reviewing the sales data, I concluded that markets with the greatest increase in average price vs. the prior year also had the largest decline in units sold. If this practice were to become wide spread, it could create a severe imbalance of supply and demand resulting in significantly lower grower returns. A gradual increase in retail pricing is a more effective long term strategy.
7. **Complete an in-depth study of the top performing markets for sweet corn and publish a best practices manual for optimal category performance.** Best practices should focus on unit sales, dollar sales and overall profitability for the retailer. By showing the retailer how to improve their category performance, you will deflect criticism away from your pricing practices. Focusing on winning strategies for growers (more units) and retailers (more sales and profits) will help reposition the FSCE as a partner rather than adversary in the supply chain.
8. **Retrain the FSCE sales companies on best practices for the sweet corn category and the importance of the communicating the benefits of the Sunshine Sweet program.** These front line employees are your conduit to the trade. It is imperative that they fully understand the category profit dynamics. They should also demonstrate a responsibility to inform the buyers of the benefits of the Sunshine Sweet.
9. **Refrain from planting or selling any GMO modified sweet corn at this time.** I believe that there is considerable risk in being an early mover on GMO's. The trade and the consumer do not really understand the issue. Adoption of GMO's in the short term could negatively impact the consumption of sweet corn in the US.

Sweet Corn

Consumer Attitude and Usage Survey

JRS CONSULTING, INC.
smart solutions in communications

February 2013

Table of Contents

Objectives	Page 3
Methodology	Page 4
Respondent Profile	Page 5
Detailed Findings (Includes Summary Points/Recommendations)	Page 8
Buying Preferences	*Page 9*
Messaging	*Page 17*
Shopping	*Page 21*
Cooking/Preparation	*Page 28*

JRS CONSULTING, INC.
smart solutions in communications

Objectives

- The research objectives were to determine:
  - Where and how often people buy sweet corn
  - What ways people prepare sweet corn and how often
  - What color(s) of sweet corn are preferred and why
  - What are the barriers to consumption
  - What sweet corn varieties and advertising sources are people aware of
  - Which combination of sweet corn packaging and pricing is optimal to motivate purchase

JRS CONSULTING, INC.
smart solutions in communications

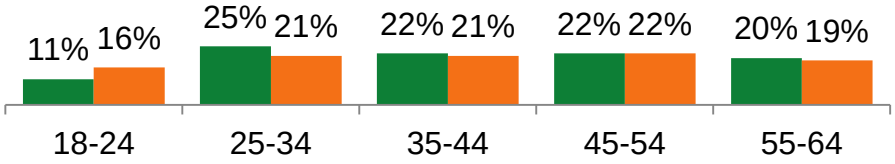
Methodology

- We conducted an online survey of 1,000 adult residents between February 13th and Feb. 18th in 31 states and Washington DC (AL, AR, CT, DE, DC, FL, GA, IL, IN, IA, KY, LA, ME, MD, MA, MI, MS, MO, NH, NJ, NY, NC, OH, PA, RI, SC, TN, TX, VT, VA, WV and WI). In addition to being residents of these states, all respondents (ages 18-64) had eaten and purchased fresh sweet corn on the cob within the past 12 months and were responsible (or split responsibility) for food shopping and meal preparation in their households.
- The sample was controlled to represent the US adult population on age, gender and geographic region for the states included in the sample.
- The survey data was cross-tabulated in order to highlight differences in responses between sub-groups of respondents. Statistically significant differences are noted among US regions/divisions, age groups, gender, household income, ethnicity, cooking affinity, preference between loose and packaged corn, as appropriate.
- All survey results by all groups are shown in the accompanying data tables.
- This summary report text focuses on results overall. Differences between groups are discussed only where differences are managerially meaningful or statistically significant at the 90% confidence level or higher.
- The survey margin of error is ±3.65%. This means that if we asked a question from this survey 100 times, 90 of those times the percentage of people giving a particular answer would be within 3.65 points of the percentage who gave the same answer in this survey.

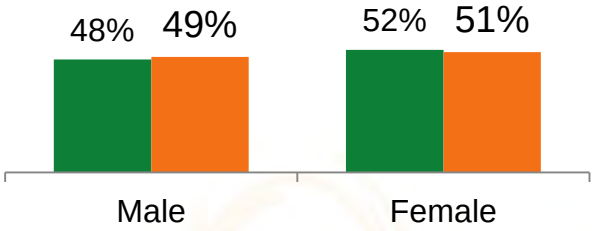
JRS CONSULTING, INC.
smart solutions in communications

Respondent Profile

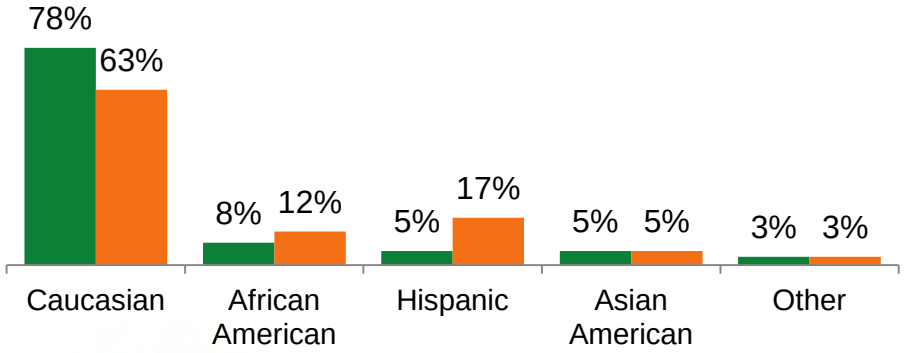
Age



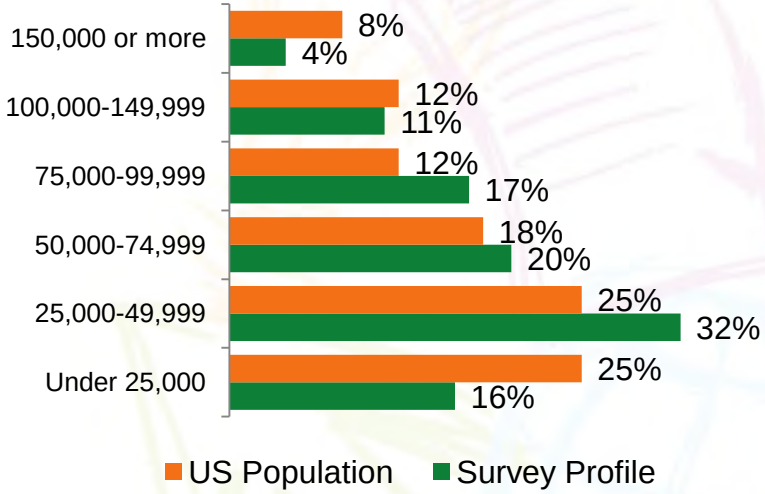
Gender



Ethnicity



Income

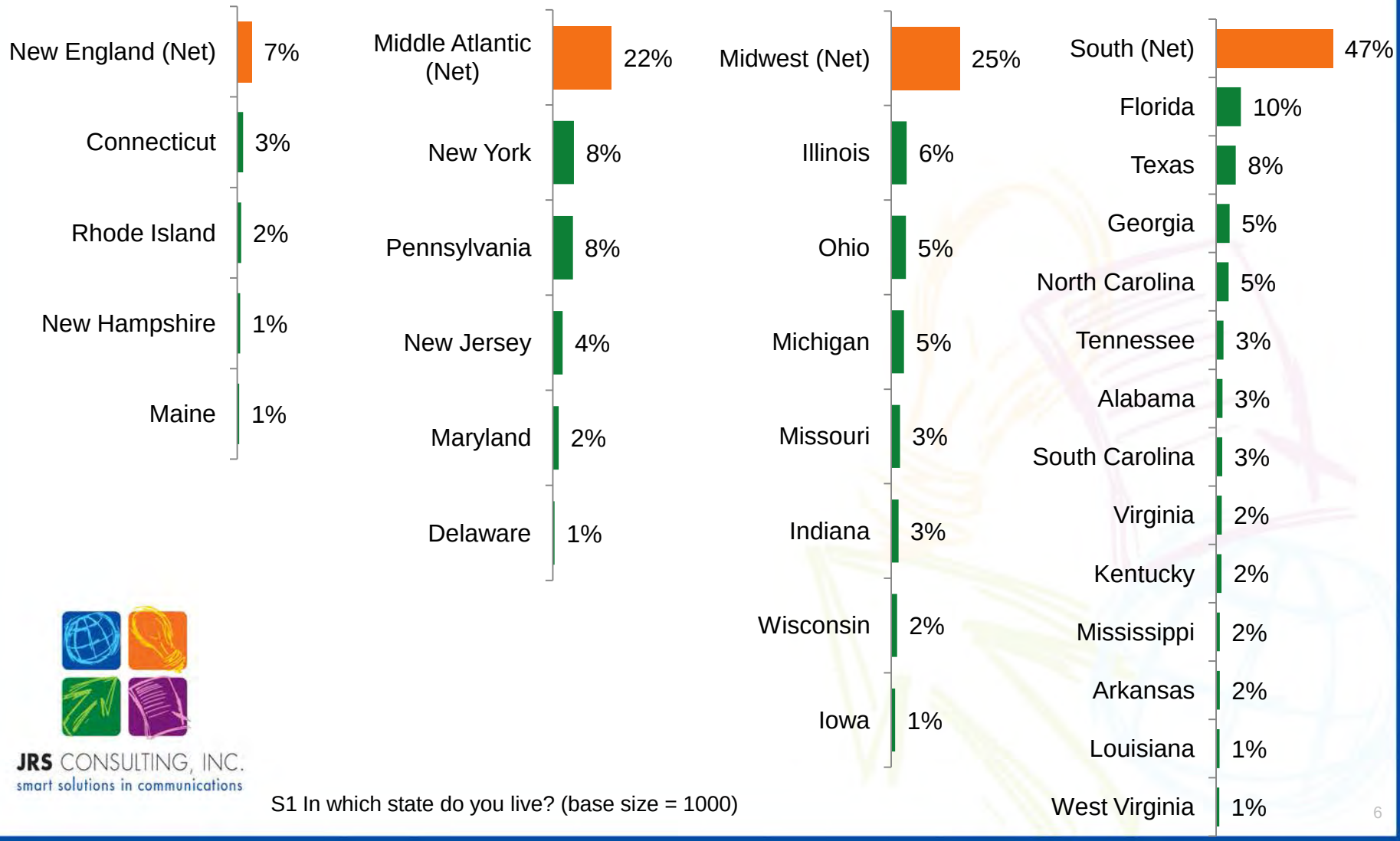


JRS CONSULTING, INC.
smart solutions in communications

S2 Are you? (base size = 1000)
S3 Which range includes your age? (base size = 1000)
D1 Which best describes your ethnicity? (base size = 1000)
D3 What is your annual household income? (base size= 1000)

Respondent Profile

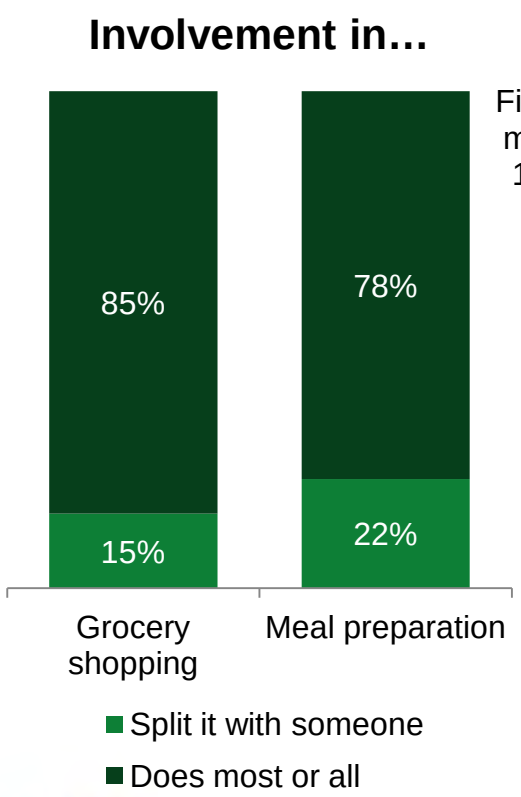
Location

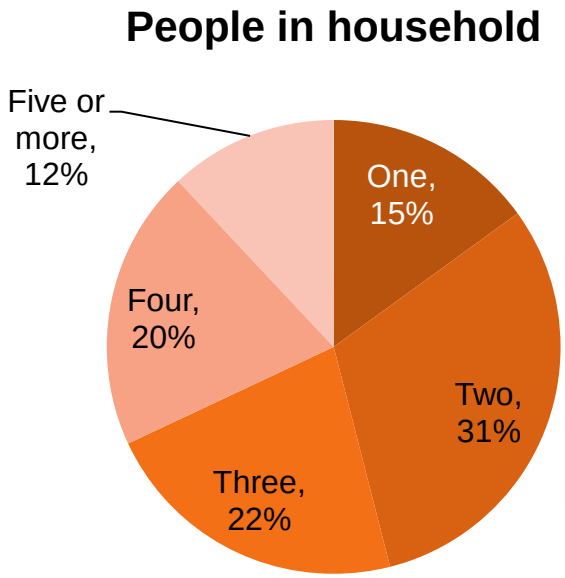


JRS CONSULTING, INC.
smart solutions in communications

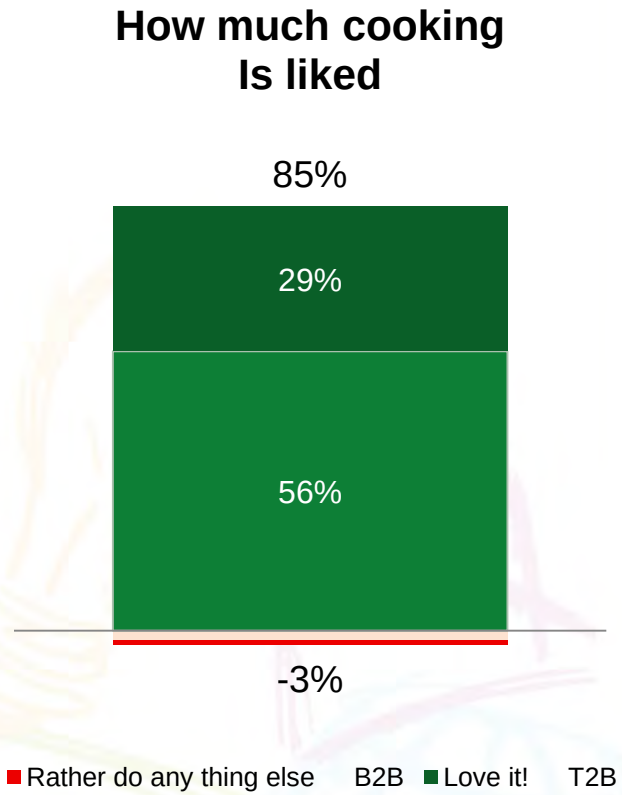
S1 In which state do you live? (base size = 1000)

Respondent Profile





45% have children



JRS CONSULTING, INC.
smart solutions in communications

S4 Which statement best describes how you are involved in grocery shopping for your household? (Base size = 1000)
S5 Which statement best describes how much you prepare meals for your household? (Base size = 1000)
D2 How many people live in your household? (base size=xxx)

Detailed Findings

The data in the tables on the following pages were statistically tested for significant differences. This allows us to determine where there are statistically significant differences between groups. A statistically significant difference means there is a high probability that the groups compared are truly different with regard to the variable measured.

Significance notations at the 90% confidence level are denoted by an orange capital letter next to the higher rating.

JRS CONSULTING, INC.
smart solutions in communications

SWEET CORN
BUYING PREFERENCES

JRS CONSULTING, INC.
smart solutions in communications

KEY FINDING

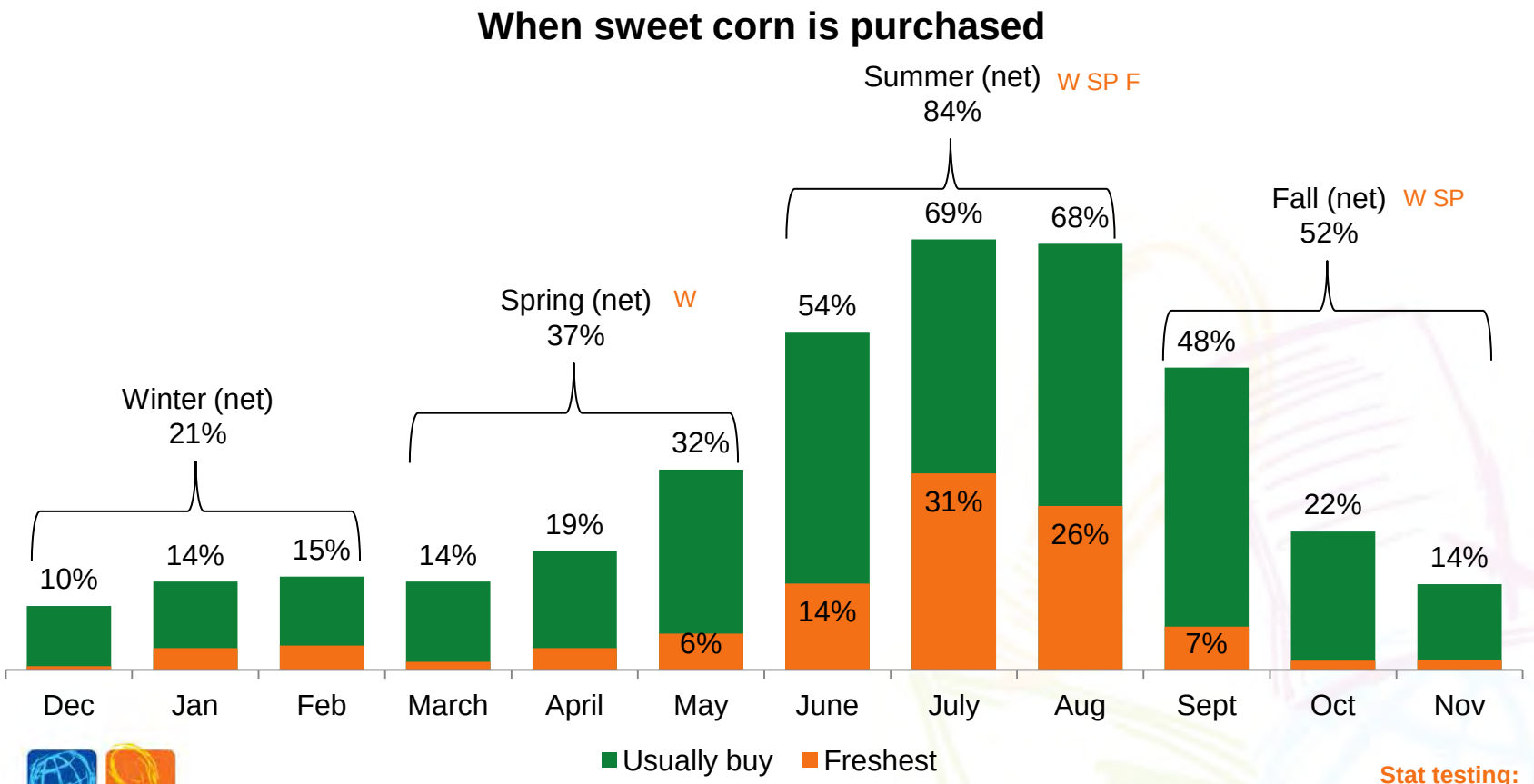
The majority of people buy in summer or early fall because people like to buy corn fresh and in season. However, southerners are more likely to buy in the winter and spring.

Recommendation:

Time messaging to coincide with seasons where corn is primarily consumed. Buy media during the summer in northern markets. Limit media buying during winter and spring to the South.

JRS CONSULTING, INC.
smart solutions in communications

Most purchase during the summer months, when sweet corn is thought to be the freshest



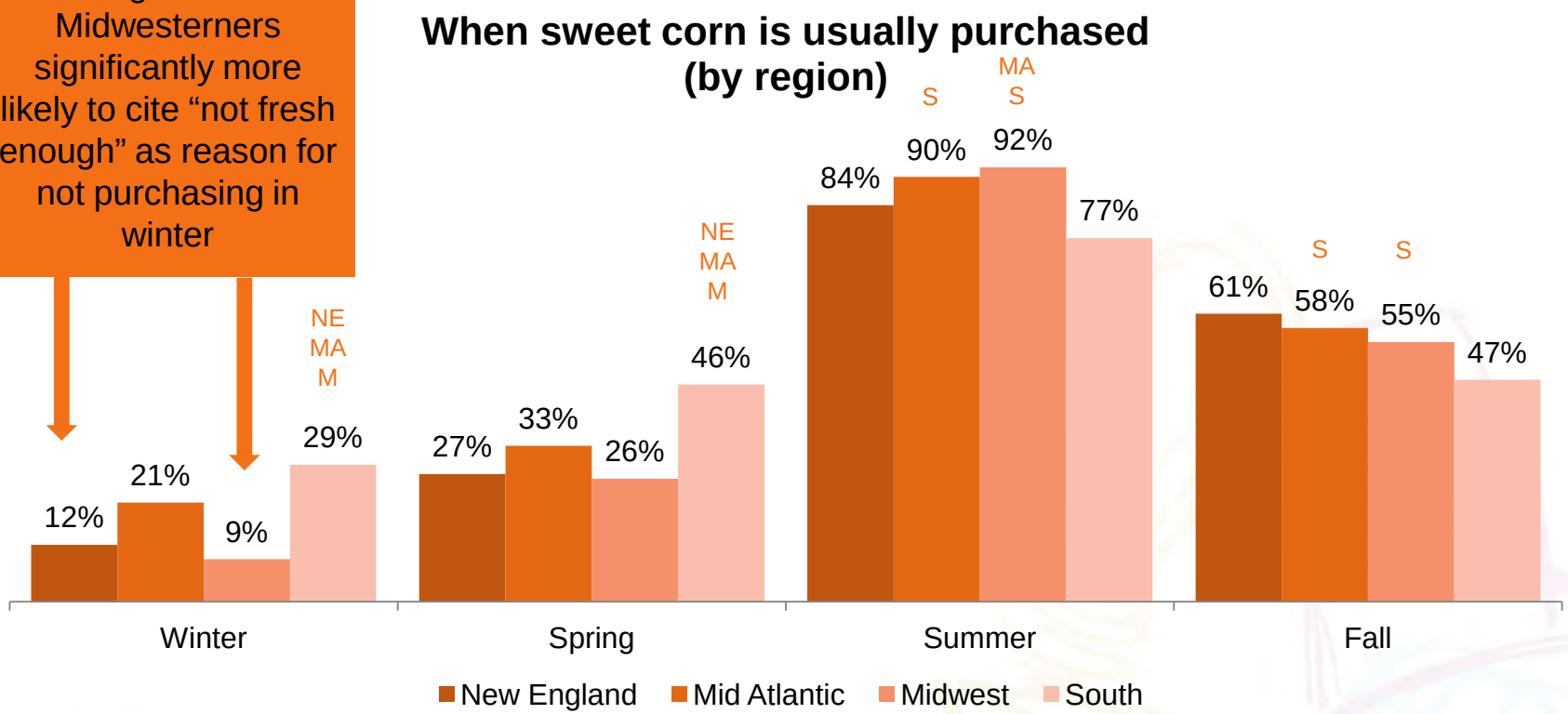
Stat testing:
W=Winter
SP=Spring
SU= Summer
F= Fall

JRS CONSULTING, INC.
smart solutions in communications

S7 At what time of year do you usually buy fresh sweet corn? (Base size = 1000)
Q1 When do you buy the freshest sweet corn on the cob? (Base size = 1000) (Not showing labels for less than 5%)

Southerners are significantly more likely to purchase in the winter and spring than those from other regions

New Englanders and Midwesterners significantly more likely to cite “not fresh enough” as reason for not purchasing in winter

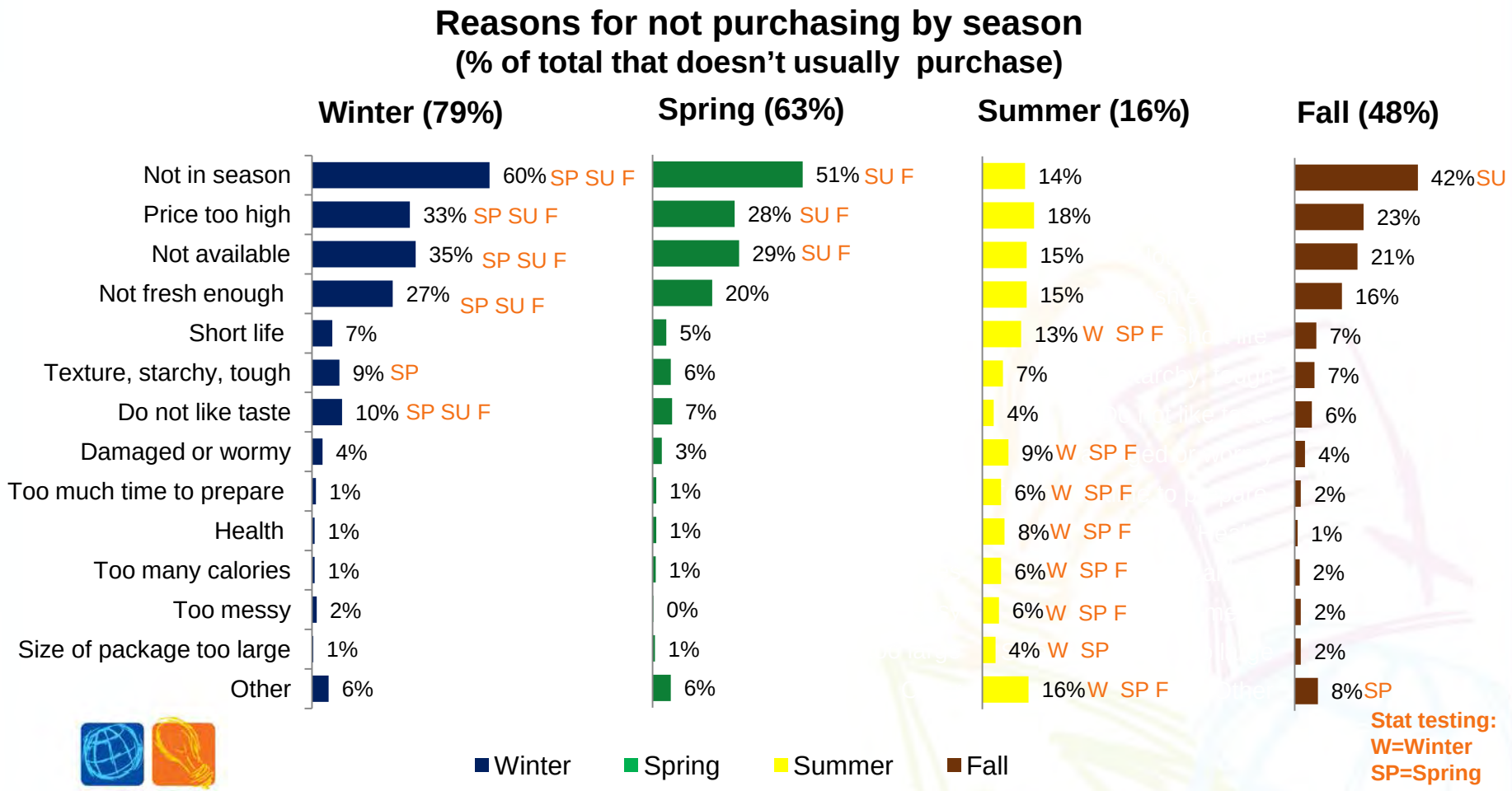


Stat testing:
NE=New England
MA= Mid Atlantic
M=Midwest
S=South

JRS CONSULTING, INC.
smart solutions in communications

S7 At what time of year to you usually buy fresh sweet corn? (Base size = 1000)
Q2a Why don’t you buy fresh sweet corn during the winter months (December, January, February)? (Base size = 788)

Reasons for not purchasing are mostly seasonal



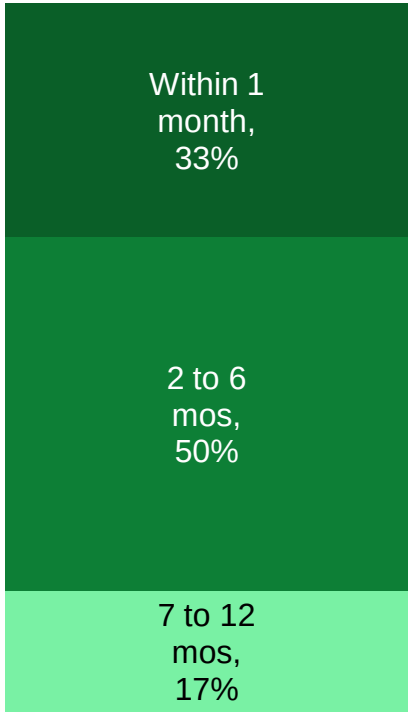
Stat testing:
W=Winter
SP=Spring
SU= Summer
F= Fall

JRS CONSULTING, INC.
smart solutions in communications

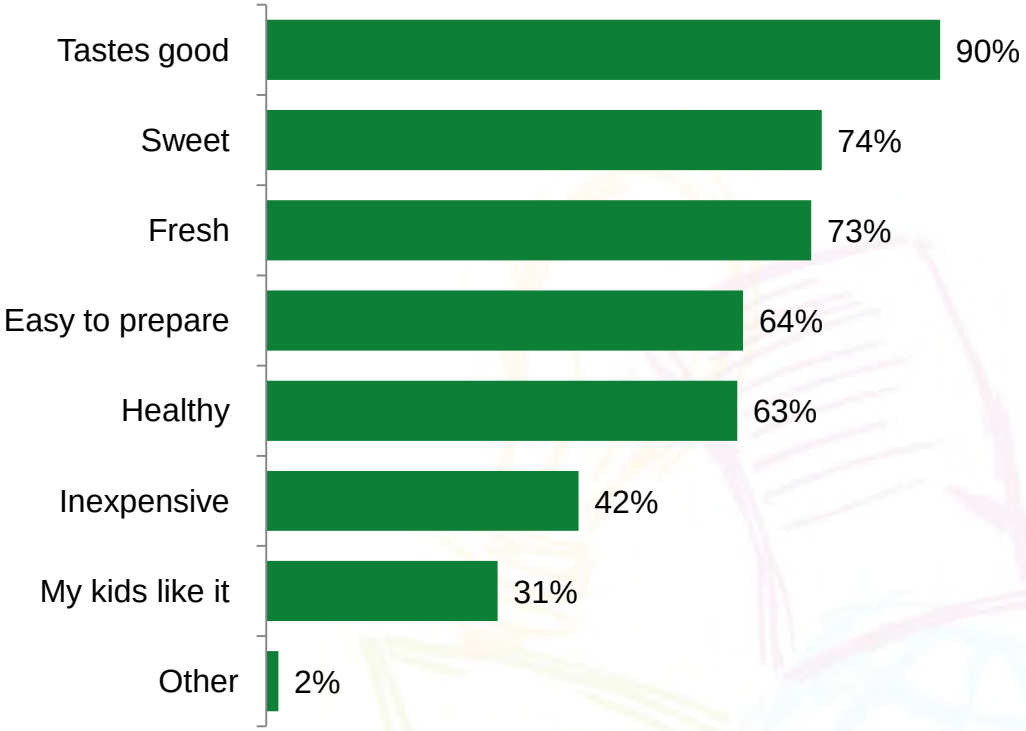
S7 At what time of year to you usually buy fresh sweet corn? (Base size = 1000)
Q2a Why don't you buy fresh sweet corn during the winter months (December, January, February)? (Base size = 788)
Q2b Why don't you buy fresh sweet corn during the spring months (March, April, May)? (Base size = 634)
Q2c Why don't you buy fresh sweet corn during the summer months (June, July, August)? (Base size = 160)
Q2d Why don't you buy fresh sweet corn during the fall months (September, October, November)? (Base size = 480)

Despite so few saying they usually purchase during winter months, one in three has purchased within the last month

Last purchased



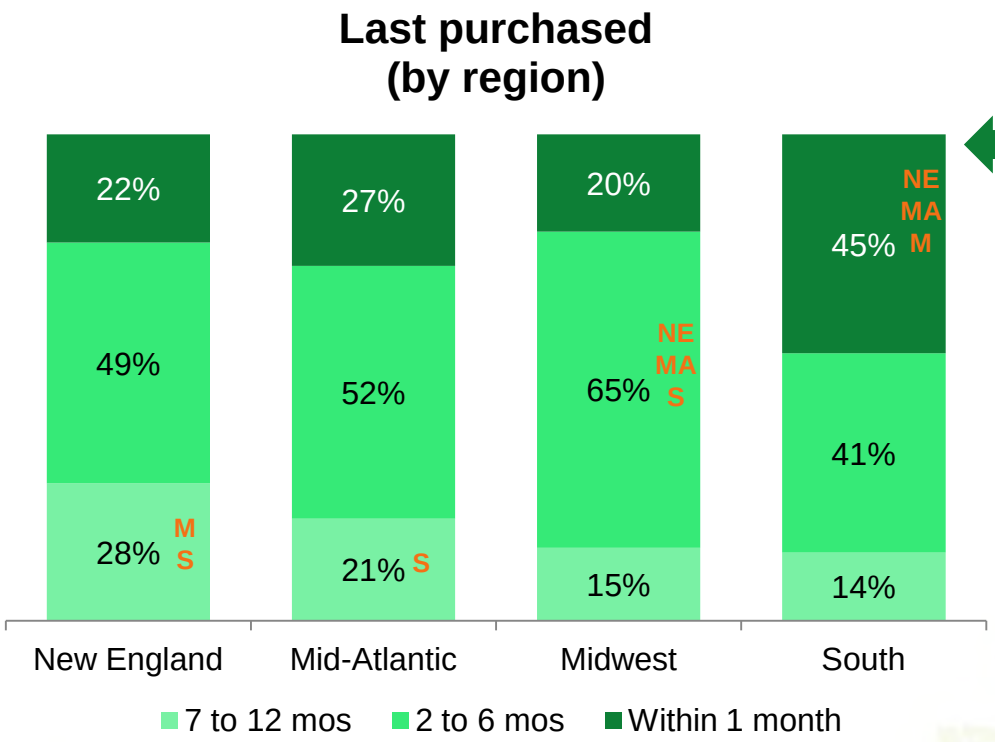
What is liked



JRS CONSULTING, INC.
smart solutions in communications

S6 When was the last time you purchased and personally ate a fresh sweet corn on the cob? (Base size = 1000) (As part of the screener, participants were required to have purchased within 12 months)
Q3 What do you like about fresh sweet corn? (Base size = 1000)

Southerners, young people, Hispanic and African Americans are much more likely to have purchased within the last month



People ages18-34, Hispanic and African Americans are also significantly more likely to have purchased within the last month

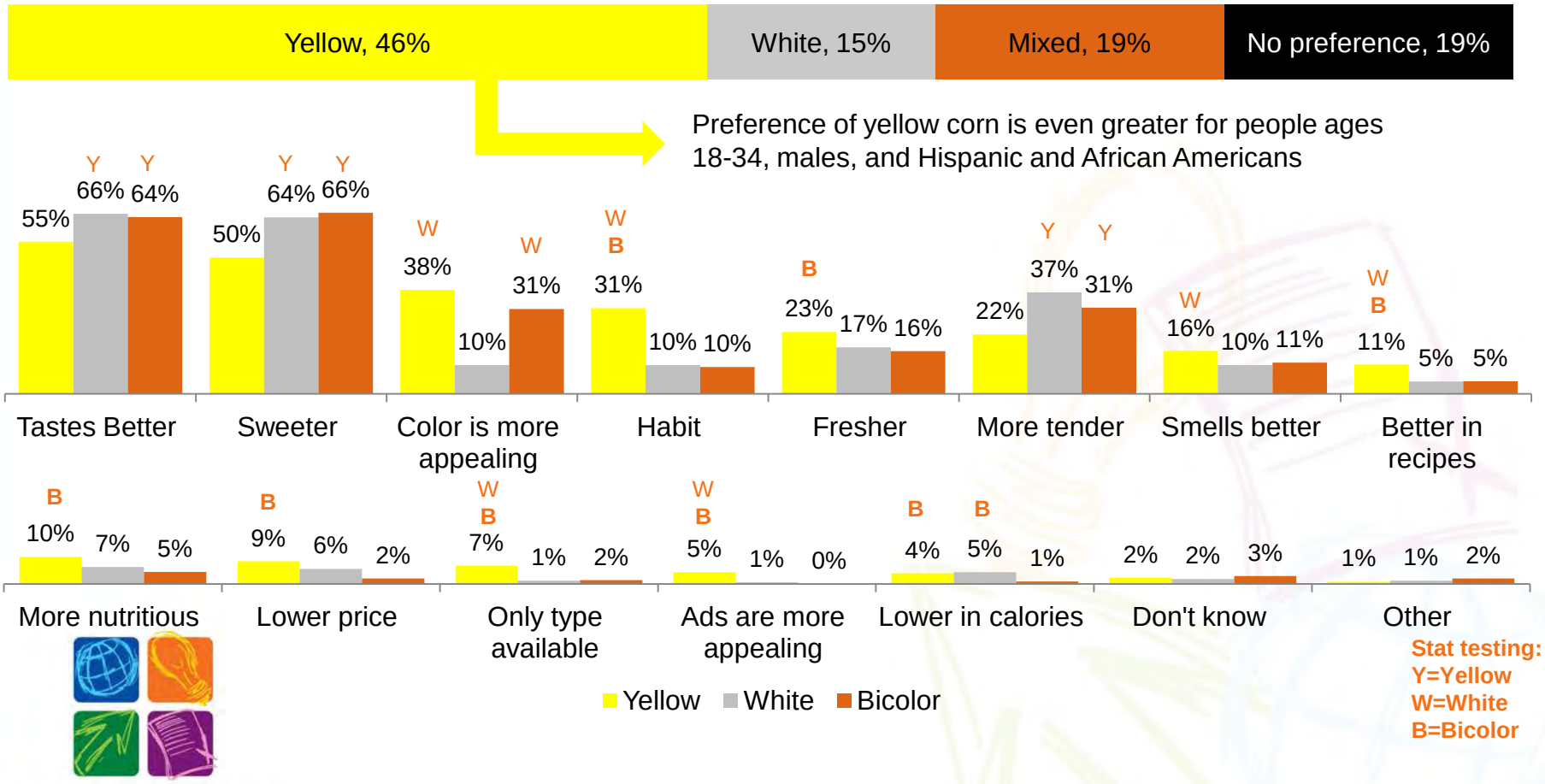
Stat testing:
NE=New England
MA=Mid-Atlantic
M=Midwest
S=South

JRS CONSULTING, INC.
smart solutions in communications

S6 When was the last time you purchased and personally ate a fresh sweet corn on the cob? (Base size = 1000) (As part of the screener, participants were required to have purchased within 12 months)

Strongest preference: yellow corn; Most popular reasons for preference: taste and sweetness (regardless of color)

Preference of Sweet Corn Choice and Why



JRS CONSULTING, INC.
smart solutions in communications

Q4 If you had a choice of yellow, white, or bicolor (mixed white and yellow kernels) fresh sweet com, which would you be most likely to buy? (Base size =997)
Q5 Why do you prefer that type of fresh sweet com? (Base size =810)

SWEET CORN MESSAGING

JRS CONSULTING, INC.
smart solutions in communications

KEY FINDING

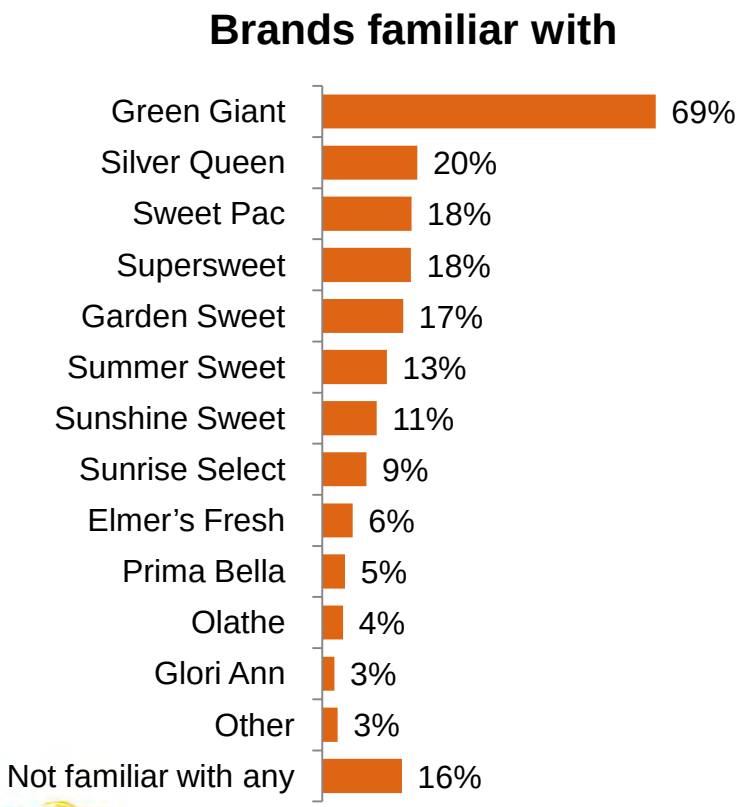
The only brand with any significant recognition is Green Giant.

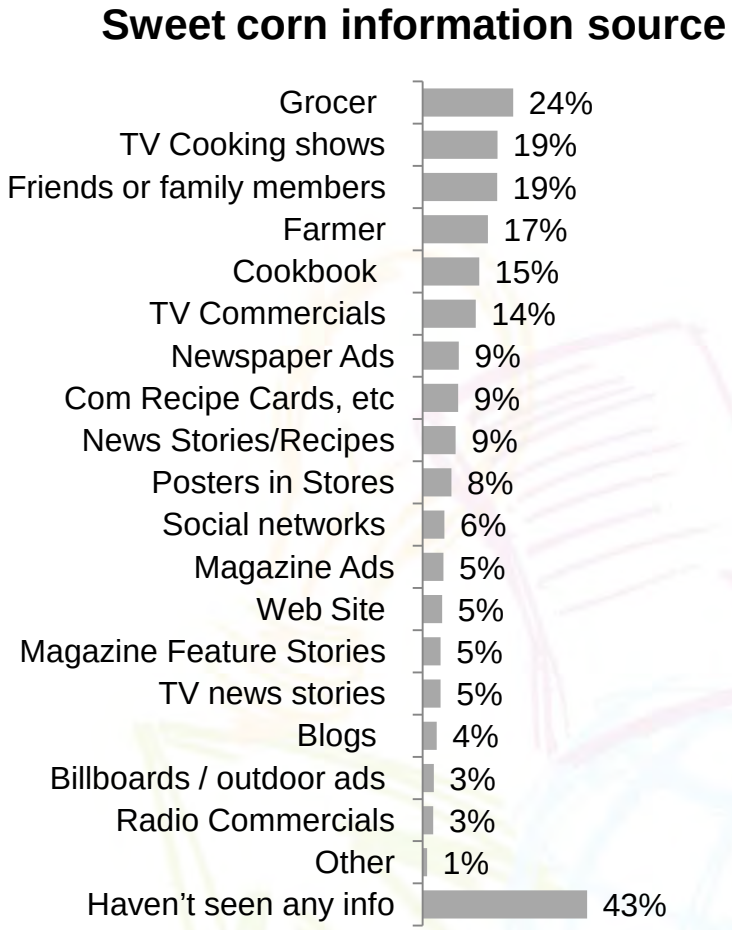
Recommendation:

Give quite a bit of though to building a brand. Success will take a significant investment -- current awareness levels of almost all sweet corn brands are low. Few recall much sweet corn information outside the grocer, so an increase in POS promotion may be a better investment.

JRS CONSULTING, INC.
smart solutions in communications

Green Giant is most familiar brand by far; Nearly half don't recall seeing any sweet corn information in the past year

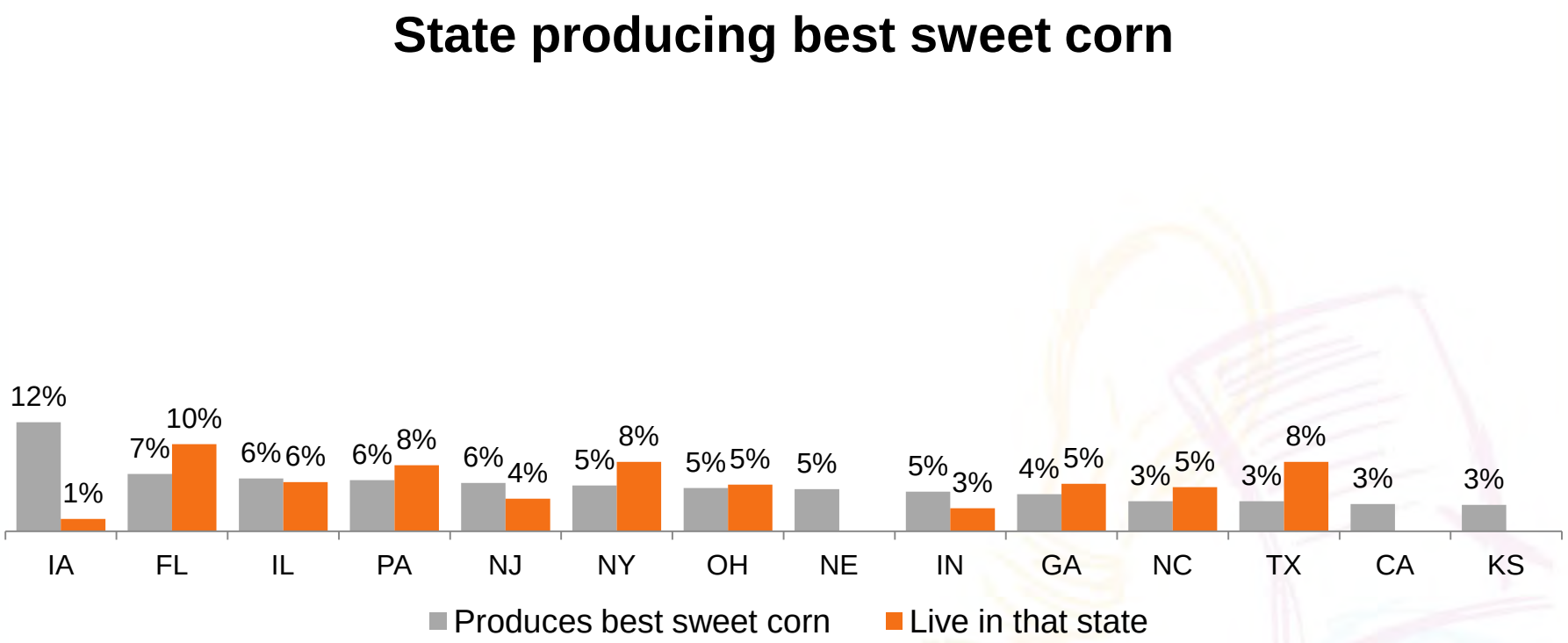




JRS CONSULTING, INC.
smart solutions in communications

Q16 Which, if any, of these varieties/brands of sweet corn are you familiar with? (Base size =1000)
Q17 Do you recall seeing or hearing information about fresh sweet corn from any of these sources in the past year? (Base size =1000)

Iowa has the most votes for best sweet corn, regardless of where people live



JRS CONSULTING, INC.
smart solutions in communications

Q18 Which state do you believe produces the best sweet corn? (Base size = 1000) (Only showing states with more than 3% of the vote)
S1 In which state do you live?/ (Base size = 1000)

SWEET CORN SHOPPING

JRS CONSULTING, INC.
smart solutions in communications

KEY FINDING

Freshness is of the utmost importance to sweet corn purchasers. Corn is mostly purchased from supermarkets or farm stands. There is an overwhelming preference for loose unhusked corn, purchased by the ear. People expect to see corn in the fresh produce section.

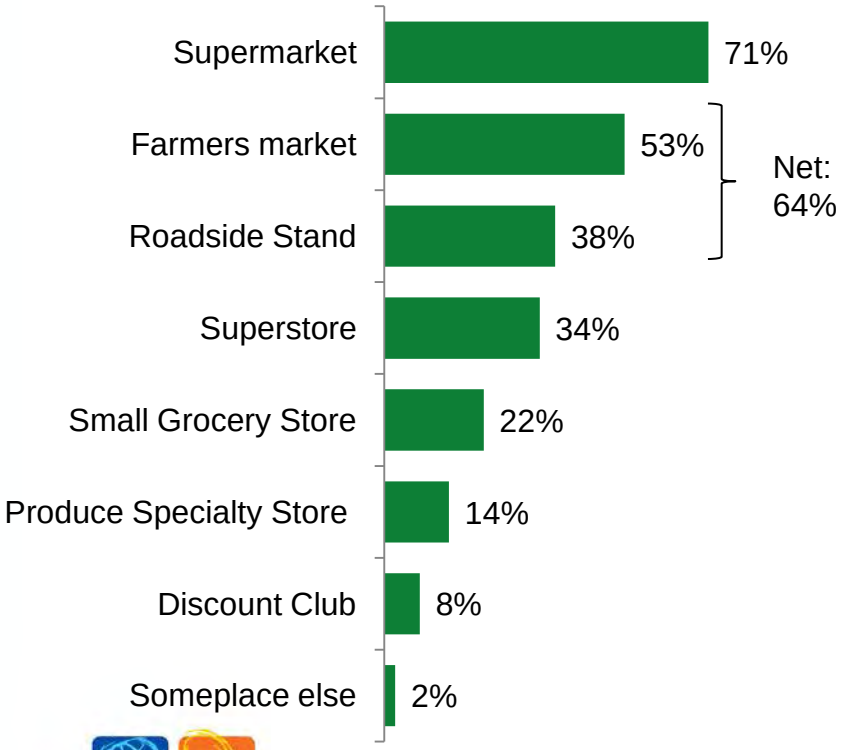
Recommendation:

Sweet corn consumers want to purchase fresh loose corn in the husk, so investments in packaging will probably not generate as much ROI as investments in POS promotional messaging.

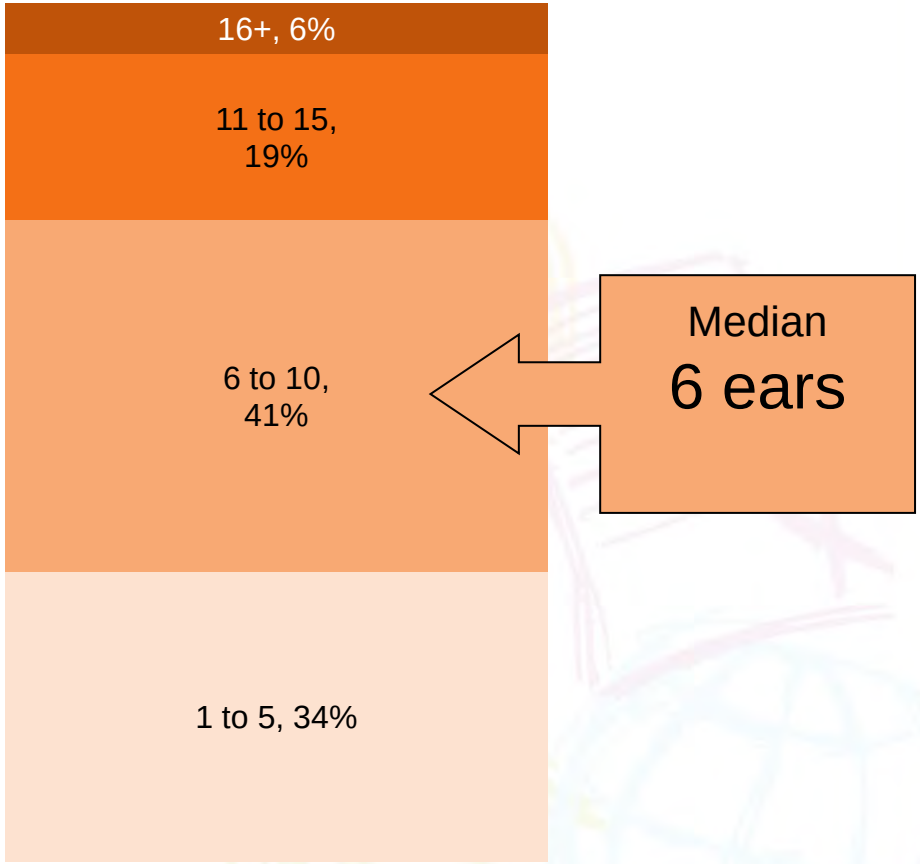
JRS CONSULTING, INC.
smart solutions in communications

Corn is usually purchased in the supermarket; On average, six ears are purchased at a time

Where usually buy sweet corn



Typical amount of corn purchased

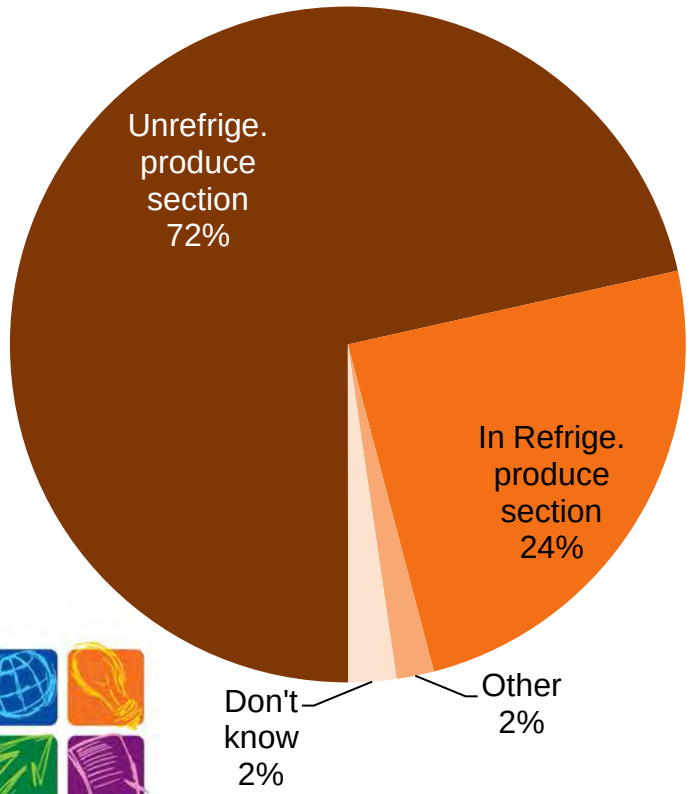


JRS CONSULTING, INC.
smart solutions in communications

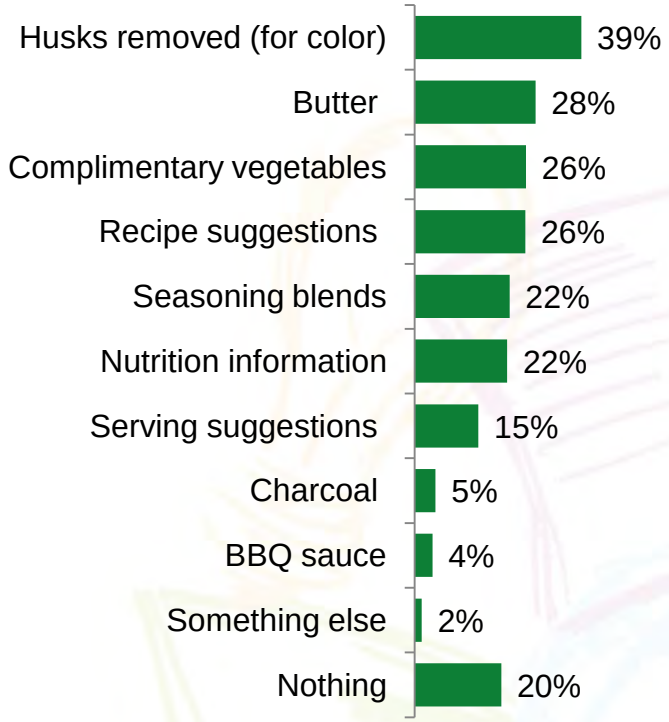
Q7 In what type of retail outlet do you usually buy fresh sweet com on the cob? (Base size = 1000)
Q8 On average, about how many individual ears of fresh sweet corn do you buy each time you purchase corn on the cob? (Base size = 1000)

Three-quarters prefer unrefrigerated corn; Shucked corn (to see color) is most preferred for display

Preference of location in store



Would like to see corn along with…

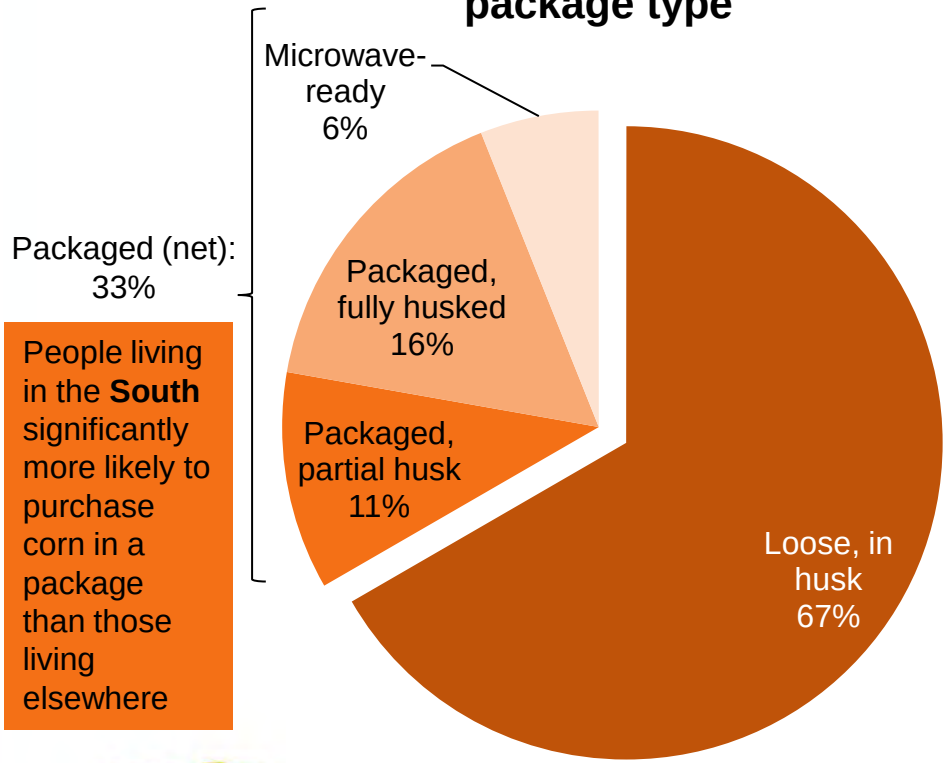


JRS CONSULTING, INC.
smart solutions in communications

Q9a Where in your usual grocery store would you prefer to see fresh sweet corn? (Base size =1000)
Q9b Which, if any, of the items below would you like to see your grocery store display along with fresh corn on the cob? (Base size =1000)

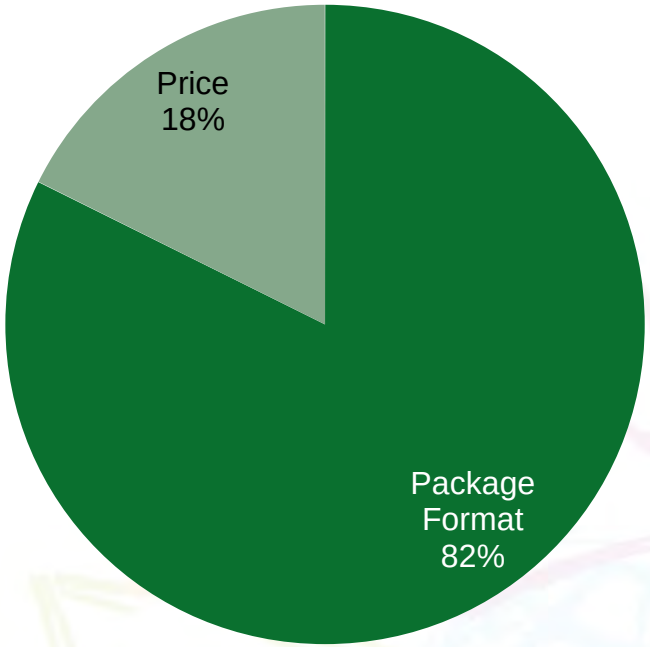
Package format is the main driver of purchase selection; Corn mostly purchased loose

Mean proportion purchased by package type



People living in the **South** significantly more likely to purchase corn in a package than those living elsewhere

Average Attribute Importance From Discreet Choice Analysis

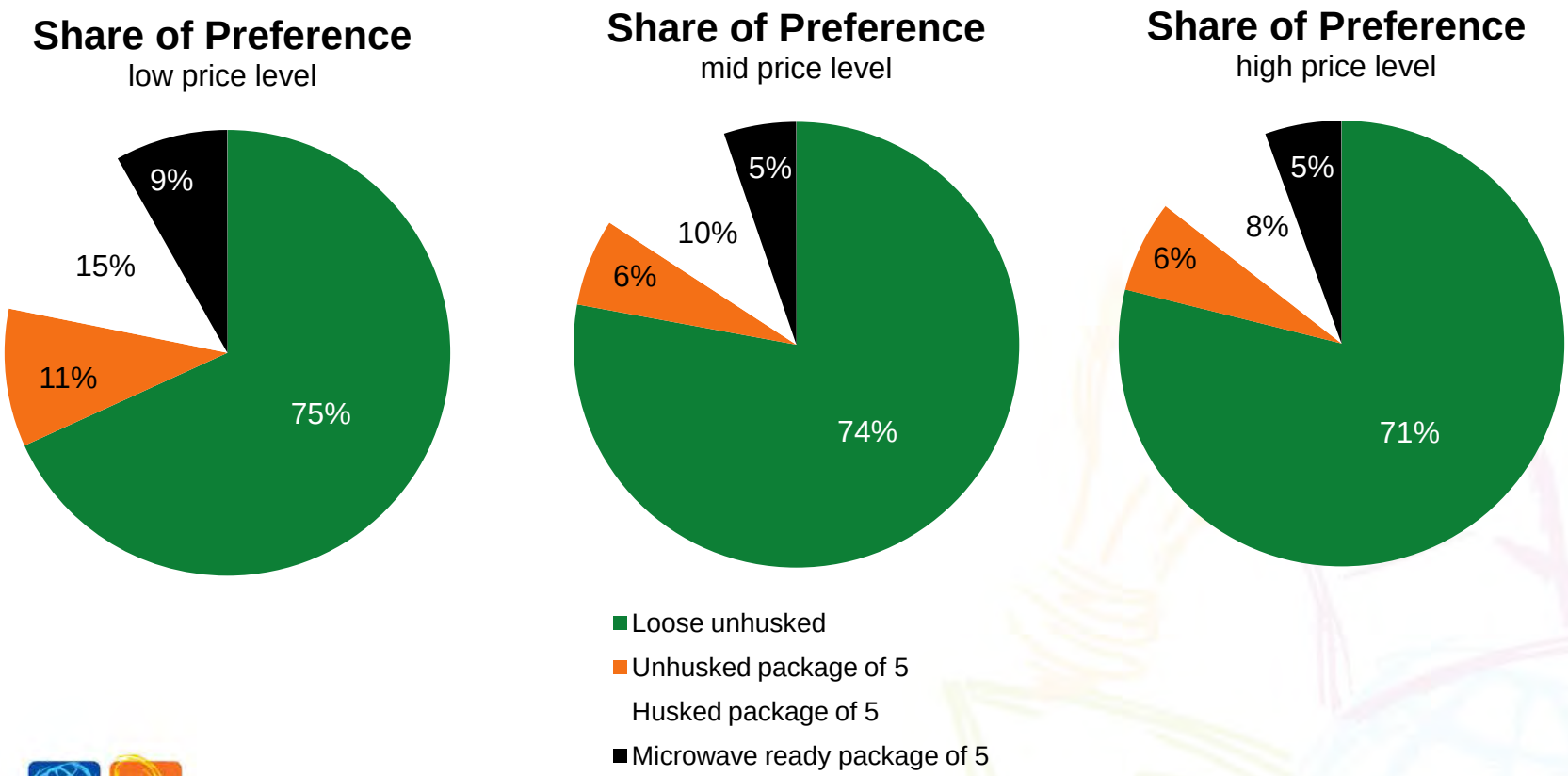


Q6 When you buy fresh sweet corn, what proportion of the time do you purchase it in each of these forms? (Base size = 1000)

DC On the next several screens, we're going to show you descriptions of fresh sweet corn products you might see in your local store. For each set of choices, please tell us which you would purchase. Click the button below to see the first set of choices. (Base size = 1000)

JRS CONSULTING, INC.
smart solutions in communications

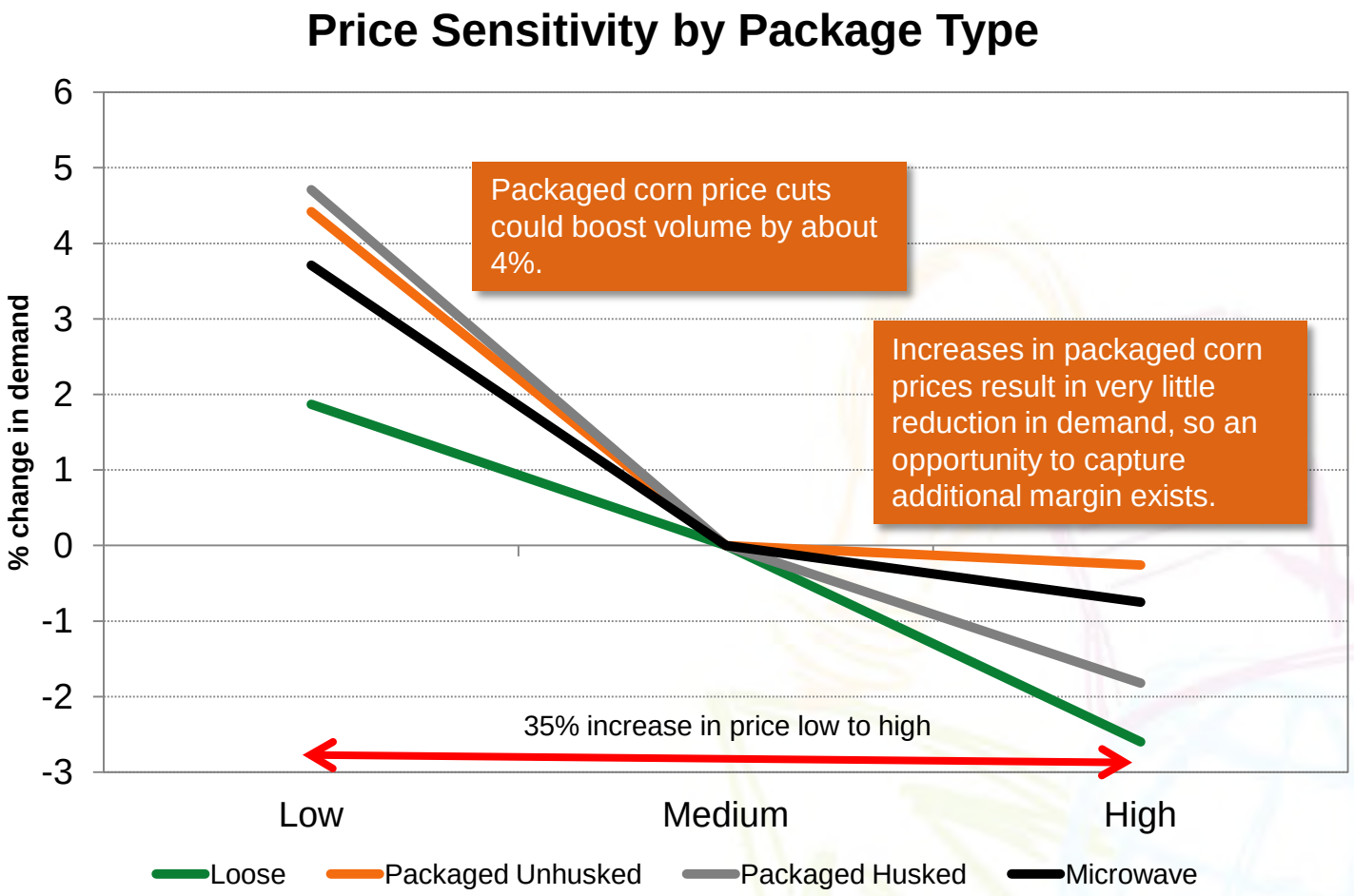
Loose corn is the most preferred package format at all price levels



JRS CONSULTING, INC.
smart solutions in communications

DC On the next several screens, we're going to show you descriptions of fresh sweet corn products you might see in your local store. For each set of choices, please tell us which you would purchase. Click the button below to see the first set of choices. (Base size = 1000)

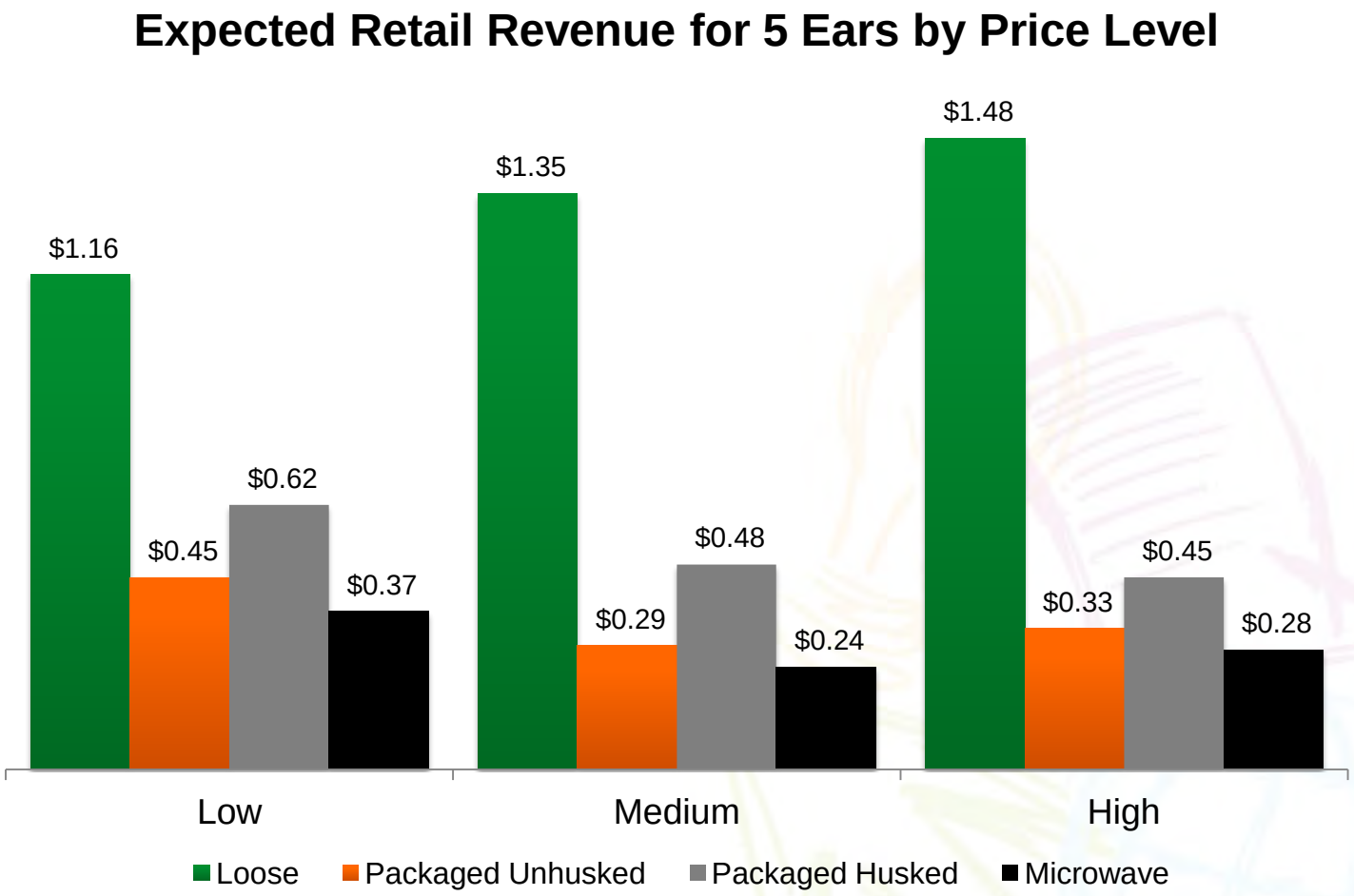
Packaged corn prices could be raised with minimal loss of sale volume



JRS CONSULTING, INC.
smart solutions in communications

From choice analysis. % change in share relative to mid-price.

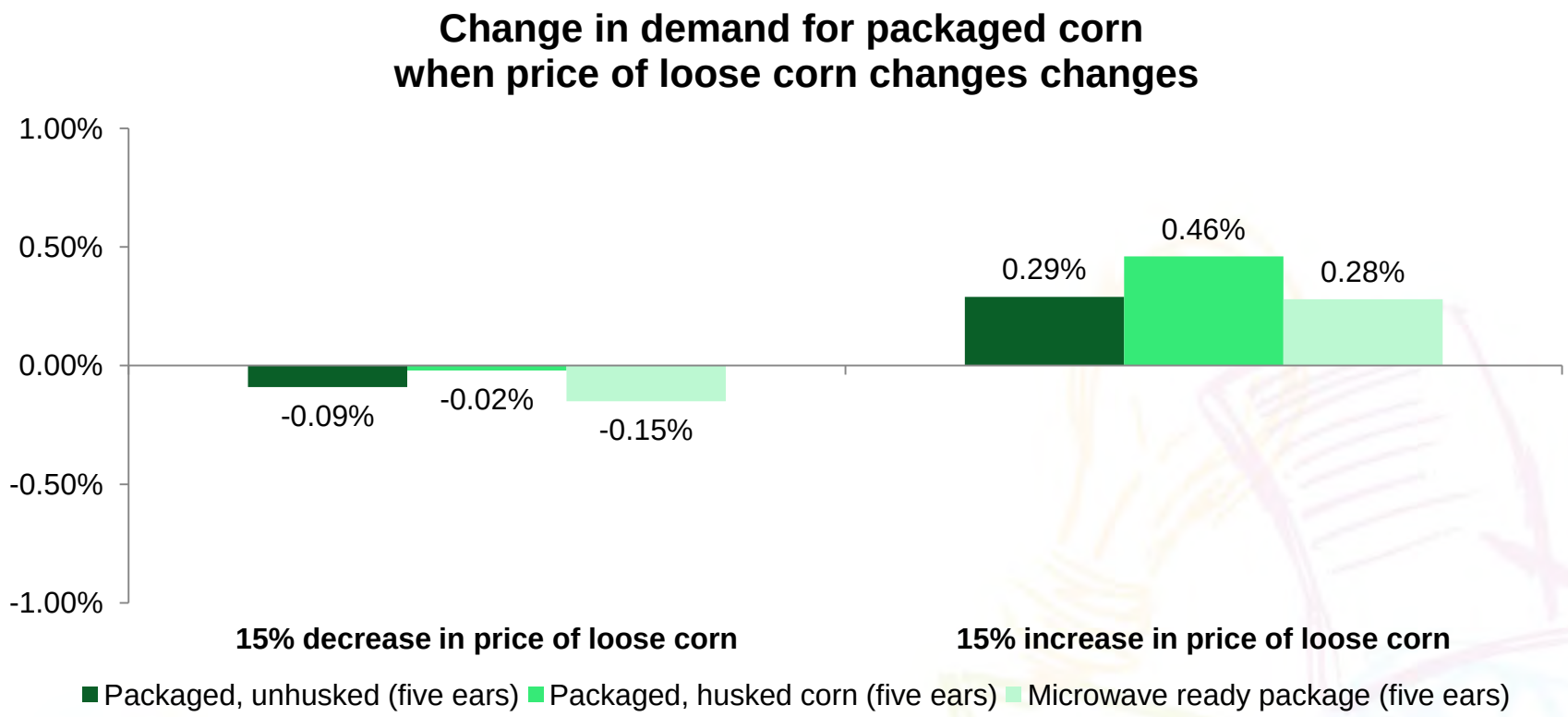
Loose corn is, by far, the biggest revenue generator



JRS CONSULTING, INC.
smart solutions in communications

Expected revenue = price * probability of selection. Overall average prices used.

People are unlikely to switch from loose to packaged corn regardless of the change in price



JRS CONSULTING, INC.
smart solutions in communications

DC On the next several screens, we're going to show you descriptions of fresh sweet corn products you might see in your local store. For each set of choices, please tell us which you would purchase. Click the button below to see the first set of choices. (Base size = 1000)

SWEET CORN PREPARATION

JRS CONSULTING, INC.
smart solutions in communications

KEY FINDING

Corn is typically boiled indoors regardless of weather. When the weather is nice, the second most common method of preparation is on the grill. Sweet corn is nearly always served on the cob as a side dish.

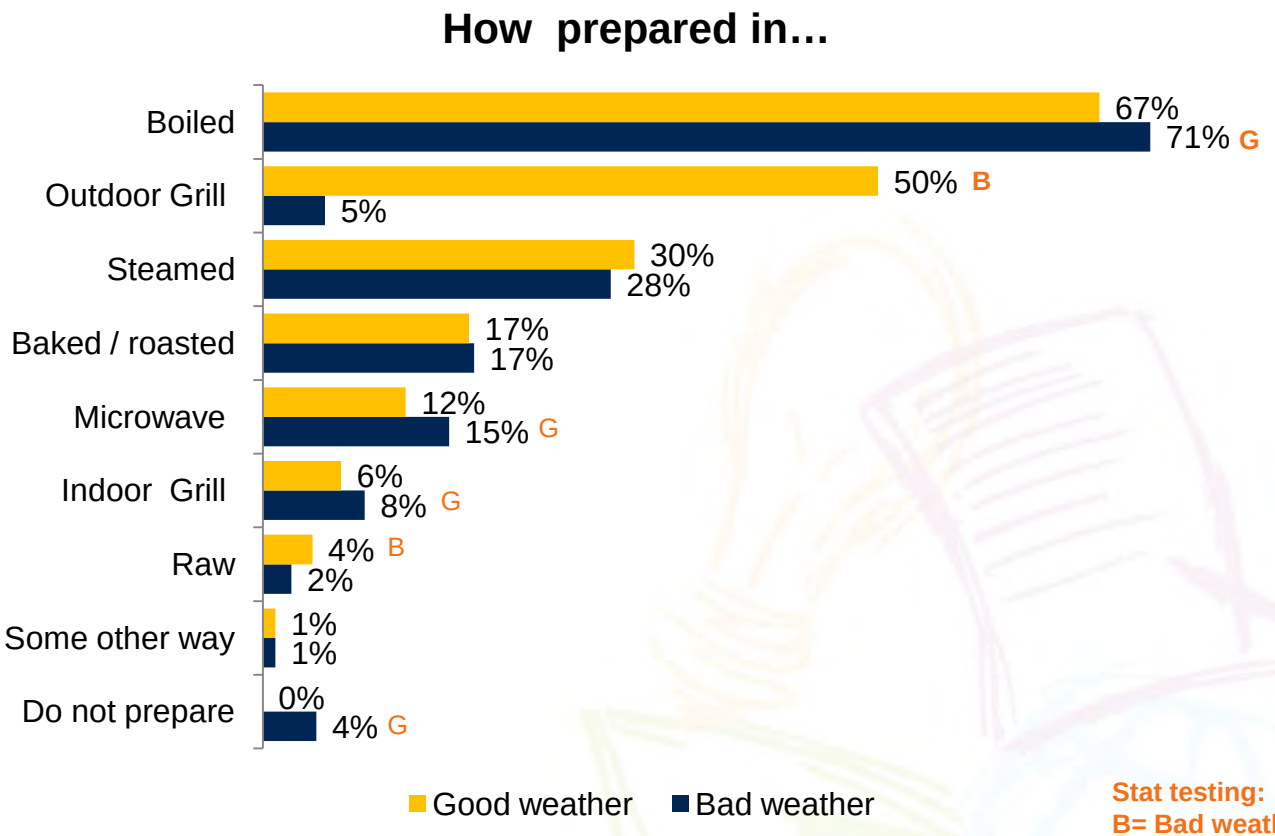
Recommendation:

While sweet corn is typically prepared and eaten only one or two ways, there may be an opportunity to increase consumption. Promoting alternate cooking methods or providing recipes using sweet corn as a key ingredient may lead to greater use among sweet corn consumers.

JRS CONSULTING, INC.
smart solutions in communications

Corn is typically boiled (regardless of weather); Grilled outdoors, during good weather, is second most popular preparation

Median time cooked
15
20
20
20
5
20



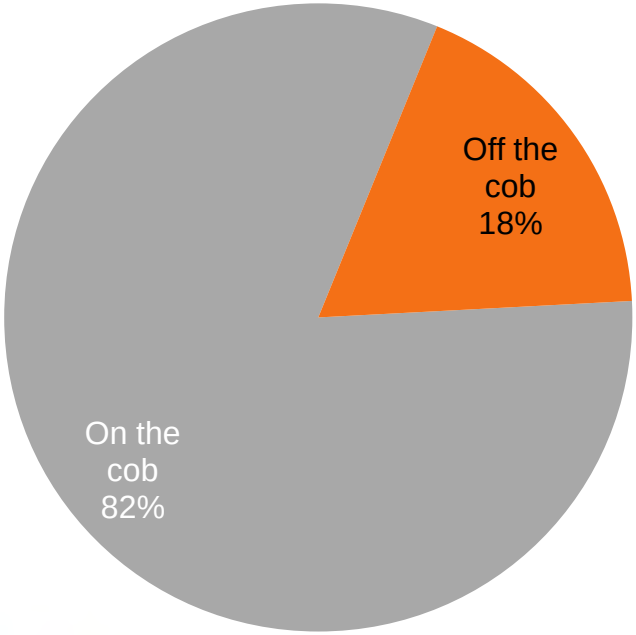
Stat testing:
B= Bad weather
G = Good weather

JRS CONSULTING, INC.
smart solutions in communications

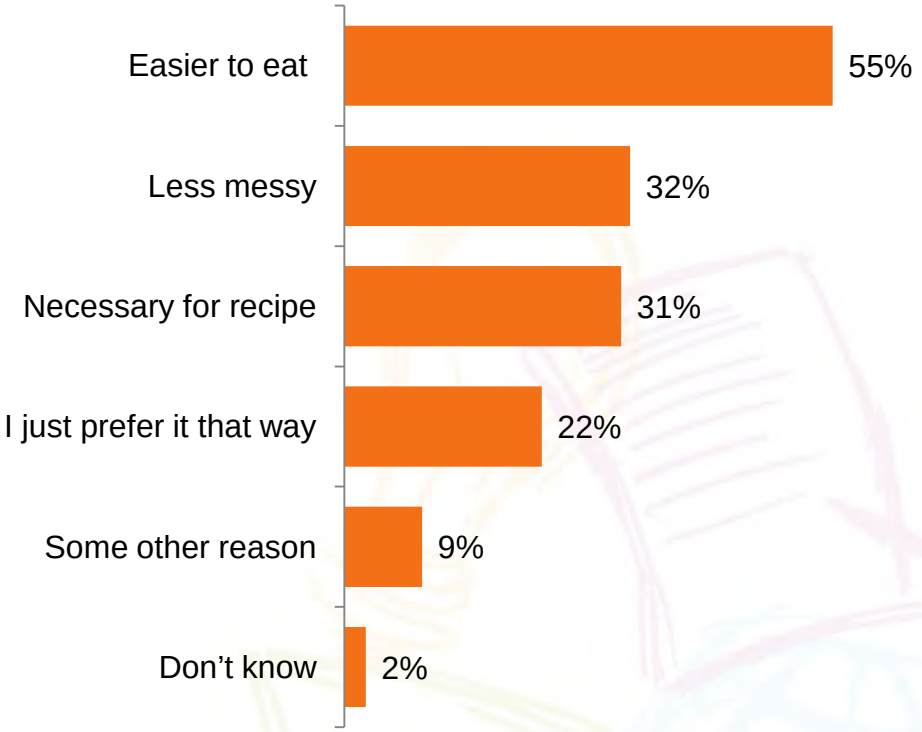
Q10a When the weather is nice, say 50 degrees or warmer and not raining, how do you usually prepare fresh sweet com on the cob? (Base size =1000)
Q10b When the weather is "bad," say colder than 50 degrees or raining or snowing, how do you usually prepare fresh sweet com on the cob? (Base size =1000)
Q10c How long do you usually cook your sweet corn each way? (Base size =1000)

Corn is usually served on the cob; When served off the cob, it's served that way mostly because it's easier to eat

Mean % served



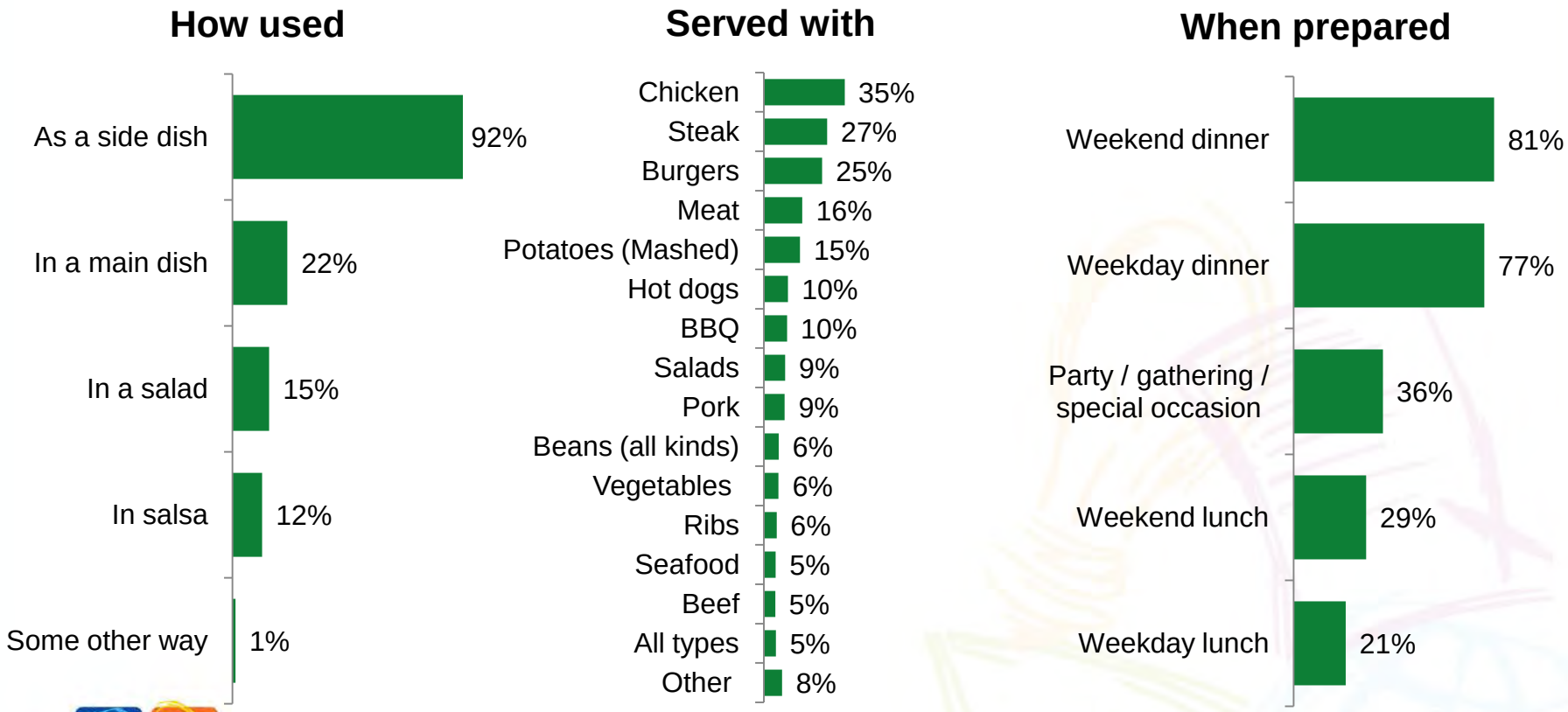
Why served off the cob



JRS CONSULTING, INC.
smart solutions in communications

Q11 What proportion of the time do you serve fresh sweet corn ON the cob, and what proportion of the time do you remove it from the cob before serving it? (Base size = 1000)
Q12 Why do you remove the corn from the cob before serving it? (Base size = 506)

Sweet corn is used the majority of the time as a side dish for dinner served with various types of meat



JRS CONSULTING, INC.
smart solutions in communications

Q13 How do you use fresh sweet com in a meal? (Base size =1000)
Q14 When do you prepare fresh sweet corn? (Base size =1000)
Q15 What foods do you usually serve fresh sweet corn with? (Base size =1000)

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N1

Have you purchased sweet corn in the months of April and May this year?

	Total (A)	Sex: Male (B)	Sex: Female (C)	Age: 18-24 (D)	Age: 25-34 (E)	Age: 35-44 (F)	Age: 45-54 (G)	Age: 55-64 (H)	Age: 65+ (I)	Region: North-east (J)	Region: Mid-west (K)	Region: South (L)	Region: West (M)	Race: White Only (Non-Hisp) (N)	Race: Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Unweighted Total	1008	504	504	68	224	153	221	259	83	190	227	363	228	747	101	104
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
Yes	494	241	253	60	94	84	84	80	92	82	100	197	115	327	53	78
	49%	51%	48%	43%	52%	48%	46%	50%	56%	48%	44%	51%	53%	48%	48%	55%
No	506	235	272	78	86	92	99	79	72	89	125	191	101	353	56	63
	51%	49%	52%	57%	48%	52%	54%	50%	44%	52%	56%	49%	47%	52%	52%	45%

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N1

Have you purchased sweet corn in the months of April and May this year?

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Unweighted Total	1008	235	144	237	171	221	201	408	399	747	261	200	116	254	309	445
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
Yes	494	119	74	126	78	98	81	182	231	331	163	126	69	173	138	184
	49%	42%	43%	57%BC	52%	56%BC	41%	48%	55%G	46%	58%J	57%	57%	47%	44%	56%O
No	506	166	99	94	71	76	117	197	192	388	118	94	53	192	172	142
	51%	58%DF	57%DF	43%	48%	44%	59%I	52%	45%	54%K	42%	43%	43%	53%	56%P	44%

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N2

How many times did you purchase sweet corn during April and May this year?

Base = Purchased sweet corn in April or May this year

		Sex		Age						Region				Race		
	Total (A)	Male (B)	Female (C)	18-24 (D)	25-34 (E)	35-44 (F)	45-54 (G)	55-64 (H)	65+ (I)	North-east (J)	Mid-west (K)	South (L)	West (M)	White Only (Non-Hisp) (N)	Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Unweighted Total	499	257	242	28	115	74	98	133	51	97	107	182	113	361	52	58
Weighted Total	494	241	253	60**	94*	84*	84*	80	92*	82*	100*	197	115*	327	53*	78*
1	74	26	48	3	12	12	12	13	22	10	15	23	26	53	9	8
	15%	11%	19%B	4%	13%	15%	14%	17%	24%	12%	15%	12%	22%	16%	18%	11%
2	144	78	66	23	30	26	17	27	20	21	25	62	36	98	7	27
	29%	32%	26%	39%	32%	31%	21%	34%	22%	25%	25%	32%	31%	30%O	12%	34%O
3	105	43	62	12	15	18	22	16	21	18	27	36	24	70	7	19
	21%	18%	24%	19%	16%	22%	26%	20%	23%	22%	27%	18%	21%	22%	13%	25%
4	80	41	39	10	18	8	18	9	17	22	20	30	7	54	19	6
	16%	17%	15%	16%	19%	10%	21%	11%	19%	27%M	20%M	15%	6%	16%	36%NP	7%
5 or more (Net)	92	54	38	13	19	19	15	15	11	11	14	45	22	52	11	18
	19%	22%	15%	21%	21%	23%	17%	18%	12%	14%	14%	23%	19%	16%	21%	23%
5-6 (Subnet)	62	40	21	4	14	15	12	7	9	7	10	35	10	38	9	11
	13%	17%C	8%	6%	15%	18%	15%	9%	10%	9%	10%	18%	9%	12%	16%	14%
5	32	22	10	4	8	7	3	4	7	3	3	17	8	22	3	5
	7%	9%	4%	6%	9%	8%	3%	5%	7%	4%	3%	9%	7%	7%	6%	6%
6	30	19	11	0	6	8	10	3	2	4	6	17	2	16	5	6
	6%	8%	4%	0	7%	9%	12%	4%	3%	5%	6%	9%	2%	5%	10%	8%
7 or more	30	13	17	9	5	4	2	7	2	4	4	10	12	14	2	7
	6%	5%	7%	15%	5%	5%	3%	9%	2%	5%	4%	5%	10%	4%	4%	9%
Mean	3.6	4.0	3.2	5.7	3.6	3.5	3.3	3.2	2.8	3.3	3.3	3.5	4.1	3.2	3.7	3.4
Standard Deviation	4.37	5.74	2.38	10.61	3.08	3.00	1.75	2.25	1.57	2.42	2.45	2.56	7.85	2.47	2.56	2.15
Standard Error	0.20	0.36	0.15	2.00	0.29	0.35	0.18	0.20	0.22	0.25	0.24	0.19	0.74	0.13	0.35	0.28
Median	3	3	3	3	3	3	3	2	3	3	3	3	2	3	4	3

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base; ** very small base (under 30) ineligible for sig testing

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N2

How many times did you purchase sweet corn during April and May this year?

Base = Purchased sweet corn in April or May this year

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Unweighted Total	499	98	59	131	86	125	76	201	222	345	154	118	68	119	138	242
Weighted Total	494	119*	74*	126*	78*	98*	81*	182	231	331	163	126*	69*	173*	138*	184
1	74	27	9	7	16	14	24	26	23	61	13	7	8	22	27	25
	15%	23%D	13%	6%	21%D	14%	30%HI	14%	10%	18%K	8%	6%	11%	13%	19%	14%
2	144	30	21	47	21	24	23	50	70	88	56	48	18	47	40	56
	29%	26%	28%	38%	28%	24%	29%	27%	31%	27%	34%	38%	26%	27%	29%	31%
3	105	21	20	26	16	22	7	49	49	69	35	24	18	35	32	37
	21%	17%	27%	21%	20%	22%	8%	27%G	21%G	21%	22%	19%	26%	20%	23%	20%
4	80	20	18	14	12	15	21	25	34	60	19	17	7	36	13	31
	16%	17%	25%	11%	15%	16%	26%	14%	15%	18%	12%	13%	10%	21%O	9%	17%
5 or more (Net)	92	20	5	31	12	23	6	32	54	52	40	30	19	33	25	34
	19%	17%	7%	25%C	16%	23%C	7%	17%	23%G	16%	24%	24%	27%	19%	18%	18%
5-6 (Subnet)	62	11	3	23	10	15	3	25	34	38	24	15	15	21	14	27
	13%	9%	4%	18%C	13%	16%C	4%	14%	15%	11%	15%	12%	22%	12%	10%	15%
5	32	6	2	12	5	7	2	14	17	19	14	8	9	10	7	15
	7%	5%	3%	10%	7%	7%	2%	8%	7%	6%	8%	7%	12%	6%	5%	8%
6	30	5	*	11	5	8	2	11	17	19	10	7	6	11	7	12
	6%	4%	1%	9%	6%	8%	2%	6%	7%	6%	6%	6%	9%	6%	5%	7%
7 or more	30	9	3	9	2	7	2	7	20	14	16	15	4	12	11	7
	6%	8%	3%	7%	3%	8%	3%	4%	9%	4%	10%	12%	5%	7%	8%	4%
Mean	3.6	3.2	3.2	4.4	3.0	3.7	2.7	3.1	4.2	3.1	4.4J	4.8	3.6	4.2	3.2	3.2
Standard Deviation	4.37	2.36	2.63	7.42	2.26	2.98	1.93	1.84	6.02	1.99	7.00	7.89	3.01	6.65	2.38	2.29
Standard Error	0.20	0.24	0.34	0.65	0.24	0.27	0.22	0.13	0.40	0.11	0.56	0.73	0.36	0.61	0.20	0.15
Median	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N3

On a scale of 1 to 5, with 5 being excellent and 1 being poor, how would you rate the flavor of the sweet corn you purchased during April and May?

Base = Purchased sweet corn in April or May this year

		Sex		Age						Region				Race		
	Total (A)	Male (B)	Fe-male (C)	18-24 (D)	25-34 (E)	35-44 (F)	45-54 (G)	55-64 (H)	65+ (I)	North -east (J)	Mid-west (K)	South (L)	West (M)	White Only (Non-Hisp) (N)	Black Only (Non-Hisp) (O)	His-panic (Any Race) (P)
Unweighted Total	499	257	242	28	115	74	98	133	51	97	107	182	113	361	52	58
Weighted Total	494	241	253	60**	94*	84*	84*	80	92*	82*	100*	197	115*	327	53*	78*
Excellent (5)	142	65	78	24	24	19	22	26	28	27	14	65	37	81	21	30
	29%	27%	31%	41%	26%	22%	26%	32%	30%	32%K	14%	33%K	32%K	25%	40%	38%
(4)	211	114	98	26	44	45	35	30	30	37	46	74	54	149	17	30
	43%	47%	39%	44%	47%	54%HI	42%	38%	33%	45%	46%	38%	47%	45%	32%	39%
(3)	117	54	64	9	21	16	22	20	28	17	31	53	17	78	14	16
	24%	22%	25%	15%	23%	19%	26%	25%	31%	20%	31%M	27%M	14%	24%	27%	20%
(2)	21	8	12	0	4	3	4	3	6	2	8	4	7	17	1	3
	4%	3%	5%	0	4%	3%	5%	4%	6%	2%	8%L	2%	6%	5%	2%	3%
Poor (1)	2	1	1	0	0	1	1	0	0	0	1	1	0	2	0	0
	*	*	*	0	0	1%	1%	0	0	0	1%	1%	0	1%	0	0
Top 2 Box (4-5)	354	178	176	51	68	64	57	56	58	64	60	139	92	230	38	60
	72%	74%	70%	85%	73%	76%	67%	70%	63%	78%K	60%	71%	79%K	70%	72%	77%
Bottom 2 Box (1-2)	23	9	13	0	4	4	5	3	6	2	9	5	7	19	1	3
	5%	4%	5%	0	4%	5%	6%	4%	6%	2%	9%L	3%	6%	6%	2%	3%
Mean	4.0	4.0	3.9	4.3	3.9	3.9	3.9	4.0	3.9	4.1K	3.6	4.0K	4.1K	3.9	4.1	4.1
Standard Deviation	0.85	0.82	0.89	0.71	0.81	0.82	0.91	0.87	0.93	0.78	0.86	0.86	0.84	0.86	0.86	0.84
Standard Error	0.04	0.05	0.06	0.13	0.08	0.09	0.09	0.08	0.13	0.08	0.08	0.06	0.08	0.05	0.12	0.11

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base; ** very small base (under 30) ineligible for sig testing

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N3

On a scale of 1 to 5, with 5 being excellent and 1 being poor, how would you rate the flavor of the sweet corn you purchased during April and May?

Base = Purchased sweet corn in April or May this year

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Unweighted Total	499	98	59	131	86	125	76	201	222	345	154	118	68	119	138	242
Weighted Total	494	119*	74*	126*	78*	98*	81*	182	231	331	163	126*	69*	173*	138*	184
Excellent (5)	142	40	24	44	13	21	24	61	57	102	40	36	16	57	45	40
	29%	34%E	32%	35%EF	17%	22%	30%	34%	25%	31%	25%	28%	23%	33%	33%P	22%
(4)	211	44	31	51	36	50	34	64	114	125	86	62	37	68	50	93
	43%	37%	41%	41%	47%	51%	42%	35%	49%H	38%	53%J	49%	53%	40%	36%	51%O
(3)	117	32	17	23	23	22	21	48	48	87	30	24	10	36	34	47
	24%	27%	23%	18%	30%	23%	26%	26%	21%	26%	19%	19%	15%	21%	25%	25%
(2)	21	3	3	6	4	5	1	10	10	15	5	4	5	10	7	4
	4%	2%	4%	5%	5%	5%	1%	5%	4%	5%	3%	3%	7%	6%	5%	2%
Poor (1)	2	0	0	1	1	0	1	0	1	1	1	1	1	1	1	0
	*	0	0	1%	1%	0	1%	0	*	*	1%	1%	2%	1%	1%	0
Top 2 Box (4-5)	354	84	54	96	50	71	58	125	171	228	126	97	53	125	95	133
	72%	71%	73%	76%	64%	72%	72%	68%	74%	69%	78%	77%	77%	73%	69%	73%
Bottom 2 Box (1-2)	23	3	3	7	5	5	2	10	11	16	6	5	6	11	8	4
	5%	2%	4%	6%	6%	5%	2%	5%	5%	5%	4%	4%	8%	6%	6%	2%
Mean	4.0	4.0	4.0	4.0E	3.7	3.9	4.0	4.0	3.9	3.9	4.0	4.0	3.9	4.0	4.0	3.9
Standard Deviation	0.85	0.84	0.84	0.90	0.85	0.80	0.84	0.90	0.82	0.89	0.79	0.82	0.89	0.91	0.92	0.74
Standard Error	0.04	0.08	0.11	0.08	0.09	0.07	0.10	0.06	0.06	0.05	0.06	0.08	0.11	0.08	0.08	0.05

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N4

What would entice you to purchase sweet corn more frequently during this April/May time period?

Base = Purchased sweet corn in April or May this year

		Sex		Age						Region				Race		
	Total (A)	Male (B)	Female (C)	18-24 (D)	25-34 (E)	35-44 (F)	45-54 (G)	55-64 (H)	65+ (I)	North-east (J)	Mid-west (K)	South (L)	West (M)	White Only (Non-Hisp) (N)	Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Unweighted Total	499	257	242	28	115	74	98	133	51	97	107	182	113	361	52	58
Weighted Total	494	241	253	60**	94*	84*	84*	80	92*	82*	100*	197	115*	327	53*	78*
Anything (Net)	422	212	210	53	81	72	74	70	72	71	91	159	100	271	46	73
	85%	88%	83%	89%	86%	86%	88%	88%	78%	86%	91%L	81%	87%	83%	88%	94%
If it is featured in a store ad/discounted pricing	222	105	117	28	32	43	36	39	44	34	38	94	56	145	30	30
	45%	44%	46%	48%	34%	51%E	43%	49%E	48%	41%	38%	48%	48%	44%	56%	38%
If it was available in more places where I live	101	57	45	20	29	13	17	18	4	24	20	25	31	65	9	20
	20%	23%	18%	34%	31%FI	15%	20%I	23%I	5%	30%L	20%	13%	27%L	20%	18%	26%
If the ears were offered in the husk	79	41	38	1	27	13	14	6	17	10	16	29	24	45	11	16
	16%	17%	15%	2%	29%FH	15%	17%	8%	19%	12%	16%	15%	21%	14%	22%	20%
Opportunity to sample it	74	37	37	9	14	19	13	13	6	12	24	21	17	38	12	15
	15%	15%	15%	14%	15%	23%I	16%	17%	6%	14%	24%L	11%	14%	11%	22%	19%
Larger/more attractive display at the store	62	37	25	18	13	10	9	9	2	9	13	25	14	34	12	9
	12%	15%	10%	30%	14%I	12%	11%	11%	2%	11%	13%	13%	12%	10%	23%N	11%
More availability of usage/recipe ideas	54	31	23	19	16	10	5	2	1	14	8	19	14	20	8	14
	11%	13%	9%	32%	17%GHI	12%HI	6%	3%	1%	17%	8%	10%	12%	6%	16%N	18%N
If there was more pre-packaged corn offered	42	30	12	3	19	9	3	5	4	8	8	18	8	27	4	8
	9%	13%C	5%	4%	20%GHI	11%	4%	6%	4%	9%	8%	9%	7%	8%	8%	10%
Any other reasons	40	22	18	0	5	5	9	9	11	4	18	13	4	34	3	3
	8%	9%	7%	0	5%	6%	11%	11%	12%	5%	18%JLM	7%	4%	10%	6%	3%
Nothing	72	29	43	7	13	12	10	10	21	11	9	37	15	57	6	5
	15%	12%	17%	11%	14%	14%	12%	12%	22%	14%	9%	19%K	13%	17%	12%	6%

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base; ** very small base (under 30) ineligible for sig testing

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N4

What would entice you to purchase sweet corn more frequently during this April/May time period?

Base = Purchased sweet corn in April or May this year

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Unweighted Total	499	98	59	131	86	125	76	201	222	345	154	118	68	119	138	242
Weighted Total	494	119*	74*	126*	78*	98*	81*	182	231	331	163	126*	69*	173*	138*	184
Anything (Net)	422	98	63	116	64	80	71	147	205	281	141	113	57	145	121	156
	85%	83%	86%	92%F	83%	82%	88%	80%	89%	85%	86%	90%	83%	84%	88%	85%
If it is featured in a store ad/discounted pricing	222	62	38	59	23	41	48	80	94	156	66	49	31	78	61	83
	45%	52%E	51%E	47%E	29%	42%	60%I	44%	41%	47%	41%	39%	45%	45%	44%	45%
If it was available in more places where I live	101	15	18	32	14	22	17	36	48	70	31	26	14	28	27	46
	20%	13%	24%	25%	18%	23%	20%	20%	21%	21%	19%	20%	20%	16%	19%	25%
If the ears were offered in the husk	79	13	12	30	10	14	16	29	34	53	26	21	12	20	26	34
	16%	11%	16%	24%B	13%	15%	20%	16%	15%	16%	16%	17%	17%	11%	19%	18%
Opportunity to sample it	74	17	10	17	14	15	14	24	36	57	17	12	11	22	19	33
	15%	14%	14%	13%	19%	16%	17%	13%	16%	17%	10%	9%	16%	13%	14%	18%
Larger/more attractive display at the store	62	12	7	21	8	13	8	18	36	38	24	22	6	17	20	24
	12%	10%	9%	17%	11%	13%	10%	10%	15%	11%	14%	18%	8%	10%	15%	13%
More availability of usage/recipe ideas	54	14	6	23	7	4	3	11	40	25	29	28	7	12	19	24
	11%	12%	8%	18%F	9%	4%	4%	6%	17%GH	7%	18%J	22%	10%	7%	13%	13%
If there was more pre-packaged corn offered	42	11	4	11	6	10	4	17	22	25	17	13	7	14	9	19
	9%	9%	6%	9%	8%	10%	4%	9%	10%	8%	10%	10%	10%	8%	6%	11%
Any other reasons	40	13	2	9	6	9	5	16	19	29	11	9	6	16	15	9
	8%	11%	3%	7%	8%	9%	6%	9%	8%	9%	7%	7%	8%	9%	11%	5%
Nothing	72	20	11	10	13	18	10	36	26	50	22	13	12	28	17	27
	15%	17%	14%	8%	17%	18%D	12%	20%	11%	15%	14%	10%	17%	16%	12%	15%

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N5

Which of the following are reasons why you did not purchase sweet corn during April and May of this year?

Base = Did not purchase sweet corn in April or May this year

		Sex		Age						Region				Race		
	Total (A)	Male (B)	Fe-male (C)	18-24 (D)	25-34 (E)	35-44 (F)	45-54 (G)	55-64 (H)	65+ (I)	North -east (J)	Mid-west (K)	South (L)	West (M)	White Only (Non-Hisp) (N)	Black Only (Non-Hisp) (O)	His-panic (Any Race) (P)
Unweighted Total	509	247	262	40	109	79	123	126	32	93	120	181	115	386	49	46
Weighted Total	506	235	272	78*	86*	92*	99*	79*	72**	89*	125*	191	101*	353	56*	63*
Availability was limited	108	49	60	18	13	16	25	19	18	21	29	38	20	82	7	9
	21%	21%	22%	23%	15%	17%	25%	23%	25%	24%	23%	20%	20%	23%	13%	14%
The price was too high	82	37	45	15	11	11	24	9	12	10	17	39	17	56	4	10
	16%	16%	17%	19%	12%	12%	25%EFH	12%	16%	11%	13%	20%	16%	16%	8%	16%
The quality or look was bad	47	25	21	5	6	10	14	7	4	8	19	10	10	35	2	5
	9%	11%	8%	7%	7%	11%	15%	8%	6%	9%	15%L	5%	10%	10%	4%	8%
My previous experiences were not good	23	9	14	5	2	2	7	3	4	4	9	4	5	17	*	2
	5%	4%	5%	6%	2%	2%	7%	4%	5%	5%	7%	2%	5%	5%	1%	3%
I was told by others the flavor wasn't good	19	9	10	4	2	2	2	4	5	7	6	5	1	14	1	0
	4%	4%	4%	5%	2%	2%	2%	5%	8%	7%M	5%	3%	1%	4%	2%	0
Any other reasons	263	123	141	39	52	54	42	44	32	48	55	106	55	175	41	40
	52%	52%	52%	50%	61%G	59%G	42%	55%	45%	54%	44%	55%	54%	50%	74%N	63%

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base; ** very small base (under 30) ineligible for sig testing

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N5

Which of the following are reasons why you did not purchase sweet corn during April and May of this year?

Base = Did not purchase sweet corn in April or May this year

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Unweighted Total	509	137	85	106	85	96	125	207	177	402	107	82	48	135	171	203
Weighted Total	506	166*	99*	94*	71*	76*	117*	197	192	388	118*	94*	53*	192*	172	142
Availability was limited	108	35	16	21	23	13	23	43	43	82	27	23	17	46	33	29
	21%	21%	16%	23%	32%CF	17%	19%	22%	22%	21%	23%	25%	31%	24%	19%	21%
The price was too high	82	39	14	15	8	6	12	33	37	62	21	18	8	37	30	15
	16%	24%F	14%	16%	11%	8%	10%	17%	20%	16%	17%	20%	15%	19%	18%	11%
The quality or look was bad	47	14	6	6	9	11	11	23	13	38	9	5	4	12	23	12
	9%	8%	7%	7%	13%	14%	9%	12%	7%	10%	7%	5%	7%	6%	13%	9%
My previous experiences were not good	23	5	7	3	2	5	5	7	11	16	7	5	5	10	5	8
	5%	3%	7%	3%	3%	7%	4%	4%	6%	4%	6%	6%	10%	5%	3%	6%
I was told by others the flavor wasn't good	19	8	4	3	3	1	*	12	6	14	5	3	2	11	6	1
	4%	5%	4%	4%	4%	1%	*	6%G	3%	4%	4%	3%	3%	6%P	4%	1%
Any other reasons	263	77	56	52	33	45	68	94	101	206	58	46	21	92	89	83
	52%	46%	56%	55%	47%	60%	58%	48%	53%	53%	49%	49%	39%	48%	52%	58%

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N6

If you had a choice of yellow, white or bicolor (mixed white and yellow kernels) fresh sweet corn on the cob, which would you be most likely to buy?

	Total (A)	Sex: Male (B)	Sex: Female (C)	Age: 18-24 (D)	Age: 25-34 (E)	Age: 35-44 (F)	Age: 45-54 (G)	Age: 55-64 (H)	Age: 65+ (I)	Region: North-east (J)	Region: Mid-west (K)	Region: South (L)	Region: West (M)	Race: White Only (Non-Hisp) (N)	Race: Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Unweighted Total	1008	504	504	68	224	153	221	259	83	190	227	363	228	747	101	104
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
Would buy (Net)	959	456	503	133	169	166	177	154	160	157	222	375	205	656	101	135
	96%	96%	96%	96%	94%	95%	97%	97%	97%	92%	99%J	97%	95%	96%	93%	95%
Any preference (Subnet)	764	359	405	112	133	127	130	121	141	132	180	292	161	504	86	115
	76%	75%	77%	81%	74%	73%	71%	76%	86%EFG	77%	80%	75%	74%	74%	79%	81%
Yellow	400	217	183	85	83	72	61	49	50	69	77	172	82	222	61	81
	40%	46%C	35%	61%EFGHI	46%GHI	41%	34%	31%	30%	41%	34%	44%K	38%	33%	56%N	57%N
White	146	56	90	8	16	18	29	33	42	28	16	61	41	108	16	14
	15%	12%	17%B	6%	9%	10%	16%D	21%DEF	25%DEF	16%K	7%	16%K	19%K	16%	15%	10%
Bicolor	219	86	133	20	33	38	40	39	49	35	87	59	38	174	9	20
	22%	18%	25%B	14%	19%	22%	22%	24%	30%D	20%	39%JLM	15%	18%	26%OP	9%	14%
No preference	194	97	97	20	36	39	47	33	19	25	42	83	44	152	15	20
	19%	20%	19%	15%	20%	22%	26%I	21%	12%	15%	18%	22%	21%	22%	14%	14%
Wouldn't buy fresh sweet corn on the cob	41	20	21	5	11	9	6	5	5	14	3	13	11	24	8	7
	4%	4%	4%	4%	6%	5%	3%	3%	3%	8%K	1%	3%	5%	4%	7%	5%

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N6

If you had a choice of yellow, white or bicolor (mixed white and yellow kernels) fresh sweet corn on the cob, which would you be most likely to buy?

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Unweighted Total	1008	235	144	237	171	221	201	408	399	747	261	200	116	254	309	445
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
Would buy (Net)	959	270	169	213	140	166	186	361	412	684	275	217	118	352	296	312
	96%	95%	98%	97%	95%	96%	94%	95%	97%	95%	98%	99%	96%	96%	96%	96%
Any preference (Subnet)	764	224	134	160	111	136	146	288	331	545	220	174	97	285	238	241
	76%	79%	78%	73%	75%	78%	74%	76%	78%	76%	78%	79%	79%	78%	77%	74%
Yellow	400	136	63	77	57	67	83	124	194	275	125	101	53	130	135	134
	40%	48%D	36%	35%	39%	39%	42%	33%	46%H	38%	44%	46%	43%	36%	44%	41%
White	146	45	24	27	15	35	30	67	49	116	30	25	9	58	40	47
	15%	16%	14%	12%	10%	20%E	15%	18%	12%	16%	11%	12%	7%	16%	13%	14%
Bicolor	219	44	48	56	38	33	33	98	88	153	65	48	35	96	62	60
	22%	15%	28%B	25%B	26%B	19%	17%	26%G	21%	21%	23%	22%	29%	26%P	20%	18%
No preference	194	46	35	53	29	31	40	74	81	139	55	42	21	66	58	70
	19%	16%	20%	24%	20%	18%	20%	19%	19%	19%	20%	19%	17%	18%	19%	22%
Wouldn't buy fresh sweet corn on the cob	41	14	4	7	8	8	12	18	11	35	6	3	4	13	14	15
	4%	5%	2%	3%	5%	4%	6%	5%	3%	5%	2%	1%	4%	4%	4%	4%

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N7 - Buy fresh sweet corn Summary

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

		Sex		Age						Region				Race		
	Total (A)	Male (B)	Female (C)	18-24 (D)	25-34 (E)	35-44 (F)	45-54 (G)	55-64 (H)	65+ (I)	North-east (J)	Mid-west (K)	South (L)	West (M)	White Only (Non-Hisp) (N)	Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Unweighted Total	1008	504	504	68	224	153	221	259	83	190	227	363	228	747	101	104
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
Any (Net)	847	397	450	98	142	154	163	138	151	143	199	329	177	600	82	107
	85%	83%	86%	71%	79%	88%DE	89%DE	87%D	92%DE G	83%	88%	85%	82%	88%OP	76%	75%
Unpackaged, in the husk, loose	771	358	414	87	125	141	142	129	147	130	189	288	165	561	63	91
	77%	75%	79%	63%	70%	80%DE	78%D	81%DE	90%DE G	76%	84%L	74%	76%	83%OP	58%	64%
Prepackaged, partially shucked	232	124	108	37	52	51	39	26	27	47	50	94	40	141	33	35
	23%	26%	21%	27%	29%HI	29%H	21%	16%	17%	28%	22%	24%	18%	21%	30%	25%
Prepackaged, completely shucked	342	165	178	44	68	72	63	45	51	71	69	135	68	211	51	59
	34%	35%	34%	32%	38%	41%H	34%	28%	31%	41%	30%	35%	31%	31%	47%N	42%
Microwave-ready package	193	104	89	34	49	46	32	18	14	43	25	91	34	103	38	38
	19%	22%	17%	25%HI	27%GHI	26%HI	17%	12%	8%	25%K	11%	23%K	16%	15%	35%N	26%N

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N7 - Buy fresh sweet corn Summary

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Unweighted Total	1008	235	144	237	171	221	201	408	399	747	261	200	116	254	309	445
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
Any (Net)	847	213	145	195	138	155	152	337	358	603	243	185	112	316	247	284
	85%	75%	84%	89%B	93%BC	89%B	77%	89%G	85%	84%	86%	84%	91%	87%	80%	87%O
Unpackaged, in the husk, loose	771	184	136	182	128	142	135	324	313	554	218	165	101	284	224	263
	77%	65%	79%B	83%B	86%B	81%B	68%	85%GI	74%	77%	77%	75%	83%	78%	73%	81%O
Prepackaged, partially shucked	232	59	35	59	42	36	44	77	111	154	78	59	37	85	65	81
	23%	21%	20%	27%	28%	21%	22%	20%	26%	21%	28%	27%	30%	23%	21%	25%
Prepackaged, completely shucked	342	94	56	73	61	60	58	125	159	225	117	88	54	131	102	109
	34%	33%	32%	33%	41%	34%	29%	33%	38%	31%	42%J	40%	44%	36%	33%	34%
Microwave-ready package	193	51	34	47	35	27	33	52	108	115	78	61	34	68	56	69
	19%	18%	19%	21%	24%	15%	17%	14%	25%H	16%	28%J	28%	28%	19%	18%	21%

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N7 - Mean (Including 0) Summary

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

		Sex		Age						Region				Race		
	Total (A)	Male (B)	Female (C)	18-24 (D)	25-34 (E)	35-44 (F)	45-54 (G)	55-64 (H)	65+ (I)	North-east (J)	Mid-west (K)	South (L)	West (M)	White Only (Non-Hisp) (N)	Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Unweighted Total	1008	504	504	68	224	153	221	259	83	190	227	363	228	747	101	104
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
Unpackaged, in the husk, loose	71.0	68.8	72.9	62.3	60.9	68.9	72.5E	77.6D EF	80.6D EF	65.7	79.0JL	65.0	77.4JL	76.6O P	44.8	57.1
Prepackaged, partially shucked	7.3	8.3	6.4	9.7	10.9FG H	6.7	5.1	5.5	6.7	8.6	6.0	8.3	5.8	6.4	10.9N	8.9
Prepackaged, completely shucked	14.4	15.0	13.8	15.9	16.0I	18.0I	15.7	11.8	9.0	16.1	10.5	16.7K	12.9	11.6	26.7N	22.3N
Microwave-ready package	7.4	8.0	6.9	12.1H I	12.2FG HI	6.3	6.8	5.1	3.7	9.6KM	4.5	10.0KM	3.9	5.4	17.7N	11.8N

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N7 - Mean (Including 0) Summary

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Unweighted Total	1008	235	144	237	171	221	201	408	399	747	261	200	116	254	309	445
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
Unpackaged, in the husk, loose	71.0	65.8	75.5	72.2	71.2	72.1	67.5	77.6G I	66.2	73.5 K	64.8	64.6	65.3	72.3	69.8	70.5
Prepackaged, partially shucked	7.3	7.9	6.4	8.1	7.0	6.4	9.4	6.2	7.3	6.9	8.1	8.6	7.0	6.9	6.1	8.7
Prepackaged, completely shucked	14.4	17.6	11.0	11.6	14.8	16.1	16.2	11.6	16.3H	13.3	16.9	16.3	18.4	13.2	18.0P	12.5
Microwave-ready package	7.4	8.7	7.1	8.0	7.0	5.3	6.9	4.6	10.3H	6.3	10.2J	10.4	9.2	7.6	6.0	8.4

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N7A

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

A. Unpackaged, in the husk, loose

	Total (A)	Sex: Male (B)	Sex: Female (C)	Age: 18-24 (D)	Age: 25-34 (E)	Age: 35-44 (F)	Age: 45-54 (G)	Age: 55-64 (H)	Age: 65+ (I)	Region: North-east (J)	Region: Mid-west (K)	Region: South (L)	Region: West (M)	Race: White Only (Non-Hisp) (N)	Race: Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Unweighted Total	1008	504	504	68	224	153	221	259	83	190	227	363	228	747	101	104
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
Ever (Net)	771	358	414	87	125	141	142	129	147	130	189	288	165	561	63	91
	77%	75%	79%	63%	70%	80%DE	78%D	81%DE	90%DE G	76%	84%L	74%	76%	83%OP	58%	64%
1 - 50% (Subnet)	199	95	103	32	47	41	27	28	23	42	37	90	31	114	38	34
	20%	20%	20%	23%	26%GI	23%	15%	18%	14%	24%M	16%	23%M	14%	17%	35%N	24%
1 - 10%	25	11	13	3	7	4	1	4	5	5	3	16	1	13	1	9
	2%	2%	3%	2%	4%G	2%	1%	3%	3%	3%	1%	4%M	*	2%	1%	6%N
11 - 20%	30	16	14	6	3	8	1	3	10	11	3	13	4	12	7	8
	3%	3%	3%	4%	2%	5%G	1%	2%	6%G	6%K	1%	3%	2%	2%	6%N	5%N
21 - 30%	53	29	24	6	21	8	13	5	0	15	7	23	8	33	11	7
	5%	6%	5%	4%	12%FHI	4%	7%I	3%	0	9%K	3%	6%	4%	5%	10%	5%
31 - 40%	21	14	8	6	7	4	2	3	0	6	2	10	3	17	3	1
	2%	3%	1%	4%	4%	2%	1%	2%	0	3%	1%	3%	2%	2%	3%	*
41 - 50%	70	25	44	12	9	18	10	13	9	6	21	28	15	40	17	10
	7%	5%	8%	9%	5%	10%	5%	8%	5%	3%	10%J	7%	7%	6%	15%N	7%
51% or more (Subnet)	573	263	310	54	78	100	115	101	124	88	152	198	134	447	26	57
	57%	55%	59%	39%	43%	57%DE	63%DE	64%DE	75%DE F	52%	68%JL	51%	62%L	66%OP	24%	40%O
51 - 60%	23	14	9	4	1	9	2	2	6	3	3	11	7	17	1	4
	2%	3%	2%	3%	*	5%E	1%	1%	4%	1%	1%	3%	3%	2%	1%	3%
61 - 70%	21	13	7	2	4	3	5	4	3	1	11	7	2	12	5	2
	2%	3%	1%	2%	2%	2%	3%	2%	2%	1%	5%J	2%	1%	2%	5%	1%

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N7A

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

A. Unpackaged, in the husk, loose

	Total (A)	Sex: Male (B)	Sex: Female (C)	Age: 18-24 (D)	Age: 25-34 (E)	Age: 35-44 (F)	Age: 45-54 (G)	Age: 55-64 (H)	Age: 65+ (I)	Region: North-east (J)	Region: Mid-west (K)	Region: South (L)	Region: West (M)	Race: White Only (Non-Hisp) (N)	Race: Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
71 - 80%	68	33	35	6	13	11	11	6	22	17	14	18	19	48	2	10
	7%	7%	7%	5%	7%	6%	6%	4%	13%H	10%L	6%	5%	9%	7%	2%	7%
81 - 90%	46	18	28	0	6	11	12	9	7	7	14	14	11	37	0	6
	5%	4%	5%	0	3%	6%D	7%D	5%D	5%	4%	6%	4%	5%	5%O	0	4%
91 - 99%	22	6	17	0	1	5	3	3	10	3	8	5	6	22	1	0
	2%	1%	3%	0	1%	3%	2%	2%	6%E	2%	4%	1%	3%	3%	1%	0
100%	393	179	214	42	53	61	83	78	76	57	102	144	89	312	17	35
	39%	38%	41%	30%	30%	35%	45%DE	49%DEF	46%E	34%	46%J	37%	41%	46%OP	16%	25%
Never (0)	75	39	36	12	17	13	22	8	4	13	10	41	11	39	19	16
	8%	8%	7%	8%	9%I	7%	12%HI	5%	2%	7%	4%	11%K	5%	6%	17%N	11%
Do not buy fresh sweet corn on the cob	153	79	74	40	38	21	20	21	13	28	26	59	40	80	27	35
	15%	17%	14%	29%FGHI	21%FGI	12%	11%	13%	8%	17%	12%	15%	18%	12%	24%N	25%N
Mean (Including 0)	71.0	68.8	72.9	62.3	60.9	68.9	72.5E	77.6DEF	80.6DEF	65.7	79.0JL	65.0	77.4JL	76.6OP	44.8	57.1
Standard Deviation (Including 0)	35.81	36.60	35.04	37.91	38.73	35.08	37.12	33.27	29.14	37.79	30.23	38.75	31.47	33.02	36.04	39.84
Standard Error (Including 0)	1.22	1.76	1.68	5.42	2.93	3.01	2.62	2.19	3.34	2.96	2.11	2.20	2.28	1.29	4.08	4.37
Median (Including 0)	75	70	80	35	40	75	90	96	95	70	90	60	80	90	25	25
Mean (Excluding 0)	77.9	76.3	79.2	70.6	69.1	75.3	83.5DEF	82.6DEF	82.7DE	72.2	83.2JL	74.2	82.8JL	82.0OP	57.9	66.9
Standard Deviation (Excluding 0)	29.48	30.15	28.86	32.22	33.65	29.36	25.78	27.61	26.42	33.16	24.71	32.07	24.78	27.00	30.19	34.64

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

Question N7A

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

A. Unpackaged, in the husk, loose

		Sex		Age						Region				Race		
	Total (A)	Male (B)	Fe-male (C)	18-24 (D)	25-34 (E)	35-44 (F)	45-54 (G)	55-64 (H)	65+ (I)	North -east (J)	Mid-west (K)	South (L)	West (M)	White Only (Non-Hisp) (N)	Black Only (Non-Hisp) (O)	His-panic (Any Race) (P)
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
Standard Error (Excluding 0)	1.04	1.51	1.44	4.91	2.71	2.64	1.90	1.87	3.09	2.70	1.77	1.95	1.86	1.08	3.80	4.17
Median (Excluding 0)	100	99	100	80	80	90	100	100	100	90	100	97	100	100	50	75

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N7A

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

A. Unpackaged, in the husk, loose

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Unweighted Total	1008	235	144	237	171	221	201	408	399	747	261	200	116	254	309	445
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
Ever (Net)	771	184	136	182	128	142	135	324	313	554	218	165	101	284	224	263
	77%	65%	79%B	83%B	86%B	81%B	68%	85%GI	74%	77%	77%	75%	83%	78%	73%	81%O
1 - 50% (Subnet)	199	54	30	49	33	32	40	67	91	125	74	57	34	60	62	77
	20%	19%	18%	22%	22%	18%	20%	18%	22%	17%	26%J	26%	28%	16%	20%	23%
1 - 10%	25	9	2	8	2	4	5	8	11	19	6	5	3	9	7	8
	2%	3%	1%	3%	1%	2%	3%	2%	3%	3%	2%	2%	2%	3%	2%	3%
11 - 20%	30	7	0	4	11	9	9	15	7	24	7	6	5	9	8	14
	3%	2%	0	2%	7%BCD	5%C	4%	4%	2%	3%	2%	3%	4%	2%	3%	4%
21 - 30%	53	13	14	11	7	8	6	15	32	26	26	20	13	25	12	16
	5%	5%	8%	5%	5%	5%	3%	4%	8%	4%	9%J	9%	11%	7%	4%	5%
31 - 40%	21	5	4	7	3	2	5	4	12	10	11	10	2	2	7	12
	2%	2%	2%	3%	2%	1%	3%	1%	3%	1%	4%J	4%	2%	1%	2%	4%N
41 - 50%	70	20	11	20	10	9	15	26	28	46	24	16	11	15	28	27
	7%	7%	6%	9%	7%	5%	8%	7%	7%	6%	8%	7%	9%	4%	9%N	8%
51% or more (Subnet)	573	130	106	133	95	110	95	257	221	429	144	108	67	224	162	187
	57%	45%	61%B	60%B	64%B	63%B	48%	68%GI	52%	60%K	51%	49%	55%	61%	53%	57%
51 - 60%	23	5	4	4	3	6	0	14	9	17	6	2	5	3	12	7
	2%	2%	3%	2%	2%	3%	0	4%G	2%	2%	2%	1%	4%	1%	4%N	2%
61 - 70%	21	1	8	6	4	3	6	8	6	16	4	4	1	6	6	9
	2%	*	4%B	3%	2%	2%	3%	2%	1%	2%	2%	2%	1%	2%	2%	3%
71 - 80%	68	15	7	18	15	13	10	27	31	42	26	17	10	30	16	23
	7%	5%	4%	8%	10%	8%	5%	7%	7%	6%	9%	8%	8%	8%	5%	7%

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N7A

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

A. Unpackaged, in the husk, loose

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
81 - 90%	46	9	11	12	6	8	6	24	16	34	11	9	5	21	14	10
	5%	3%	6%	5%	4%	5%	3%	6%	4%	5%	4%	4%	4%	6%	5%	3%
91 - 99%	22	7	6	4	3	2	4	10	9	19	3	2	3	11	9	3
	2%	3%	3%	2%	2%	1%	2%	3%	2%	3%	1%	1%	3%	3%	3%	1%
100%	393	92	70	90	64	77	68	174	151	300	93	73	43	153	106	134
	39%	32%	41%	41%	43%	44%B	35%	46%GI	36%	42%K	33%	33%	35%	42%	34%	41%
Never (0)	75	29	9	13	10	14	18	13	45	50	26	19	11	32	23	21
	8%	10%	5%	6%	7%	8%	9%H	3%	11%H	7%	9%	9%	9%	9%	7%	6%
Do not buy fresh sweet corn on the cob	153	72	29	25	10	18	45	43	65	115	38	35	10	49	62	42
	15%	25%DEF	16%E	11%	7%	11%	23%H	11%	15%	16%	14%	16%	9%	13%	20%P	13%
Mean (Including 0)	71.0	65.8	75.5	72.2	71.2	72.1	67.5	77.6GI	66.2	73.5K	64.8	64.6	65.3	72.3	69.8	70.5
Standard Deviation (Including 0)	35.81	39.09	32.38	34.43	35.14	36.07	37.72	31.38	37.96	35.27	36.47	37.16	36.60	36.79	35.38	35.16
Standard Error (Including 0)	1.22	2.92	2.98	2.36	2.80	2.54	3.01	1.64	2.05	1.40	2.40	2.83	3.54	2.47	2.23	1.77
Median (Including 0)	75	50	85	80	80	90	50	90	70	80	60	50	75	90	60	75
Mean (Excluding 0)	77.9	76.2	80.3	77.5	76.9	79.2	76.4	80.7	75.6	80.1K	72.4	72.2	72.2	80.4	76.9	76.0
Standard Deviation (Excluding 0)	29.48	31.18	27.04	29.41	29.85	29.42	30.48	27.84	30.52	28.78	30.57	31.53	31.31	29.16	28.91	30.21
Standard Error (Excluding 0)	1.04	2.47	2.59	2.10	2.45	2.17	2.58	1.49	1.74	1.18	2.13	2.54	3.18	2.06	1.91	1.58
Median (Excluding 0)	100	100	100	99	99	100	100	100	96	100	80	90	90	100	95	100

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N7B

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

B. Prepackaged, partially shucked

	Total (A)	Sex: Male (B)	Sex: Female (C)	Age: 18-24 (D)	Age: 25-34 (E)	Age: 35-44 (F)	Age: 45-54 (G)	Age: 55-64 (H)	Age: 65+ (I)	Region: North-east (J)	Region: Mid-west (K)	Region: South (L)	Region: West (M)	Race: White Only (Non-Hisp) (N)	Race: Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Unweighted Total	1008	504	504	68	224	153	221	259	83	190	227	363	228	747	101	104
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
Ever (Net)	232	124	108	37	52	51	39	26	27	47	50	94	40	141	33	35
	23%	26%	21%	27%	29%HI	29%H	21%	16%	17%	28%	22%	24%	18%	21%	30%	25%
1 - 50% (Subnet)	217	116	101	36	48	50	38	23	21	44	48	87	37	132	31	33
	22%	24%	19%	26%H	27%HI	29%HI	21%	14%	13%	26%	22%	23%	17%	19%	28%	23%
1 - 10%	67	32	35	8	9	17	16	9	8	15	20	22	11	44	5	11
	7%	7%	7%	6%	5%	10%	9%	6%	5%	9%	9%	6%	5%	7%	5%	8%
11 - 20%	46	29	17	8	10	17	2	3	7	11	7	22	7	24	8	8
	5%	6%	3%	6%	5%G	10%GH	1%	2%	4%	6%	3%	6%	3%	4%	7%	6%
21 - 30%	60	37	23	13	21	7	13	6	1	11	11	25	13	35	11	6
	6%	8%	4%	10%I	11%FHI	4%	7%I	4%	1%	6%	5%	7%	6%	5%	10%	4%
31 - 40%	21	7	14	2	2	7	2	2	5	7	6	5	4	14	6	2
	2%	2%	3%	2%	1%	4%	1%	1%	3%	4%	3%	1%	2%	2%	5%	1%
41 - 50%	22	10	12	4	8	2	4	3	1	1	5	14	2	15	*	6
	2%	2%	2%	3%	4%	1%	2%	2%	1%	1%	2%	4%	1%	2%	*	4%
51% or more (Subnet)	15	9	6	1	3	1	1	3	6	3	2	7	2	10	2	3
	1%	2%	1%	1%	2%	*	*	2%	4%	2%	1%	2%	1%	1%	2%	2%
51 - 60%	1	1	0	0	0	1	1	0	0	1	0	0	1	1	0	1
	*	*	0	0	0	*	*	0	0	*	0	0	*	*	0	*
61 - 70%	1	1	0	0	0	0	0	1	0	0	0	1	0	0	1	0
	*	*	0	0	0	0	0	*	0	0	0	*	0	0	1%	0
71 - 80%	1	1	0	0	0	0	0	1	0	0	0	1	0	1	0	0
	*	*	0	0	0	0	0	1%	0	0	0	*	0	*	0	0

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N7B

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

B. Prepackaged, partially shucked

	Total (A)	Sex: Male (B)	Sex: Female (C)	Age: 18-24 (D)	Age: 25-34 (E)	Age: 35-44 (F)	Age: 45-54 (G)	Age: 55-64 (H)	Age: 65+ (I)	Region: North-east (J)	Region: Mid-west (K)	Region: South (L)	Region: West (M)	Race: White Only (Non-Hisp) (N)	Race: Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
81 - 90%	7	2	4	0	1	0	0	1	5	1	2	4	0	6	0	0
	1%	*	1%	0	*	0	0	1%	3%	*	1%	1%	0	1%	0	0
91 - 99%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100%	5	3	2	1	3	0	0	1	1	2	0	2	2	2	1	2
	1%	1%	*	1%	1%	0	0	*	1%	1%	0	*	1%	*	1%	1%
Never (0)	615	273	342	61	90	103	125	112	124	95	148	234	137	459	50	72
	61%	57%	65%B	44%	50%	59%	68%DE	70%DE F	75%DE F	56%	66%	60%	63%	68%OP	46%	50%
Do not buy fresh sweet corn on the cob	153	79	74	40	38	21	20	21	13	28	26	59	40	80	27	35
	15%	17%	14%	29%FG HI	21%FG I	12%	11%	13%	8%	17%	12%	15%	18%	12%	24%N	25%N
Mean (Including 0)	7.3	8.3	6.4	9.7	10.9FG H	6.7	5.1	5.5	6.7	8.6	6.0	8.3	5.8	6.4	10.9N	8.9
Standard Deviation (Including 0)	16.13	16.74	15.54	16.83	19.54	12.20	11.54	15.58	19.55	17.53	14.07	17.51	14.25	15.56	17.59	18.26
Standard Error (Including 0)	0.55	0.81	0.74	2.40	1.48	1.05	0.82	1.03	2.24	1.37	0.98	1.00	1.03	0.61	1.99	2.00
Median (Including 0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean (Excluding 0)	26.5	26.3	26.7	25.6	30.0F	20.4	21.6	29.0F	37.1	25.9	23.5	28.8	25.6	27.0	27.4	26.9
Standard Deviation (Excluding 0)	21.00	20.47	21.69	18.53	21.84	13.14	14.45	24.83	31.75	21.96	19.29	21.88	19.94	21.77	18.12	23.02
Standard Error (Excluding 0)	1.40	1.86	2.12	4.37	2.89	2.03	2.15	3.58	7.94	3.31	2.81	2.31	2.97	1.76	3.25	4.52

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

Question N7B

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

B. Prepackaged, partially shucked

		Sex		Age						Region				Race		
	Total (A)	Male (B)	Female (C)	18-24 (D)	25-34 (E)	35-44 (F)	45-54 (G)	55-64 (H)	65+ (I)	North-east (J)	Mid-west (K)	South (L)	West (M)	White Only (Non-Hisp) (N)	Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
Median (Excluding 0)	21	21	25	21	25	20	25	25	20	20	20	25	21	25	25	20

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N7B

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

B. Prepackaged, partially shucked

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Unweighted Total	1008	235	144	237	171	221	201	408	399	747	261	200	116	254	309	445
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
Ever (Net)	232	59	35	59	42	36	44	77	111	154	78	59	37	85	65	81
	23%	21%	20%	27%	28%	21%	22%	20%	26%	21%	28%	27%	30%	23%	21%	25%
1 - 50% (Subnet)	217	55	34	55	39	34	39	70	108	142	75	57	35	82	62	73
	22%	19%	20%	25%	26%	20%	20%	18%	26%H	20%	27%J	26%	28%	22%	20%	22%
1 - 10%	67	10	9	18	17	13	8	27	32	49	19	11	15	24	23	21
	7%	4%	5%	8%	12%B	8%	4%	7%	8%	7%	7%	5%	12%	7%	7%	6%
11 - 20%	46	17	3	11	12	3	9	16	22	31	15	12	5	13	17	17
	5%	6%F	2%	5%	8%CF	1%	4%	4%	5%	4%	5%	6%	4%	4%	5%	5%
21 - 30%	60	19	15	14	4	8	11	14	35	34	27	19	11	29	15	17
	6%	7%	9%	6%	3%	5%	5%	4%	8%H	5%	9%J	9%	9%	8%	5%	5%
31 - 40%	21	6	2	3	4	6	8	7	6	15	6	6	2	8	4	9
	2%	2%	1%	2%	2%	4%	4%	2%	1%	2%	2%	3%	2%	2%	1%	3%
41 - 50%	22	3	5	8	2	4	3	6	13	13	9	8	1	8	4	10
	2%	1%	3%	4%	1%	2%	1%	2%	3%	2%	3%	4%	1%	2%	1%	3%
51% or more (Subnet)	15	5	1	4	3	2	5	7	2	12	2	2	2	4	3	8
	1%	2%	1%	2%	2%	1%	3%	2%	1%	2%	1%	1%	1%	1%	1%	3%
51 - 60%	1	0	0	1	0	0	0	0	1	0	1	1	1	0	0	1
	*	0	0	1%	0	0	0	0	*	0	*	1%	*	0	0	*
61 - 70%	1	0	1	0	0	0	0	1	0	1	0	0	0	0	1	0
	*	0	*	0	0	0	0	*	0	*	0	0	0	0	*	0
71 - 80%	1	0	0	0	*	*	0	1	0	1	0	0	0	0	0	1
	*	0	0	0	*	*	0	*	0	*	0	0	0	0	0	*

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N7B

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

B. Prepackaged, partially shucked

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
81 - 90%	7	4	*	1	1	0	4	3	0	7	0	0	0	4	0	3
	1%	1%	*	*	1%	0	2%I	1%	0	1%	0	0	0	1%	0	1%
91 - 99%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100%	5	1	0	2	1	2	1	3	1	4	1	1	1	0	2	3
	1%	*	0	1%	1%	1%	1%	1%	*	1%	*	1%	1%	0	1%	1%
Never (0)	615	154	109	136	96	119	108	260	247	449	165	126	76	230	182	203
	61%	54%	63%	62%	65%	69%B	55%	68%GI	58%	63%	59%	57%	62%	63%	59%	62%
Do not buy fresh sweet corn on the cob	153	72	29	25	10	18	45	43	65	115	38	35	10	49	62	42
	15%	25%DEF	16%E	11%	7%	11%	23%H	11%	15%	16%	14%	16%	9%	13%	20%P	13%
Mean (Including 0)	7.3	7.9	6.4	8.1	7.0	6.4	9.4	6.2	7.3	6.9	8.1	8.6	7.0	6.9	6.1	8.7
Standard Deviation (Including 0)	16.13	17.00	13.99	16.97	16.08	15.84	19.82	16.39	13.96	16.56	15.00	15.93	14.55	15.03	13.99	18.79
Standard Error (Including 0)	0.55	1.27	1.29	1.17	1.28	1.12	1.58	0.86	0.75	0.66	0.99	1.21	1.41	1.01	0.88	0.95
Median (Including 0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean (Excluding 0)	26.5	28.2	26.2	26.9	23.1	27.4	32.5	27.2	23.6	27.1	25.3	27.0	21.6	25.6	23.1	30.2
Standard Deviation (Excluding 0)	21.00	21.63	16.95	21.27	22.03	22.50	24.72	24.61	15.64	23.03	16.34	17.26	18.43	18.99	18.72	24.18
Standard Error (Excluding 0)	1.40	3.19	3.15	2.68	3.32	3.39	4.06	2.67	1.53	1.87	1.89	2.25	3.16	2.61	2.27	2.36
Median (Excluding 0)	21	25	25	21	20	25	25	20	21	20	25	25	20	25	20	25

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N7C

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

C. Prepackaged, completely shucked

	Total (A)	Sex: Male (B)	Sex: Female (C)	Age: 18-24 (D)	Age: 25-34 (E)	Age: 35-44 (F)	Age: 45-54 (G)	Age: 55-64 (H)	Age: 65+ (I)	Region: North-east (J)	Region: Mid-west (K)	Region: South (L)	Region: West (M)	Race: White Only (Non-Hisp) (N)	Race: Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Unweighted Total	1008	504	504	68	224	153	221	259	83	190	227	363	228	747	101	104
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
Ever (Net)	342	165	178	44	68	72	63	45	51	71	69	135	68	211	51	59
	34%	35%	34%	32%	38%	41%H	34%	28%	31%	41%	30%	35%	31%	31%	47%N	42%
1 - 50% (Subnet)	287	135	151	40	56	57	48	38	48	63	59	105	60	181	41	46
	29%	28%	29%	29%	31%	32%	26%	24%	29%	37%	26%	27%	28%	27%	38%N	33%
1 - 10%	76	34	42	4	14	16	16	12	14	16	27	19	14	60	3	8
	8%	7%	8%	3%	8%	9%	9%	7%	9%	9%	12%L	5%	7%	9%	3%	5%
11 - 20%	60	30	30	6	8	14	11	6	15	16	11	20	13	34	7	14
	6%	6%	6%	5%	5%	8%	6%	4%	9%	9%	5%	5%	6%	5%	7%	10%
21 - 30%	74	41	32	11	26	13	9	8	6	13	7	37	16	47	13	11
	7%	9%	6%	8%	15%GHI	7%	5%	5%	4%	8%	3%	10%K	7%	7%	12%	8%
31 - 40%	25	13	12	6	1	7	2	2	6	11	2	9	3	14	6	2
	2%	3%	2%	5%	1%	4%E	1%	1%	3%	6%KM	1%	2%	1%	2%	5%	1%
41 - 50%	52	18	34	12	6	7	10	10	6	8	10	20	14	26	12	11
	5%	4%	7%	9%	4%	4%	5%	6%	4%	4%	5%	5%	6%	4%	11%N	8%
51% or more (Subnet)	56	30	26	4	11	15	15	7	3	7	10	30	8	31	10	13
	6%	6%	5%	3%	6%	9%I	8%I	4%	2%	4%	4%	8%	4%	4%	9%	9%
51 - 60%	1	0	1	0	1	0	0	0	0	0	0	1	0	0	1	0
	*	0	*	0	1%	0	0	0	0	0	0	*	0	0	1%N	0
61 - 70%	6	4	2	2	2	1	2	0	0	0	2	3	1	5	1	1
	1%	1%	*	1%	1%	*	1%	0	0	0	1%	1%	*	1%	1%	1%
71 - 80%	13	8	5	2	2	4	2	2	1	*	2	8	3	3	3	6
	1%	2%	1%	2%	1%	2%	1%	1%	1%	*	1%	2%	1%	1%	3%N	4%N

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

Question N7C

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

C. Prepackaged, completely shucked

	Total (A)	Sex: Male (B)	Sex: Female (C)	Age: 18-24 (D)	Age: 25-34 (E)	Age: 35-44 (F)	Age: 45-54 (G)	Age: 55-64 (H)	Age: 65+ (I)	Region: North-east (J)	Region: Mid-west (K)	Region: South (L)	Region: West (M)	Race: White Only (Non-Hisp) (N)	Race: Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
81 - 90%	4	1	3	0	2	0	1	*	0	1	1	2	0	3	1	0
	*	*	*	0	1%	0	1%	*	0	*	*	1%	0	*	1%	0
91 - 99%	1	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0
	*	0	*	0	1%	0	0	0	0	1%	0	0	0	0	0	0
100%	30	17	13	0	3	11	11	4	1	5	6	15	4	20	4	6
	3%	4%	2%	0	2%	6%DE	6%DE	3%	1%	3%	3%	4%	2%	3%	4%	4%
Never (0)	504	232	272	54	74	82	101	93	100	72	130	194	109	389	31	47
	50%	49%	52%	39%	41%	47%	55%DE	58%DE F	61%DE	42%	58%J	50%	50%	57%OP	29%	33%
Do not buy fresh sweet corn on the cob	153	79	74	40	38	21	20	21	13	28	26	59	40	80	27	35
	15%	17%	14%	29%FG HI	21%FG I	12%	11%	13%	8%	17%	12%	15%	18%	12%	24%N	25%N
Mean (Including 0)	14.4	15.0	13.8	15.9	16.0I	18.0I	15.7	11.8	9.0	16.1	10.5	16.7K	12.9	11.6	26.7N	22.3N
Standard Deviation (Including 0)	24.95	25.62	24.36	21.85	24.78	29.05	28.72	23.41	17.73	24.49	22.29	27.38	22.89	22.92	29.00	29.63
Standard Error (Including 0)	0.85	1.23	1.17	3.12	1.87	2.49	2.03	1.54	2.03	1.92	1.56	1.56	1.66	0.89	3.28	3.25
Median (Including 0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean (Excluding 0)	35.5	36.1	35.0	35.6	33.5	38.4	40.8	36.5	26.8	32.3	30.5	40.8K	33.5	33.0	43.0	40.1
Standard Deviation (Excluding 0)	28.07	28.64	27.59	19.11	26.48	31.87	33.57	28.21	21.44	26.12	28.88	29.11	25.92	28.12	25.53	29.41
Standard Error (Excluding 0)	1.55	2.29	2.11	4.17	3.08	4.05	4.10	3.19	4.20	3.19	3.40	2.62	3.19	1.90	3.61	4.43
Median (Excluding 0)	25	25	25	35	25	25	25	25	20	25	20	25	25	25	40	25

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N7C

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

C. Prepackaged, completely shucked

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Unweighted Total	1008	235	144	237	171	221	201	408	399	747	261	200	116	254	309	445
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
Ever (Net)	342	94	56	73	61	60	58	125	159	225	117	88	54	131	102	109
	34%	33%	32%	33%	41%	34%	29%	33%	38%	31%	42%J	40%	44%	36%	33%	34%
1 - 50% (Subnet)	287	78	51	63	52	43	46	113	128	188	99	75	43	114	77	96
	29%	27%	29%	29%	35%	25%	23%	30%	30%	26%	35%J	34%	35%	31%	25%	30%
1 - 10%	76	15	21	19	12	9	8	35	34	55	21	18	8	40	18	19
	8%	5%	12%B	9%	8%	5%	4%	9%	8%	8%	8%	8%	6%	11%P	6%	6%
11 - 20%	60	13	7	14	14	12	9	25	27	39	21	13	13	15	17	28
	6%	4%	4%	6%	10%	7%	4%	7%	6%	5%	8%	6%	11%	4%	5%	9%N
21 - 30%	74	19	13	16	12	13	10	20	43	37	36	28	14	35	13	26
	7%	7%	8%	7%	8%	7%	5%	5%	10%H	5%	13%J	13%	12%	10%O	4%	8%
31 - 40%	25	11	0	4	6	4	9	11	5	20	5	4	2	7	10	8
	2%	4%C	0	2%	4%C	2%	4%I	3%	1%	3%	2%	2%	1%	2%	3%	2%
41 - 50%	52	20	9	10	8	5	11	22	19	37	15	11	7	17	19	16
	5%	7%	5%	5%	5%	3%	5%	6%	5%	5%	5%	5%	6%	5%	6%	5%
51% or more (Subnet)	56	16	5	9	9	16	12	12	31	38	18	13	11	17	26	13
	6%	6%	3%	4%	6%	9%C	6%	3%	7%H	5%	6%	6%	9%	5%	8%P	4%
51 - 60%	1	0	1	1	0	0	1	0	1	1	0	0	0	0	0	1
	*	0	*	*	0	0	*	0	*	*	0	0	0	0	0	*
61 - 70%	6	3	0	1	0	2	1	2	3	5	2	2	0	1	3	2
	1%	1%	0	1%	0	1%	*	1%	1%	1%	1%	1%	0	*	1%	1%
71 - 80%	13	0	0	2	5	5	3	3	7	9	4	3	3	2	9	3
	1%	0	0	1%	4%BC	3%B	1%	1%	2%	1%	1%	1%	3%	*	3%N	1%

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N7C

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

C. Prepackaged, completely shucked

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
81 - 90%	4	1	1	1	0	*	1	1	2	3	1	1	0	1	1	1
	*	*	1%	1%	0	*	*	*	*	*	*	*	0	*	*	*
91 - 99%	1	1	0	0	0	0	0	0	1	0	1	1	0	1	0	0
	*	*	0	0	0	0	0	0	*	0	*	1%	0	*	0	0
100%	30	11	4	4	3	9	7	6	17	20	10	7	7	12	13	6
	3%	4%	2%	2%	2%	5%	3%	2%	4%	3%	4%	3%	6%	3%	4%	2%
Never (0)	504	119	89	123	77	96	94	211	198	378	126	96	58	185	144	175
	50%	42%	51%	56%B	52%	55%B	48%	56%I	47%	53%	45%	44%	48%	51%	47%	54%
Do not buy fresh sweet corn on the cob	153	72	29	25	10	18	45	43	65	115	38	35	10	49	62	42
	15%	25%DEF	16%E	11%	7%	11%	23%H	11%	15%	16%	14%	16%	9%	13%	20%P	13%
Mean (Including 0)	14.4	17.6	11.0	11.6	14.8	16.1	16.2	11.6	16.3H	13.3	16.9	16.3	18.4	13.2	18.0P	12.5
Standard Deviation (Including 0)	24.95	27.35	21.31	21.87	24.03	28.39	27.11	21.16	27.03	24.43	26.08	25.42	28.39	24.05	29.00	21.67
Standard Error (Including 0)	0.85	2.04	1.96	1.50	1.92	2.00	2.16	1.11	1.46	0.97	1.72	1.93	2.74	1.61	1.83	1.09
Median (Including 0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean (Excluding 0)	35.5	40.1	28.4	31.3	33.6	42.2	42.5H	31.1	36.5	35.7	35.1	34.1	38.5	32.0	43.4NP	32.3
Standard Deviation (Excluding 0)	28.07	28.30	26.13	25.97	26.15	31.80	28.54	24.45	30.04	28.27	27.78	27.30	30.20	28.28	30.40	24.00
Standard Error (Excluding 0)	1.55	3.36	3.98	2.85	3.35	3.80	3.81	2.22	2.44	1.94	2.59	2.91	4.07	3.09	3.09	1.98
Median (Excluding 0)	25	33	20	25	25	25	40	25	25	25	25	25	25	25	40	25

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N7D

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

D. Microwave-ready package

	Total (A)	Sex: Male (B)	Sex: Female (C)	Age: 18-24 (D)	Age: 25-34 (E)	Age: 35-44 (F)	Age: 45-54 (G)	Age: 55-64 (H)	Age: 65+ (I)	Region: North-east (J)	Region: Mid-west (K)	Region: South (L)	Region: West (M)	Race: White Only (Non-Hisp) (N)	Race: Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Unweighted Total	1008	504	504	68	224	153	221	259	83	190	227	363	228	747	101	104
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
Ever (Net)	193	104	89	34	49	46	32	18	14	43	25	91	34	103	38	38
	19%	22%	17%	25%HI	27%GHI	26%HI	17%	12%	8%	25%K	11%	23%K	16%	15%	35%N	26%N
1 - 50% (Subnet)	161	88	72	28	39	46	27	13	8	38	20	70	33	87	32	27
	16%	19%	14%	20%HI	22%HI	26%GHI	15%I	8%	5%	22%K	9%	18%K	15%	13%	30%N	19%
1 - 10%	55	30	24	6	11	17	9	6	5	8	9	22	16	30	7	11
	5%	6%	5%	5%	6%	9%	5%	4%	3%	5%	4%	6%	7%	4%	7%	8%
11 - 20%	35	22	13	10	4	13	4	4	1	7	4	20	4	17	7	5
	4%	5%	2%	7%	2%	7%EGHI	2%	2%	1%	4%	2%	5%	2%	2%	7%N	4%
21 - 30%	38	25	13	9	14	8	6	1	0	12	2	13	10	23	6	9
	4%	5%	3%	6%HI	8%HI	5%HI	3%	1%	0	7%K	1%	3%	5%K	3%	5%	6%
31 - 40%	11	3	8	0	4	2	4	0	1	5	1	5	0	7	4	0
	1%	1%	1%	0	2%	1%	2%	0	1%	3%M	1%	1%	0	1%	4%	0
41 - 50%	22	7	14	3	5	6	5	2	0	6	4	10	2	10	8	2
	2%	2%	3%	2%	3%	4%	3%	1%	0	4%	2%	2%	1%	1%	7%N	2%
51% or more (Subnet)	32	16	17	6	10	0	5	5	6	5	5	22	1	15	6	11
	3%	3%	3%	5%F	6%F	0	3%	3%F	4%	3%	2%	6%M	*	2%	5%	7%N
51 - 60%	8	2	5	0	3	0	*	0	4	*	0	7	0	2	0	6
	1%	*	1%	0	2%	0	*	0	2%	*	0	2%	0	*	0	4%N
61 - 70%	5	2	3	2	1	0	1	1	0	4	0	1	0	1	1	2
	*	*	1%	2%	*	0	1%	*	0	2%	0	*	0	*	1%	2%

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N7D

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

D. Microwave-ready package

	Total (A)	Sex: Male (B)	Sex: Female (C)	Age: 18-24 (D)	Age: 25-34 (E)	Age: 35-44 (F)	Age: 45-54 (G)	Age: 55-64 (H)	Age: 65+ (I)	Region: North-east (J)	Region: Mid-west (K)	Region: South (L)	Region: West (M)	Race: White Only (Non-Hisp) (N)	Race: Black Only (Non-Hisp) (O)	Race: Hispanic (Any Race) (P)
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
71 - 80%	5	3	2	0	2	0	0	2	1	*	1	4	0	5	0	0
	*	1%	*	0	1%	0	0	1%	1%	*	*	1%	0	1%	0	0
81 - 90%	1	1	0	0	0	0	*	*	0	*	0	*	0	1	0	0
	*	*	0	0	0	0	*	*	0	*	0	*	0	*	0	0
91 - 99%	*	0	*	0	0	0	0	*	0	0	0	*	0	*	0	0
	*	0	*	0	0	0	0	*	0	0	0	*	0	*	0	0
100%	14	8	6	4	4	0	3	1	1	0	4	9	1	7	5	2
	1%	2%	1%	3%	2%	0	2%	1%	1%	0	2%	2%	*	1%	5%N	2%
Never (0)	654	293	361	64	93	108	131	119	137	99	174	238	143	498	44	69
	65%	62%	69%B	46%	52%	62%D	72%DE	75%DE F	83%DE F	58%	77%JLM	61%	66%	73%OP	41%	49%
Do not buy fresh sweet corn on the cob	153	79	74	40	38	21	20	21	13	28	26	59	40	80	27	35
	15%	17%	14%	29%FG HI	21%FG I	12%	11%	13%	8%	17%	12%	15%	18%	12%	24%N	25%N
Mean (Including 0)	7.4	8.0	6.9	12.1H I	12.2FG HI	6.3	6.8	5.1	3.7	9.6KM	4.5	10.0KM	3.9	5.4	17.7N	11.8N
Standard Deviation (Including 0)	18.70	19.01	18.42	23.96	22.90	12.43	18.61	17.69	15.22	18.22	17.13	22.26	11.06	16.39	27.28	22.32
Standard Error (Including 0)	0.63	0.92	0.88	3.42	1.73	1.07	1.32	1.16	1.75	1.43	1.20	1.27	0.80	0.64	3.09	2.45
Median (Including 0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean (Excluding 0)	32.4	30.4	34.7	34.7	35.6F	21.1	34.6	38.1	40.3	31.6	36.2	36.1	20.6	31.8	38.5	33.5
Standard Deviation (Excluding 0)	26.92	26.45	27.43	29.54	26.50	14.34	28.72	33.42	33.48	19.90	35.09	29.16	17.50	27.22	28.69	26.39

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

Question N7D

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

D. Microwave-ready package

		Sex		Age						Region				Race		
	Total (A)	Male (B)	Fe-male (C)	18-24 (D)	25-34 (E)	35-44 (F)	45-54 (G)	55-64 (H)	65+ (I)	North -east (J)	Mid-west (K)	South (L)	West (M)	White Only (Non-Hisp) (N)	Black Only (Non-Hisp) (O)	His-panic (Any Race) (P)
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
Standard Error (Excluding 0)	2.00	2.62	3.09	7.17	3.61	2.33	4.92	6.00	12.65	3.15	6.88	3.24	3.00	2.55	5.24	5.18
Median (Excluding 0)	25	20	25	25	25	20	25	20	40	25	25	25	20	25	25	24

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N7D

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

D. Microwave-ready package

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Unweighted Total	1008	235	144	237	171	221	201	408	399	747	261	200	116	254	309	445
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
Ever (Net)	193	51	34	47	35	27	33	52	108	115	78	61	34	68	56	69
	19%	18%	19%	21%	24%	15%	17%	14%	25%H	16%	28%J	28%	28%	19%	18%	21%
1 - 50% (Subnet)	161	42	31	37	31	20	29	41	91	92	69	51	31	55	52	54
	16%	15%	18%	17%	21%F	12%	15%	11%	21%H	13%	24%J	23%	25%	15%	17%	16%
1 - 10%	55	15	8	13	12	7	10	19	25	38	17	16	4	19	21	15
	5%	5%	4%	6%	8%	4%	5%	5%	6%	5%	6%	7%	4%	5%	7%	5%
11 - 20%	35	8	3	6	11	6	6	8	21	19	16	9	9	11	9	15
	4%	3%	2%	3%	8%CD	4%	3%	2%	5%	3%	6%	4%	7%	3%	3%	5%
21 - 30%	38	8	11	11	4	5	7	6	25	20	18	16	9	12	10	16
	4%	3%	6%	5%	3%	3%	4%	2%	6%H	3%	7%J	7%	7%	3%	3%	5%
31 - 40%	11	0	5	4	1	0	1	2	9	3	8	4	5	4	4	3
	1%	0	3%B	2%	1%	0	*	*	2%	*	3%J	2%	4%	1%	1%	1%
41 - 50%	22	10	3	4	2	2	5	5	11	12	10	7	4	9	7	5
	2%	4%	2%	2%	2%	1%	2%	1%	3%	2%	4%	3%	3%	3%	2%	2%
51% or more (Subnet)	32	9	3	9	5	6	4	11	17	23	10	9	3	14	4	15
	3%	3%	2%	4%	3%	4%	2%	3%	4%	3%	3%	4%	3%	4%	1%	5%O
51 - 60%	8	0	1	2	0	4	0	6	2	6	2	2	*	3	0	4
	1%	0	1%	1%	0	2%B	0	2%	*	1%	1%	1%	*	1%	0	1%
61 - 70%	5	0	0	3	2	0	0	3	2	2	3	3	2	2	0	3
	*	0	0	1%	2%	0	0	1%	1%	*	1%	1%	2%	*	0	1%
71 - 80%	5	1	*	1	1	1	1	2	2	4	1	1	0	2	0	3
	*	1%	*	1%	*	1%	*	1%	*	*	*	1%	0	*	0	1%

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N7D

When you buy fresh sweet corn on the cob, what proportion of the time do you purchase it in each of the following forms?

D. Microwave-ready package

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
81 - 90%	1	0	0	0	*	*	0	0	1	*	*	0	*	0	*	*
	*	0	0	0	*	*	0	0	*	*	*	0	*	0	*	*
91 - 99%	*	0	*	0	0	0	0	0	*	*	0	0	0	0	0	*
	*	0	*	0	0	0	0	0	*	*	0	0	0	0	0	*
100%	14	8	1	3	1	*	3	*	10	11	3	3	0	7	3	4
	1%	3%	1%	1%	1%	*	2%	*	2%H	1%	1%	1%	0	2%	1%	1%
Never (0)	654	162	111	149	103	129	119	285	250	489	165	124	78	247	191	215
	65%	57%	64%	68%	69%B	74%B	60%	75%GI	59%	68%K	59%	57%	64%	68%	62%	66%
Do not buy fresh sweet corn on the cob	153	72	29	25	10	18	45	43	65	115	38	35	10	49	62	42
	15%	25%DEF	16%E	11%	7%	11%	23%H	11%	15%	16%	14%	16%	9%	13%	20%P	13%
Mean (Including 0)	7.4	8.7	7.1	8.0	7.0	5.3	6.9	4.6	10.3H	6.3	10.2J	10.4	9.2	7.6	6.0	8.4
Standard Deviation (Including 0)	18.70	22.15	16.63	19.33	17.19	15.59	18.53	14.15	21.89	18.14	19.78	20.61	17.42	19.61	15.81	19.93
Standard Error (Including 0)	0.63	1.66	1.53	1.33	1.37	1.10	1.48	0.74	1.18	0.72	1.30	1.57	1.68	1.32	1.00	1.00
Median (Including 0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean (Excluding 0)	32.4	36.6	30.5	33.5	27.5	31.4	31.3	29.6	34.1	32.9	31.6	31.7	30.3	34.9	26.8	34.4
Standard Deviation (Excluding 0)	26.92	32.34	21.94	26.75	24.57	24.98	28.45	23.79	27.95	29.26	23.23	24.90	18.93	28.78	23.68	27.18
Standard Error (Excluding 0)	2.00	5.25	4.15	3.71	4.15	4.72	5.48	3.30	2.77	2.87	2.65	3.14	3.35	4.24	3.49	2.88
Median (Excluding 0)	25	25	25	25	20	20	25	20	25	22	25	25	25	25	20	25

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N8

On average, about how many individual ears of fresh sweet corn do you buy each time you purchase corn on the cob?

Base = Buy fresh sweet corn on the cob

		Sex		Age						Region				Race		
	Total (A)	Male (B)	Female (C)	18-24 (D)	25-34 (E)	35-44 (F)	45-54 (G)	55-64 (H)	65+ (I)	North-east (J)	Mid-west (K)	South (L)	West (M)	White Only (Non-Hisp) (N)	Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Unweighted Total	867	431	436	49	175	136	200	231	76	163	205	309	190	660	78	83
Weighted Total	847	397	450	98*	142	154	163	138	151*	143*	199	329	177	600	82*	107*
1	12	3	9	2	4	1	1	1	2	*	1	7	3	6	0	5
	1%	1%	2%	2%	3%	*	1%	1%	2%	*	1%	2%	2%	1%	0	5%N
2-6 (Net)	607	287	319	72	114	110	100	93	117	100	121	244	141	429	63	77
	72%	72%	71%	74%	80%GH	71%	61%	68%	77%G	70%	61%	74%K	80%K	71%	77%	72%
2	59	27	32	14	13	10	6	7	9	16	6	24	12	32	11	11
	7%	7%	7%	14%G	9%	7%	4%	5%	6%	11%K	3%	7%	7%	5%	14%N	11%
3	53	24	29	12	11	9	4	6	11	7	13	19	14	36	5	4
	6%	6%	6%	12%G	8%	6%	3%	4%	7%	5%	6%	6%	8%	6%	6%	4%
4	226	102	124	20	43	49	32	34	47	22	39	104	61	176	15	27
	27%	26%	27%	21%	30%G	32%G	20%	25%	31%	16%	19%	32%JK	34%JK	29%	18%	25%
5	70	39	31	18	22	12	13	5	0	14	10	31	15	41	9	14
	8%	10%	7%	19%GHI	15%GHI	8%I	8%I	3%	0	10%	5%	9%	8%	7%	11%	13%
6	199	95	105	8	25	30	44	42	50	40	53	65	40	143	24	21
	24%	24%	23%	8%	18%	19%	27%D	31%DEF	33%DEF	28%	27%	20%	23%	24%	29%	20%
7	4	1	3	0	3	1	0	*	0	*	1	3	0	2	0	2
	*	*	1%	0	2%	1%	0	*	0	*	1%	1%	0	*	0	2%
8	57	22	35	3	7	8	18	13	8	6	13	26	12	36	5	11
	7%	6%	8%	3%	5%	5%	11%	10%	6%	4%	7%	8%	7%	6%	6%	10%
9-11	43	24	18	10	4	9	12	5	3	2	12	17	11	26	6	4
	5%	6%	4%	10%	3%	6%	7%	3%	2%	2%	6%	5%	6%	4%	7%	4%

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N8

On average, about how many individual ears of fresh sweet corn do you buy each time you purchase corn on the cob?

Base = Buy fresh sweet corn on the cob

		Sex		Age						Region				Race		
	Total (A)	Male (B)	Fe-male (C)	18-24 (D)	25-34 (E)	35-44 (F)	45-54 (G)	55-64 (H)	65+ (I)	North -east (J)	Mid-west (K)	South (L)	West (M)	White Only (Non-Hisp) (N)	Black Only (Non-Hisp) (O)	His-panic (Any Race) (P)
Weighted Total	847	397	450	98*	142	154	163	138	151*	143*	199	329	177	600	82*	107*
12	102	45	57	4	8	19	29	22	20	29	46	22	5	89	6	4
	12%	11%	13%	4%	6%	13%	18%DE	16%DE	13%	21%LM	23%LM	7%	3%	15%P	7%	4%
13 or more	22	14	8	7	2	6	4	3	0	4	4	10	4	11	3	5
	3%	4%	2%	8%I	1%	4%	2%	2%	0	3%	2%	3%	2%	2%	3%	5%
Mean	6.3	6.6	6.1	6.5	5.4	6.5	7.1EI	6.7E	5.8	7.1M	7.2LM	5.9	5.6	6.3	6.6	6.0
Standard Deviation	4.31	4.80	3.81	7.14	4.55	4.02	3.53	3.59	2.94	5.92	3.57	4.07	3.71	3.50	6.74	5.33
Standard Error	0.15	0.23	0.18	1.02	0.34	0.34	0.25	0.24	0.34	0.46	0.25	0.23	0.27	0.14	0.76	0.58

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N8

On average, about how many individual ears of fresh sweet corn do you buy each time you purchase corn on the cob?

Base = Buy fresh sweet corn on the cob

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Unweighted Total	867	179	118	212	157	201	157	366	344	637	230	173	107	222	251	394
Weighted Total	847	213	145*	195	138	155	152	337	358	603	243	185	112*	316	247	284
1	12	5	2	0	2	2	7	0	5	9	3	3	0	3	3	6
	1%	2%	2%	0	2%	2%	4%H	0	1%	2%	1%	1%	0	1%	1%	2%
2-6 (Net)	607	151	110	127	98	119	126	257	223	454	153	112	71	194	186	226
	72%	71%	76%	65%	71%	77%D	83%I	76%I	62%	75%K	63%	61%	63%	61%	75%N	80%N
2	59	20	11	10	11	8	19	23	17	51	8	8	4	23	13	23
	7%	9%	8%	5%	8%	5%	13%I	7%	5%	9%K	3%	4%	4%	7%	5%	8%
3	53	14	9	14	7	10	17	21	14	46	6	5	3	11	13	29
	6%	6%	6%	7%	5%	6%	11%I	6%	4%	8%K	3%	3%	3%	3%	5%	10%N
4	226	50	38	44	40	54	46	102	78	162	64	45	28	66	71	89
	27%	24%	26%	23%	29%	35%D	30%	30%I	22%	27%	26%	25%	25%	21%	29%	31%N
5	70	27	9	16	9	9	13	15	42	42	27	21	12	22	23	24
	8%	13%	6%	8%	7%	6%	8%	5%	12%H	7%	11%	12%	11%	7%	10%	8%
6	199	40	44	44	32	39	31	97	72	152	48	33	24	72	66	61
	24%	19%	30%	23%	23%	25%	20%	29%I	20%	25%	20%	18%	21%	23%	27%	22%
7	4	1	0	2	0	1	1	0	3	1	3	3	2	3	0	1
	*	1%	0	1%	0	1%	1%	0	1%	*	1%	1%	2%	1%	0	*
8	57	12	7	16	10	12	2	21	34	33	24	20	8	25	12	19
	7%	6%	5%	8%	7%	8%	2%	6%	9%G	5%	10%	11%	8%	8%	5%	7%
9-11	43	12	3	13	9	5	5	9	29	23	20	15	8	20	13	10
	5%	6%	2%	6%	7%	4%	3%	3%	8%H	4%	8%J	8%	7%	6%	5%	3%
12	102	26	21	27	16	12	8	47	47	73	29	22	19	64	24	15
	12%	12%	15%	14%	12%	8%	5%	14%G	13%G	12%	12%	12%	17%	20%OP	10%	5%

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N8

On average, about how many individual ears of fresh sweet corn do you buy each time you purchase corn on the cob?

Base = Buy fresh sweet corn on the cob

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Weighted Total	847	213	145*	195	138	155	152	337	358	603	243	185	112*	316	247	284
13 or more	22	6	1	11	2	3	3	3	17	10	12	10	4	6	9	7
	3%	3%	1%	6%	1%	2%	2%	1%	5%H	2%	5%J	6%	4%	2%	4%	2%
Mean	6.3	6.2	6.0	7.3CF	6.2	5.8	5.0	6.2G	7.1GH	5.9	7.4J	7.4	7.5	7.0P	6.4P	5.6
Standard Deviation	4.31	4.47	3.15	5.75	3.63	3.14	3.18	4.31	4.57	3.31	5.99	5.87	5.63	3.96	4.84	4.07
Standard Error	0.15	0.33	0.29	0.40	0.29	0.22	0.25	0.23	0.25	0.13	0.40	0.45	0.54	0.27	0.31	0.21

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N9

When the weather is nice, say 50 degrees or warmer and not raining, how do you usually prepare fresh sweet corn on the cob?

Base = Buy fresh sweet corn on the cob

		Sex		Age						Region				Race		
	Total (A)	Male (B)	Female (C)	18-24 (D)	25-34 (E)	35-44 (F)	45-54 (G)	55-64 (H)	65+ (I)	North-east (J)	Mid-west (K)	South (L)	West (M)	White Only (Non-Hisp) (N)	Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Unweighted Total	867	431	436	49	175	136	200	231	76	163	205	309	190	660	78	83
Weighted Total	847	397	450	98*	142	154	163	138	151*	143*	199	329	177	600	82*	107*
Prepare in nice weather (Net)	844	395	450	96	142	154	163	138	151	143	197	329	177	600	80	107
	100%	99%	100%	98%	100%	100%	100%	100%	100%	100%	99%	100%	100%	100%O	97%	100%
Cooked (Subnet)	843	394	450	96	141	154	163	138	151	143	197	329	176	600	80	106
	100%	99%	100%	98%	99%	100%	100%	100%	100%	100%	99%	100%	100%	100%O	97%	99%
Boiled	524	254	270	46	92	97	99	85	104	91	127	196	109	369	60	62
	62%	64%	60%	47%	65%D	63%	60%	62%	69%D	64%	64%	59%	62%	61%	73%	58%
Grill (Sub-subnet)	379	198	182	55	80	79	80	51	35	53	98	150	78	264	34	57
	45%	50%C	40%	56%HI	57%HI	51%HI	49%HI	37%I	23%	37%	49%	46%	44%	44%	41%	54%
Outdoor grill	366	187	178	51	74	76	80	50	35	52	98	141	75	260	32	53
	43%	47%	40%	52%I	52%HI	49%HI	49%HI	36%	23%	36%	49%J	43%	43%	43%	39%	50%
Indoor grill	34	23	11	10	11	7	2	3	1	3	2	18	11	14	3	9
	4%	6%C	2%	10%GHI	8%GHI	5%	1%	2%	1%	2%	1%	6%K	6%K	2%	4%	8%N
Steamed	191	92	98	38	31	35	37	27	24	35	31	84	40	112	21	34
	23%	23%	22%	39%EFGHI	22%	22%	22%	19%	16%	24%	16%	26%K	23%	19%	25%	32%N
Microwave	145	63	82	19	22	25	16	25	39	36	27	65	17	102	13	16
	17%	16%	18%	19%	15%	16%	10%	18%G	26%G	25%KM	14%	20%M	10%	17%	16%	15%
Baked/roasted	83	45	38	19	22	16	12	9	5	11	12	38	21	44	11	14
	10%	11%	8%	19%GHI	16%GHI	10%	7%	7%	3%	8%	6%	12%	12%	7%	14%	13%
Some other way	15	1	14	0	6	1	*	3	5	0	1	7	8	6	3	6
	2%	*	3%B	0	4%G	1%	*	2%	4%	0	*	2%	4%JK	1%	4%	5%N

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N9

When the weather is nice, say 50 degrees or warmer and not raining, how do you usually prepare fresh sweet corn on the cob?

Base = Buy fresh sweet corn on the cob

		Sex		Age						Region				Race		
	Total (A)	Male (B)	Fe-male (C)	18-24 (D)	25-34 (E)	35-44 (F)	45-54 (G)	55-64 (H)	65+ (I)	North -east (J)	Mid-west (K)	South (L)	West (M)	White Only (Non-Hisp) (N)	Black Only (Non-Hisp) (O)	His-panic (Any Race) (P)
Weighted Total	847	397	450	98*	142	154	163	138	151*	143*	199	329	177	600	82*	107*
Raw	19	15	4	5	6	4	2	0	2	4	1	3	11	10	1	4
	2%	4%C	1%	5%H	4%H	3%	1%	0	2%	3%	*	1%	6%KL	2%	1%	4%
Do not prepare in nice weather	2	2	0	2	0	0	0	0	0	0	2	0	0	0	2	0
	*	1%	0	2%	0	0	0	0	0	0	1%	0	0	0	3%N	0

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N9

When the weather is nice, say 50 degrees or warmer and not raining, how do you usually prepare fresh sweet corn on the cob?

Base = Buy fresh sweet corn on the cob

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Unweighted Total	867	179	118	212	157	201	157	366	344	637	230	173	107	222	251	394
Weighted Total	847	213	145*	195	138	155	152	337	358	603	243	185	112*	316	247	284
Prepare in nice weather (Net)	844	211	145	195	138	155	152	337	355	601	243	185	112	313	247	284
	100%	99%	100%	100%	100%	100%	100%	100%	99%	100%	100%	100%	100%	99%	100%	100%
Cooked (Subnet)	843	210	145	195	138	155	151	337	355	600	243	185	112	313	247	283
	100%	99%	100%	100%	100%	100%	99%	100%	99%	99%	100%	100%	100%	99%	100%	100%
Boiled	524	116	98	133	79	98	93	206	225	360	164	126	73	194	161	168
	62%	54%	68%	68%B	57%	63%	61%	61%	63%	60%	67%	68%	65%	62%	65%	59%
Grill (Sub-subnet)	379	79	71	93	61	75	54	134	192	239	140	105	66	117	130	133
	45%	37%	49%	48%	44%	48%	35%	40%	54%GH	40%	58%J	57%	59%	37%	53%N	47%N
Outdoor grill	366	77	71	89	59	70	49	129	187	229	136	101	64	113	128	124
	43%	36%	49%	46%	43%	45%	32%	38%	52%GH	38%	56%J	55%	57%	36%	52%N	44%
Indoor grill	34	9	0	11	5	9	7	11	17	25	9	8	5	9	12	13
	4%	4%	0	6%C	4%	6%C	4%	3%	5%	4%	4%	4%	5%	3%	5%	5%
Steamed	191	56	19	52	33	30	36	72	83	132	59	47	27	58	58	75
	23%	26%C	13%	27%C	24%	20%	23%	21%	23%	22%	24%	26%	24%	18%	24%	26%N
Microwave	145	43	21	34	22	25	35	66	44	113	32	23	15	52	40	53
	17%	20%	15%	17%	16%	16%	23%I	20%I	12%	19%	13%	13%	14%	17%	16%	19%
Baked/roasted	83	22	7	29	8	18	9	29	45	49	34	30	14	15	35	32
	10%	10%	5%	15%CE	6%	12%	6%	9%	12%	8%	14%J	16%	12%	5%	14%N	11%N
Some other way	15	2	3	2	4	3	4	5	7	9	7	7	3	7	4	4
	2%	1%	2%	1%	3%	2%	2%	1%	2%	1%	3%	4%	2%	2%	2%	1%
Raw	19	5	1	3	3	7	1	4	14	10	9	8	5	5	9	5
	2%	2%	1%	2%	3%	4%	1%	1%	4%	2%	4%	5%	5%	2%	4%	2%

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

Question N9

When the weather is nice, say 50 degrees or warmer and not raining, how do you usually prepare fresh sweet corn on the cob?

Base = Buy fresh sweet corn on the cob

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Weighted Total	847	213	145*	195	138	155	152	337	358	603	243	185	112*	316	247	284
Do not prepare in nice weather	2 *	2 1%	0 0	0 0	0 0	0 0	0 0	0 0	2 1%	2 *	0 0	0 0	0 0	2 1%	0 0	0 0

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N10

When the weather is 'bad', say colder than 50 degrees or raining or snowing, how do you usually prepare fresh sweet corn on the cob?

Base = Buy fresh sweet corn on the cob

		Sex		Age						Region				Race		
	Total (A)	Male (B)	Female (C)	18-24 (D)	25-34 (E)	35-44 (F)	45-54 (G)	55-64 (H)	65+ (I)	North-east (J)	Mid-west (K)	South (L)	West (M)	White Only (Non-Hisp) (N)	Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Unweighted Total	867	431	436	49	175	136	200	231	76	163	205	309	190	660	78	83
Weighted Total	847	397	450	98*	142	154	163	138	151*	143*	199	329	177	600	82*	107*
Prepare in nice weather (Net)	800	382	417	96	136	146	151	129	142	132	182	316	169	561	80	103
	94%	96%	93%	98%	96%	94%	93%	94%	94%	93%	92%	96%	96%	93%	97%	96%
Cooked (Subnet)	797	381	416	94	136	146	151	129	142	132	182	316	166	560	80	102
	94%	96%	92%	96%	96%	94%	93%	94%	94%	93%	92%	96%	94%	93%	97%	96%
Boiled	545	273	271	51	88	106	110	89	102	92	130	209	113	394	61	64
	64%	69%C	60%	52%	62%	68%	67%	65%	67%	65%	66%	64%	64%	66%	74%	60%
Steamed	183	89	93	29	31	36	39	30	18	30	37	77	39	102	26	35
	22%	22%	21%	30%I	22%	23%	24%I	22%	12%	21%	19%	23%	22%	17%	32%N	33%N
Microwave	160	84	76	19	27	27	25	27	34	32	32	70	25	110	16	18
	19%	21%	17%	19%	19%	18%	15%	19%	22%	23%	16%	21%	14%	18%	19%	17%
Grill (Sub-subnet)	102	61	41	17	29	22	12	14	8	11	15	49	27	59	7	23
	12%	15%C	9%	17%I	20%GHI	14%	8%	10%	5%	8%	7%	15%K	15%K	10%	9%	21%N
Outdoor grill	55	35	20	4	15	15	10	6	5	8	12	24	12	39	1	14
	6%	9%C	4%	4%	11%H	10%	6%	4%	3%	5%	6%	7%	7%	7%	1%	13%O
Indoor grill	51	30	22	13	15	9	3	9	3	5	3	27	17	24	7	9
	6%	7%	5%	13%GI	11%GI	6%	2%	6%G	2%	3%	1%	8%K	10%K	4%	8%	8%
Baked/roasted	98	60	39	24	22	23	14	8	7	14	13	42	28	53	13	16
	12%	15%C	9%	25%GHI	15%HI	15%HI	8%	6%	5%	10%	7%	13%	16%K	9%	16%	15%
Some other way	11	0	11	0	6	1	0	2	3	0	*	6	5	3	3	6
	1%	0	3%B	0	4%G	1%	0	1%	2%	0	*	2%	3%	*	4%N	5%N

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

Question N10

When the weather is 'bad', say colder than 50 degrees or raining or snowing, how do you usually prepare fresh sweet corn on the cob?

Base = Buy fresh sweet corn on the cob

		Sex		Age						Region				Race		
	Total (A)	Male (B)	Female (C)	18-24 (D)	25-34 (E)	35-44 (F)	45-54 (G)	55-64 (H)	65+ (I)	North-east (J)	Mid-west (K)	South (L)	West (M)	White Only (Non-Hisp) (N)	Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Weighted Total	847	397	450	98*	142	154	163	138	151*	143*	199	329	177	600	82*	107*
Raw	12	10	2	5	3	3	2	0	0	2	1	3	6	8	1	2
	1%	3%C	*	5%H	2%	2%	1%	0	0	1%	*	1%	4%	1%	1%	2%
Do not prepare in bad weather	47	15	32	2	5	9	12	9	10	10	16	12	8	39	2	4
	6%	4%	7%	2%	4%	6%	7%	6%	6%	7%	8%	4%	4%	7%	3%	4%

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N10

When the weather is 'bad', say colder than 50 degrees or raining or snowing, how do you usually prepare fresh sweet corn on the cob?

Base = Buy fresh sweet corn on the cob

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Unweighted Total	867	179	118	212	157	201	157	366	344	637	230	173	107	222	251	394
Weighted Total	847	213	145*	195	138	155	152	337	358	603	243	185	112*	316	247	284
Prepare in nice weather (Net)	800	199	136	188	131	145	145	314	340	567	233	176	107	295	232	273
	94%	93%	94%	97%	95%	94%	95%	93%	95%	94%	96%	95%	96%	93%	94%	96%
Cooked (Subnet)	797	198	136	187	131	145	144	313	340	564	233	176	107	295	231	272
	94%	93%	94%	96%	95%	94%	95%	93%	95%	94%	96%	95%	96%	93%	93%	96%
Boiled	545	129	100	134	79	103	97	218	230	377	167	125	76	203	160	182
	64%	61%	69%	69%	57%	66%	64%	65%	64%	63%	69%	67%	68%	64%	65%	64%
Steamed	183	46	28	56	27	26	38	65	80	130	53	38	26	53	60	70
	22%	21%	19%	29%F	19%	17%	25%	19%	22%	21%	22%	21%	23%	17%	24%	25%N
Microwave	160	44	23	37	27	28	34	70	55	122	38	27	18	62	40	58
	19%	21%	16%	19%	20%	18%	23%	21%	15%	20%	15%	15%	16%	19%	16%	21%
Grill (Sub-subnet)	102	26	10	28	14	24	13	34	54	57	45	41	17	23	39	39
	12%	12%	7%	14%	10%	15%	9%	10%	15%	9%	18%J	22%	15%	7%	16%N	14%N
Outdoor grill	55	7	9	13	11	15	5	21	30	30	25	22	10	8	21	26
	6%	3%	6%	7%	8%	10%B	3%	6%	8%	5%	10%J	12%	9%	3%	9%N	9%N
Indoor grill	51	19	2	19	3	9	9	15	28	28	23	22	8	16	19	17
	6%	9%CE	1%	10%CE	2%	6%	6%	4%	8%	5%	9%J	12%	7%	5%	8%	6%
Baked/roasted	98	32	9	25	9	22	10	31	57	58	40	33	18	19	31	49
	12%	15%CE	6%	13%	7%	14%	6%	9%	16%GH	10%	17%J	18%	16%	6%	12%N	17%N
Some other way	11	2	3	2	4	1	4	1	7	5	7	7	3	7	1	3
	1%	1%	2%	1%	3%	1%	2%	*	2%	1%	3%	4%	2%	2%	1%	1%
Raw	12	4	1	4	*	3	3	4	6	7	5	4	4	1	6	5
	1%	2%	*	2%	*	2%	2%	1%	2%	1%	2%	2%	3%	*	3%	2%

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N10

When the weather is 'bad', say colder than 50 degrees or raining or snowing, how do you usually prepare fresh sweet corn on the cob?

Base = Buy fresh sweet corn on the cob

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Weighted Total	847	213	145*	195	138	155	152	337	358	603	243	185	112*	316	247	284
Do not prepare in bad weather	47 6%	14 7%	8 6%	7 3%	7 5%	10 6%	7 5%	22 7%	17 5%	37 6%	10 4%	9 5%	5 4%	21 7%	15 6%	11 4%

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N11

Which, if any, of these varieties/brands of sweet corn are you familiar with?

	Total (A)	Sex: Male (B)	Sex: Female (C)	Age: 18-24 (D)	Age: 25-34 (E)	Age: 35-44 (F)	Age: 45-54 (G)	Age: 55-64 (H)	Age: 65+ (I)	Region: North-east (J)	Region: Mid-west (K)	Region: South (L)	Region: West (M)	Race: White Only (Non-Hisp) (N)	Race: Black Only (Non-Hisp) (O)	His-panic (Any Race) (P)
Unweighted Total	1008	504	504	68	224	153	221	259	83	190	227	363	228	747	101	104
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
Any (Net)	679	313	365	98	117	112	123	114	115	112	137	287	143	438	93	105
	68%	66%	70%	71%	65%	64%	67%	71%	70%	65%	61%	74%K	66%	64%	85%N	74%
Green Giant	534	251	284	78	91	92	104	85	85	90	112	222	111	336	87	84
	53%	53%	54%	56%	51%	52%	57%	53%	51%	53%	50%	57%	51%	49%	80%NP	59%
Silver Queen	164	64	100	7	11	20	33	36	55	37	21	91	14	142	8	10
	16%	13%	19%B	5%	6%	12%	18%DE	23%DE F	34%DE FG	22%KM	9%	23%KM	7%	21%OP	7%	7%
Sweet Pac	125	52	72	13	24	27	28	20	12	14	26	46	39	78	19	21
	12%	11%	14%	9%	13%	16%	15%	13%	7%	8%	11%	12%	18%J	11%	18%	15%
Supersweet	101	52	49	15	17	20	19	20	11	14	28	37	22	65	9	14
	10%	11%	9%	11%	9%	11%	10%	13%	7%	8%	13%	10%	10%	10%	8%	10%
Summer Sweet	92	56	37	18	25	17	13	9	10	17	15	40	20	47	16	18
	9%	12%C	7%	13%	14%GH	10%	7%	6%	6%	10%	7%	10%	9%	7%	15%N	13%
Garden Sweet	86	54	32	21	14	16	18	8	10	9	12	36	29	42	17	18
	9%	11%C	6%	15%H	8%	9%	10%	5%	6%	5%	5%	9%	13%JK	6%	15%N	12%
Sunshine Sweet	64	35	29	17	12	15	5	6	9	14	9	27	14	31	11	16
	6%	7%	5%	13%GH	7%	8%G	3%	4%	6%	8%	4%	7%	7%	5%	10%	11%N
Sunrise Select	61	35	26	24	18	9	5	3	4	10	8	24	19	32	6	16
	6%	7%	5%	17%FG HI	10%GHI	5%	2%	2%	2%	6%	3%	6%	9%K	5%	5%	11%N
Elmer's Fresh	43	25	18	15	10	9	3	1	5	7	5	18	13	13	8	14
	4%	5%	3%	11%GH	6%H	5%H	2%	*	3%	4%	2%	5%	6%	2%	7%N	10%N
Olathe	35	20	14	4	5	6	3	9	8	1	6	13	15	27	1	3
	3%	4%	3%	3%	3%	3%	1%	6%G	5%	*	3%	3%	7%J	4%	1%	2%

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N11

Which, if any, of these varieties/brands of sweet corn are you familiar with?

		Sex		Age						Region				Race		
	Total (A)	Male (B)	Female (C)	18-24 (D)	25-34 (E)	35-44 (F)	45-54 (G)	55-64 (H)	65+ (I)	North-east (J)	Mid-west (K)	South (L)	West (M)	White Only (Non-Hisp) (N)	Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
Prima Bella	32	18	14	4	6	8	3	2	7	10	2	14	5	18	2	7
	3%	4%	3%	3%	4%	5%	2%	1%	4%	6%K	1%	4%	2%	3%	1%	5%
Glori Ann	17	13	4	9	3	4	1	1	0	1	3	7	6	9	3	3
	2%	3%	1%	6%GHI	2%	2%	*	1%	0	1%	1%	2%	3%	1%	3%	2%
Some other variety/brand	19	9	10	0	3	2	5	7	2	1	5	9	4	13	4	1
	2%	2%	2%	0	2%	1%	3%	4%D	1%	*	2%	2%	2%	2%	4%	1%
I am not familiar with any varieties/brands	321	162	159	40	63	64	60	45	49	59	88	102	73	242	16	37
	32%	34%	30%	29%	35%	36%	33%	29%	30%	35%	39%L	26%	34%	36%O	15%	26%

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N11

Which, if any, of these varieties/brands of sweet corn are you familiar with?

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Unweighted Total	1008	235	144	237	171	221	201	408	399	747	261	200	116	254	309	445
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
Any (Net)	679	199	119	151	89	121	139	253	287	483	196	158	82	253	209	217
	68%	70%	69%	69%	60%	70%	70%	67%	68%	67%	70%	72%	67%	69%	68%	66%
Green Giant	534	151	99	119	70	96	113	195	226	387	147	113	65	195	177	163
	53%	53%	57%	54%	47%	55%	57%	51%	54%	54%	52%	52%	53%	53%	57%	50%
Silver Queen	164	45	21	29	22	46	26	92	45	136	28	24	10	74	42	48
	16%	16%	12%	13%	15%	26%BC DE	13%	24%GI	11%	19%K	10%	11%	8%	20%	14%	15%
Sweet Pac	125	26	23	30	23	24	19	45	61	81	44	41	23	55	32	38
	12%	9%	13%	14%	15%	14%	10%	12%	14%	11%	16%	19%	19%	15%	10%	12%
Supersweet	101	23	12	25	13	29	15	34	52	67	34	29	15	30	26	45
	10%	8%	7%	12%	9%	16%BC	8%	9%	12%	9%	12%	13%	12%	8%	8%	14%NO
Summer Sweet	92	19	16	24	13	20	11	31	50	62	30	25	15	20	29	43
	9%	7%	9%	11%	9%	11%	6%	8%	12%G	9%	11%	11%	12%	6%	9%	13%N
Garden Sweet	86	21	5	31	12	18	10	28	48	60	26	23	9	24	28	34
	9%	8%	3%	14%C	8%	10%C	5%	7%	11%G	8%	9%	10%	7%	7%	9%	10%
Sunshine Sweet	64	18	10	16	10	11	6	21	37	33	30	29	11	15	16	32
	6%	6%	6%	7%	7%	6%	3%	6%	9%G	5%	11%J	13%	9%	4%	5%	10%NO
Sunrise Select	61	19	8	15	10	8	6	15	40	38	23	21	11	15	22	24
	6%	7%	5%	7%	7%	5%	3%	4%	10%GH	5%	8%	9%	9%	4%	7%	7%
Elmer's Fresh	43	8	8	12	6	8	1	9	33	21	22	18	6	10	9	24
	4%	3%	5%	6%	4%	5%	1%	2%	8%GH	3%	8%J	8%	5%	3%	3%	7%NO
Olathe	35	8	4	10	6	7	3	17	14	25	9	9	5	13	11	11
	3%	3%	2%	5%	4%	4%	2%	5%	3%	4%	3%	4%	4%	4%	4%	3%
Prima Bella	32	8	4	9	3	7	3	11	17	21	11	8	6	9	8	15
	3%	3%	2%	4%	2%	4%	2%	3%	4%	3%	4%	4%	5%	2%	3%	5%

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N11

Which, if any, of these varieties/brands of sweet corn are you familiar with?

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
Glori Ann	17	5	3	3	3	3	3	1	13	9	8	8	4	5	4	9
	2%	2%	2%	1%	2%	2%	2%	*	3%H	1%	3%	3%	3%	1%	1%	3%
Some other variety/brand	19	4	8	1	2	4	6	8	6	17	2	2	*	4	5	10
	2%	1%	5%D	1%	1%	2%	3%	2%	1%	2%	1%	1%	*	1%	2%	3%
I am not familiar with any varieties/brands	321	86	54	69	59	53	59	126	136	235	86	62	40	112	100	110
	32%	30%	31%	31%	40%	30%	30%	33%	32%	33%	30%	28%	33%	31%	32%	34%

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N12

Do you recall seeing or hearing information about fresh sweet corn from any of these sources in the past year?

	Total (A)	Sex: Male (B)	Sex: Female (C)	Age: 18-24 (D)	Age: 25-34 (E)	Age: 35-44 (F)	Age: 45-54 (G)	Age: 55-64 (H)	Age: 65+ (I)	Region: North-east (J)	Region: Mid-west (K)	Region: South (L)	Region: West (M)	Race: White Only (Non-Hisp) (N)	Race: Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Unweighted Total	1008	504	504	68	224	153	221	259	83	190	227	363	228	747	101	104
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
Any (Net)	467	208	259	64	79	65	83	84	91	82	102	181	103	315	44	72
	47%	44%	49%	47%	44%	37%	46%	53%F	56%F	48%	45%	47%	48%	46%	40%	51%
Grocer	218	92	126	21	37	33	47	36	44	41	51	84	42	165	26	21
	22%	19%	24%	15%	21%	19%	26%	23%	27%	24%	23%	22%	20%	24%	24%	14%
Newspaper (Subnet)	180	85	95	18	18	24	33	38	48	40	47	57	36	124	16	26
	18%	18%	18%	13%	10%	14%	18%E	24%EF	29%DEF	23%	21%	15%	17%	18%	15%	18%
Newspaper food-page advertisements	133	60	73	13	11	18	20	29	42	24	39	39	31	91	12	21
	13%	13%	14%	10%	6%	10%	11%	18%E	26%DEFG	14%	17%L	10%	14%	13%	11%	15%
Newspaper food-page stories or recipes	88	48	40	7	12	13	18	18	20	21	19	34	15	59	9	13
	9%	10%	8%	5%	7%	7%	10%	11%	12%	12%	8%	9%	7%	9%	9%	9%
TV (Subnet)	163	72	91	33	31	18	26	22	33	24	32	74	33	101	17	31
	16%	15%	17%	24%F	17%	10%	14%	14%	20%	14%	14%	19%	15%	15%	16%	22%
TV cooking shows	116	48	68	19	23	14	17	14	29	17	24	52	22	77	11	18
	12%	10%	13%	13%	13%	8%	9%	9%	17%	10%	11%	13%	10%	11%	11%	13%
TV commercials	55	28	27	14	13	8	8	8	4	3	11	27	15	30	8	10
	6%	6%	5%	10%	7%	5%	4%	5%	2%	2%	5%	7%J	7%J	4%	8%	7%
TV news stories	17	14	3	4	3	2	3	4	1	7	3	6	2	8	3	4
	2%	3%C	1%	3%	2%	1%	2%	2%	1%	4%	1%	1%	1%	1%	2%	3%
Friend or family members	113	46	67	12	22	16	21	20	22	23	31	36	23	86	6	10
	11%	10%	13%	9%	12%	9%	11%	13%	13%	13%	14%	9%	11%	13%	6%	7%
Farmer	92	49	43	12	17	14	23	17	9	17	28	28	19	71	4	13
	9%	10%	8%	9%	10%	8%	12%	11%	5%	10%	13%	7%	9%	10%	4%	9%

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N12

Do you recall seeing or hearing information about fresh sweet corn from any of these sources in the past year?

	Total (A)	Sex: Male (B)	Sex: Female (C)	Age: 18-24 (D)	Age: 25-34 (E)	Age: 35-44 (F)	Age: 45-54 (G)	Age: 55-64 (H)	Age: 65+ (I)	Region: North-east (J)	Region: Mid-west (K)	Region: South (L)	Region: West (M)	Race: White Only (Non-Hisp) (N)	Race: Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
Cookbook	79	35	44	16	18	12	12	13	8	12	12	33	21	44	7	21
	8%	7%	8%	12%	10%	7%	7%	8%	5%	7%	6%	8%	10%	6%	7%	15%N
Posters in stores	61	37	24	5	12	13	11	12	9	18	10	22	12	25	14	17
	6%	8%	5%	3%	7%	7%	6%	8%	6%	10%	4%	6%	5%	4%	13%N	12%N
Internet (Subnet)	50	28	21	7	19	10	3	5	6	9	7	20	14	24	6	13
	5%	6%	4%	5%	11%GH	6%	2%	3%	3%	5%	3%	5%	6%	4%	5%	9%N
Website	28	16	12	7	9	4	1	4	3	8	3	9	7	11	5	6
	3%	3%	2%	5%	5%G	2%	1%	2%	2%	5%	1%	2%	3%	2%	5%	4%
Social networks (Facebook, Google+, etc.)	26	13	13	2	8	7	2	1	6	6	2	10	8	16	1	6
	3%	3%	3%	2%	4%H	4%	1%	1%	3%	3%	1%	3%	4%	2%	1%	4%
Blogs	11	10	1	0	7	3	1	*	0	1	2	4	4	4	2	3
	1%	2%C	*	0	4%GH	2%	1%	*	0	*	1%	1%	2%	1%	2%	2%
Magazine (Subnet)	43	19	24	4	5	8	7	8	10	6	6	20	12	29	2	8
	4%	4%	4%	3%	3%	5%	4%	5%	6%	3%	3%	5%	5%	4%	2%	6%
Magazine feature stories	25	8	17	0	3	5	2	6	9	2	2	13	8	18	1	6
	3%	2%	3%	0	2%	3%	1%	4%	6%	1%	1%	3%	4%	3%	1%	4%
Magazine advertisements	20	12	8	4	3	4	6	2	1	4	4	7	5	12	2	2
	2%	2%	1%	3%	2%	2%	3%	1%	1%	2%	2%	2%	2%	2%	2%	2%
Sweet corn recipe cards, leaflets or booklets	39	19	20	3	7	8	5	7	10	7	8	12	13	25	4	8
	4%	4%	4%	2%	4%	4%	3%	4%	6%	4%	3%	3%	6%	4%	3%	6%
Billboards/outdoor ads	24	19	5	6	9	1	2	5	1	6	5	7	7	9	3	4
	2%	4%C	1%	5%	5%FG	1%	1%	3%	1%	3%	2%	2%	3%	1%	3%	3%
Radio commercials	13	11	3	4	3	2	3	1	0	4	0	5	3	6	0	2
	1%	2%C	*	3%	1%	1%	2%	1%	0	3%K	0	1%	2%	1%	0	1%
Someplace else	14	7	6	0	*	2	2	4	5	3	4	2	4	12	0	1
	1%	2%	1%	0	*	1%	1%	3%	3%	2%	2%	*	2%	2%	0	1%

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N12

Do you recall seeing or hearing information about fresh sweet corn from any of these sources in the past year?

		Sex		Age						Region				Race		
	Total (A)	Male (B)	Female (C)	18-24 (D)	25-34 (E)	35-44 (F)	45-54 (G)	55-64 (H)	65+ (I)	North-east (J)	Mid-west (K)	South (L)	West (M)	White Only (Non-Hisp) (N)	Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
I haven't seen any information about fresh sweet corn in the past year	533	268	265	74	101	111	100	75	73	89	123	207	113	365	65	69
	53%	56%	51%	53%	56%	63%HI	54%	47%	44%	52%	55%	53%	52%	54%	60%	49%

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N12

Do you recall seeing or hearing information about fresh sweet corn from any of these sources in the past year?

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Unweighted Total	1008	235	144	237	171	221	201	408	399	747	261	200	116	254	309	445
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
Any (Net)	467	117	77	116	61	96	93	184	190	324	143	118	63	155	151	161
	47%	41%	45%	53%B	41%	55%BE	47%	48%	45%	45%	51%	54%	51%	43%	49%	49%
Grocer	218	50	35	59	30	44	43	98	78	156	63	56	22	79	64	75
	22%	18%	20%	27%B	20%	25%	22%	26%I	18%	22%	22%	26%	18%	22%	21%	23%
Newspaper (Subnet)	180	47	26	42	26	38	39	68	73	133	47	42	19	57	57	66
	18%	17%	15%	19%	17%	22%	20%	18%	17%	18%	17%	19%	16%	16%	18%	20%
Newspaper food-page advertisements	133	31	22	39	13	29	29	51	52	96	37	34	15	42	40	51
	13%	11%	13%	18%E	9%	17%	15%	14%	12%	13%	13%	15%	12%	12%	13%	16%
Newspaper food-page stories or recipes	88	23	9	16	19	21	17	35	36	70	18	14	8	28	26	35
	9%	8%	5%	7%	13%	12%	8%	9%	9%	10%	6%	6%	7%	8%	8%	11%
TV (Subnet)	163	44	22	38	20	40	37	59	67	117	46	40	24	48	57	58
	16%	15%	13%	17%	13%	23%CE	19%	15%	16%	16%	16%	18%	19%	13%	18%	18%
TV cooking shows	116	30	17	30	13	27	29	43	43	85	30	26	18	29	47	40
	12%	10%	10%	14%	9%	15%	15%	11%	10%	12%	11%	12%	14%	8%	15%N	12%
TV commercials	55	14	9	12	9	11	10	18	27	35	20	17	9	21	12	23
	6%	5%	5%	5%	6%	6%	5%	5%	6%	5%	7%	8%	7%	6%	4%	7%
TV news stories	17	5	1	5	1	5	1	6	10	12	6	5	2	3	5	10
	2%	2%	*	2%	1%	3%	*	2%	2%	2%	2%	2%	2%	1%	2%	3%
Friend or family members	113	29	15	34	15	19	28	38	46	80	33	26	17	38	36	38
	11%	10%	9%	15%	10%	11%	14%	10%	11%	11%	12%	12%	14%	10%	12%	12%
Farmer	92	30	12	21	11	18	20	29	43	65	27	24	10	27	33	32
	9%	11%	7%	9%	8%	10%	10%	8%	10%	9%	10%	11%	8%	7%	11%	10%
Cookbook	79	24	9	19	12	15	15	22	42	51	28	23	11	17	27	35
	8%	8%	5%	8%	8%	9%	7%	6%	10%	7%	10%	11%	9%	5%	9%	11%N

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N12

Do you recall seeing or hearing information about fresh sweet corn from any of these sources in the past year?

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
Posters in stores	61	14	4	19	5	20	14	27	20	47	14	10	5	13	15	34
	6%	5%	2%	9%C	3%	12%BCE	7%	7%	5%	7%	5%	5%	4%	4%	5%	10%NO
Internet (Subnet)	50	13	8	15	3	11	5	19	25	27	23	22	6	15	12	23
	5%	5%	5%	7%E	2%	7%	3%	5%	6%	4%	8%J	10%	5%	4%	4%	7%
Website	28	10	4	6	3	6	3	13	13	17	11	10	3	7	7	14
	3%	3%	2%	3%	2%	3%	1%	3%	3%	2%	4%	5%	2%	2%	2%	4%
Social networks (Facebook, Google+, etc.)	26	8	4	7	0	6	1	8	17	12	14	13	4	9	4	13
	3%	3%	2%	3%E	0	4%E	1%	2%	4%	2%	5%J	6%	3%	2%	1%	4%O
Blogs	11	1	0	6	0	4	2	5	4	7	4	3	2	2	4	5
	1%	1%	0	3%	0	2%	1%	1%	1%	1%	2%	1%	2%	1%	1%	2%
Magazine (Subnet)	43	6	1	11	5	19	5	17	21	29	14	11	8	5	9	29
	4%	2%	1%	5%	4%	11%BCDE	2%	4%	5%	4%	5%	5%	7%	1%	3%	9%NO
Magazine feature stories	25	3	*	5	3	13	3	12	10	18	7	5	5	1	5	19
	3%	1%	*	2%	2%	8%BCDE	2%	3%	2%	3%	3%	2%	4%	*	2%	6%NO
Magazine advertisements	20	3	1	7	2	6	1	6	12	12	7	7	4	3	5	11
	2%	1%	*	3%	2%	4%	1%	2%	3%	2%	3%	3%	4%	1%	2%	3%
Sweet corn recipe cards, leaflets or booklets	39	7	1	13	8	10	3	17	20	27	12	10	5	7	14	18
	4%	2%	1%	6%C	5%	6%C	1%	4%	5%	4%	4%	5%	4%	2%	5%	6%N
Billboards/outdoor ads	24	6	2	10	2	3	1	7	16	15	9	8	3	11	6	8
	2%	2%	1%	5%	1%	2%	*	2%	4%	2%	3%	4%	3%	3%	2%	2%
Radio commercials	13	3	1	5	*	5	3	2	9	9	5	5	2	0	4	9
	1%	1%	*	2%	*	3%	2%	*	2%	1%	2%	2%	2%	0	1%	3%N
Someplace else	14	2	4	*	2	5	3	10	1	12	1	0	1	4	4	5
	1%	1%	2%	*	1%	3%D	2%	3%I	*	2%	*	0	1%	1%	1%	2%

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N12

Do you recall seeing or hearing information about fresh sweet corn from any of these sources in the past year?

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
I haven't seen any information about fresh sweet corn in the past year	533	167	96	104	87	78	105	196	233	395	138	101	59	209	159	165
	53%	59%DF	55%	47%	59%F	45%	53%	52%	55%	55%	49%	46%	49%	57%	51%	51%

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N13

Which state do you believe produces the best sweet corn?

	Total (A)	Sex: Male (B)	Sex: Female (C)	Age: 18-24 (D)	Age: 25-34 (E)	Age: 35-44 (F)	Age: 45-54 (G)	Age: 55-64 (H)	Age: 65+ (I)	Region: North-east (J)	Region: Mid-west (K)	Region: South (L)	Region: West (M)	Race: White Only (Non-Hisp) (N)	Race: Black Only (Non-Hisp) (O)	His-panic (Any Race) (P)
Unweighted Total	1008	504	504	68	224	153	221	259	83	190	227	363	228	747	101	104
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
North East (Net)	118	61	58	10	13	20	30	20	25	93	1	18	6	90	13	10
	12%	13%	11%	7%	8%	11%	16%E	13%	15%	54%KLM	*	5%K	3%	13%	12%	7%
Connecticut	3	3	*	0	0	2	*	1	0	3	0	0	0	3	0	0
	*	1%	*	0	0	1%	*	*	0	2%L	0	0	0	1%	0	0
Massachusetts	7	4	3	2	2	1	1	1	1	7	0	0	0	4	0	2
	1%	1%	*	2%	1%	*	*	*	1%	4%KLM	0	0	0	1%	0	2%
Maine	3	1	2	0	1	1	*	1	0	3	0	0	0	2	0	0
	*	*	*	0	1%	*	*	1%	0	2%L	0	0	0	*	0	0
New Hampshire	1	0	1	0	0	0	1	0	0	1	0	0	0	1	0	0
	*	0	*	0	0	0	*	0	0	*	0	0	0	*	0	0
Rhode Island	4	1	3	3	1	0	0	0	0	4	0	0	0	3	0	1
	*	*	*	2%	1%	0	0	0	0	2%L	0	0	0	*	0	1%
Vermont	1	1	1	0	1	0	0	1	0	1	0	1	0	1	0	0
	*	*	*	0	*	0	0	*	0	*	0	*	0	*	0	0
New Jersey	39	19	20	0	2	5	14	9	9	23	1	11	4	31	4	2
	4%	4%	4%	0	1%	3%	7%DE	6%DE	6%	14%KLM	*	3%	2%	5%	4%	1%
New York	26	15	11	4	4	9	4	2	5	20	0	5	2	14	6	4
	3%	3%	2%	3%	2%	5%H	2%	1%	3%	11%KLM	0	1%	1%	2%	6%	3%
Pennsylvania	34	16	18	1	2	2	11	7	10	31	0	2	1	30	2	1
	3%	3%	3%	1%	1%	1%	6%EF	4%	6%	18%KLM	0	*	*	4%	2%	1%
Midwest (Net)	460	240	220	63	84	86	80	72	76	40	205	138	76	350	38	44
	46%	50%C	42%	45%	47%	49%	44%	45%	46%	23%	91%JLM	36%J	35%J	52%OP	35%	31%
Illinois	44	18	26	13	7	5	7	6	8	1	28	8	7	27	8	7
	4%	4%	5%	9%	4%	3%	4%	4%	5%	1%	12%JLM	2%	3%	4%	7%	5%

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N13

Which state do you believe produces the best sweet corn?

		Sex		Age						Region				Race		
	Total (A)	Male (B)	Female (C)	18-24 (D)	25-34 (E)	35-44 (F)	45-54 (G)	55-64 (H)	65+ (I)	North-east (J)	Mid-west (K)	South (L)	West (M)	White Only (Non-Hisp) (N)	Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
Indiana	33	17	16	2	5	8	3	6	7	1	22	8	1	31	0	1
	3%	4%	3%	1%	3%	5%	2%	4%	5%	1%	10%JLM	2%	*	5%	0	1%
Michigan	38	14	24	2	8	10	6	5	7	0	32	6	1	31	2	4
	4%	3%	5%	1%	5%	6%	3%	3%	4%	0	14%JLM	2%	*	4%	2%	3%
Ohio	50	23	27	4	6	11	14	9	7	*	40	9	1	46	3	1
	5%	5%	5%	3%	3%	6%	8%	6%	4%	*	18%JLM	2%	*	7%P	2%	1%
Wisconsin	26	20	6	4	1	7	5	5	5	0	15	6	5	20	3	1
	3%	4%C	1%	3%	*	4%E	3%	3%E	3%	0	7%JL	1%	3%	3%	3%	1%
Iowa	140	77	62	15	25	23	20	25	31	21	37	49	32	110	11	11
	14%	16%	12%	11%	14%	13%	11%	16%	19%	13%	17%	13%	15%	16%P	10%	7%
Kansas	40	19	21	10	10	7	6	2	5	2	6	18	14	21	2	10
	4%	4%	4%	7%H	5%H	4%	3%	1%	3%	1%	3%	5%	6%J	3%	2%	7%
Minnesota	8	7	1	0	1	1	1	4	1	0	8	1	0	8	0	0
	1%	2%	*	0	1%	*	*	3%	1%	0	3%JLM	*	0	1%	0	0
Missouri	14	8	6	5	5	0	2	2	0	2	5	7	0	8	1	2
	1%	2%	1%	3%	3%F	0	1%	1%	0	1%	2%	2%	0	1%	1%	2%
Nebraska	66	35	31	10	16	13	15	7	4	12	13	26	16	47	8	6
	7%	7%	6%	7%	9%	8%	8%	5%	3%	7%	6%	7%	7%	7%	8%	4%
North Dakota	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Dakota	1	1	0	0	0	0	1	0	0	0	0	1	0	1	0	0
	*	*	0	0	0	0	1%	0	0	0	0	*	0	*	0	0
South (Net)	259	107	152	37	51	39	51	42	40	21	12	214	12	158	43	48
	26%	23%	29%	27%	28%	22%	28%	26%	24%	13%K	5%	55%JKM	6%	23%	40%N	34%
Delaware	2	1	*	0	1	0	0	1	0	0	0	2	0	2	0	0
	*	*	*	0	*	0	0	1%	0	0	0	*	0	*	0	0

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N13

Which state do you believe produces the best sweet corn?

	Total (A)	Sex: Male (B)	Sex: Female (C)	Age: 18-24 (D)	Age: 25-34 (E)	Age: 35-44 (F)	Age: 45-54 (G)	Age: 55-64 (H)	Age: 65+ (I)	Region: North-east (J)	Region: Mid-west (K)	Region: South (L)	Region: West (M)	Race: White Only (Non-Hisp) (N)	Race: Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
District of Columbia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Florida	49	20	28	4	6	12	9	7	11	4	5	36	3	30	9	9
	5%	4%	5%	3%	4%	7%	5%	4%	7%	3%	2%	9%JKM	1%	4%	8%	7%
Georgia	25	2	22	2	6	2	4	8	3	1	1	22	0	17	4	4
	2%	1%	4%B	1%	3%	1%	2%	5%F	2%	1%	1%	6%JKM	0	2%	4%	3%
Maryland	28	14	14	2	6	3	4	3	10	0	1	27	0	24	2	1
	3%	3%	3%	1%	3%	2%	2%	2%	6%	0	*	7%JKM	0	4%	2%	1%
North Carolina	21	5	16	2	5	0	6	3	5	1	0	19	0	15	5	0
	2%	1%	3%	1%	3%F	0	3%F	2%	3%	1%	0	5%KM	0	2%	4%	0
South Carolina	3	0	3	0	1	0	1	2	0	0	0	3	0	3	0	0
	*	0	1%	0	*	0	*	1%	0	0	0	1%	0	*	0	0
Virginia	9	3	6	0	3	2	2	2	0	0	*	8	0	6	0	1
	1%	1%	1%	0	2%	1%	1%	1%	0	0	*	2%	0	1%	0	1%
West Virginia	4	4	0	0	0	0	4	*	0	4	0	*	0	*	4	0
	*	1%	0	0	0	0	2%	*	0	2%L	0	*	0	*	4%N	0
Alabama	16	9	8	6	2	2	1	4	0	2	1	11	3	6	4	3
	2%	2%	1%	5%	1%	1%	1%	3%	0	1%	*	3%	1%	1%	4%	2%
Kentucky	14	9	5	1	6	3	3	1	0	2	1	11	0	12	0	2
	1%	2%	1%	1%	3%H	2%	2%	*	0	1%	*	3%M	0	2%	0	2%
Mississippi	2	2	1	0	0	0	1	2	0	1	1	1	0	0	1	1
	*	*	*	0	0	0	*	1%	0	*	*	*	0	0	1%N	1%
Tennessee	12	3	10	0	3	3	5	0	2	0	0	12	0	9	1	3
	1%	1%	2%	0	1%	1%	3%H	0	1%	0	0	3%KM	0	1%	1%	2%
Arkansas	13	6	7	5	0	1	2	1	4	0	2	8	4	3	7	0
	1%	1%	1%	4%	0	1%	1%	*	2%	0	1%	2%	2%	*	7%NP	0

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N13

Which state do you believe produces the best sweet corn?

	Total (A)	Sex: Male (B)	Sex: Female (C)	Age: 18-24 (D)	Age: 25-34 (E)	Age: 35-44 (F)	Age: 45-54 (G)	Age: 55-64 (H)	Age: 65+ (I)	Region: North-east (J)	Region: Mid-west (K)	Region: South (L)	Region: West (M)	Race: White Only (Non-Hisp) (N)	Race: Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
Louisiana	3	0	3	0	1	2	0	0	0	1	0	2	0	2	1	0
	*	0	1%	0	*	1%	0	0	0	1%	0	*	0	*	1%	0
Oklahoma	14	6	8	2	2	2	2	1	4	5	0	7	2	11	2	1
	1%	1%	1%	2%	1%	1%	1%	*	3%	3%K	0	2%	1%	2%	2%	1%
Texas	45	22	23	13	9	7	7	9	0	*	0	44	1	19	3	22
	4%	5%	4%	10%I	5%I	4%	4%	5%I	0	*	0	11%JKM	*	3%	2%	15%NO
West (Net)	162	68	95	28	32	31	22	26	24	16	7	18	121	82	14	41
	16%	14%	18%	20%	18%	18%	12%	16%	14%	10%K	3%	5%	56%JKL	12%	13%	29%NO
Arizona	6	3	3	1	2	1	1	1	0	0	0	0	6	3	1	1
	1%	1%	1%	1%	1%	*	1%	*	0	0	0	0	3%KL	*	1%	1%
Colorado	9	4	5	0	2	2	1	3	1	1	1	2	6	8	1	0
	1%	1%	1%	0	1%	1%	*	2%	1%	1%	*	*	3%	1%	1%	0
Idaho	20	10	10	5	4	4	1	2	4	4	3	10	2	10	6	3
	2%	2%	2%	3%	2%	2%	*	1%	2%	3%	1%	3%	1%	1%	5%N	2%
Montana	2	1	1	0	1	1	0	0	0	1	0	0	1	2	0	0
	*	*	*	0	1%	1%	0	0	0	1%	0	0	*	*	0	0
Nevada	1	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1
	*	0	*	0	0	1%	0	0	0	0	0	0	1%	0	0	1%
New Mexico	7	3	4	2	0	3	1	1	0	1	0	0	6	1	0	6
	1%	1%	1%	2%	0	2%	*	*	0	*	0	0	3%KL	*	0	4%N
Utah	6	0	6	0	1	1	*	1	2	0	0	1	5	6	0	0
	1%	0	1%	0	*	1%	*	*	1%	0	0	*	2%KL	1%	0	0
Wyoming	6	0	6	3	0	3	0	0	0	1	0	0	5	0	1	2
	1%	0	1%	2%	0	2%	0	0	0	*	0	0	2%L	0	1%	2%N
California	89	40	49	14	16	15	12	18	15	5	3	4	76	42	6	23
	9%	8%	9%	10%	9%	8%	6%	11%	9%	3%	1%	1%	35%JKL	6%	5%	16%NO

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

Question N13

Which state do you believe produces the best sweet corn?

	Total (A)	Sex: Male (B)	Sex: Female (C)	Age: 18-24 (D)	Age: 25-34 (E)	Age: 35-44 (F)	Age: 45-54 (G)	Age: 55-64 (H)	Age: 65+ (I)	Region: North-east (J)	Region: Mid-west (K)	Region: South (L)	Region: West (M)	Race: White Only (Non-Hisp) (N)	Race: Black Only (Non-Hisp) (O)	Hispanic (Any Race) (P)
Weighted Total	1000	476	524	138*	180	176	183	159	165*	171	225	388	216	680	109*	142*
Oregon	7	2	5	3	2	0	1	1	0	0	0	0	7	4	0	3
	1%	*	1%	2%	1%	0	1%	*	0	0	0	0	3%KL	1%	0	2%
Washington	7	4	3	0	3	0	2	1	2	2	0	0	4	4	1	2
	1%	1%	1%	0	1%	0	1%	*	1%	1%	0	0	2%L	1%	1%	1%
Alaska	1	1	0	0	0	0	1	0	0	0	0	1	0	1	0	0
	*	*	0	0	0	0	1%	0	0	0	0	*	0	*	0	0
Hawaii	2	*	2	0	0	0	2	0	0	*	0	0	2	*	0	0
	*	*	*	0	0	0	1%	0	0	*	0	0	1%	*	0	0

Proportions/Means: Columns Tested (5% risk level) - B/C - D/E/F/G/H/I - J/K/L/M - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N13

Which state do you believe produces the best sweet corn?

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Unweighted Total	1008	235	144	237	171	221	201	408	399	747	261	200	116	254	309	445
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
North East (Net)	118	28	18	25	24	23	24	54	41	92	27	16	19	50	31	37
	12%	10%	11%	12%	16%	13%	12%	14%	10%	13%	10%	7%	15%	14%	10%	11%
Connecticut	3	0	0	1	1	2	2	*	1	2	2	1	*	3	0	*
	*	0	0	*	1%	1%	1%	*	*	*	1%	1%	*	1%	0	*
Massachusetts	7	0	*	2	4	1	1	3	3	5	2	2	2	1	1	5
	1%	0	*	1%	3%B	*	*	1%	1%	1%	1%	1%	2%	*	*	2%
Maine	3	2	*	0	0	1	1	*	2	1	2	1	1	2	1	*
	*	1%	*	0	0	*	1%	*	1%	*	1%	1%	1%	1%	*	*
New Hampshire	1	0	0	1	0	0	0	1	0	1	0	0	0	1	0	0
	*	0	0	*	0	0	0	*	0	*	0	0	0	*	0	0
Rhode Island	4	2	0	0	0	2	0	1	3	4	0	0	0	0	2	2
	*	1%	0	0	0	1%	0	*	1%	1%	0	0	0	0	1%	*
Vermont	1	1	1	0	0	0	0	1	0	1	0	0	0	1	0	1
	*	*	*	0	0	0	0	*	0	*	0	0	0	*	0	*
New Jersey	39	8	5	7	6	12	9	19	11	31	8	1	7	15	7	16
	4%	3%	3%	3%	4%	7%	4%	5%	3%	4%	3%	1%	6%	4%	2%	5%
New York	26	5	6	5	7	4	1	12	13	18	8	7	5	5	13	9
	3%	2%	3%	2%	5%	2%	1%	3%	3%	3%	3%	3%	4%	1%	4%	3%
Pennsylvania	34	11	6	9	6	2	10	17	7	29	5	3	3	23	7	4
	3%	4%	3%	4%	4%	1%	5%	4%	2%	4%	2%	2%	2%	6%P	2%	1%
Midwest (Net)	460	122	78	112	73	75	93	176	191	345	115	86	55	157	147	156
	46%	43%	45%	51%	49%	43%	47%	46%	45%	48%	41%	39%	45%	43%	47%	48%
Illinois	44	15	6	5	12	6	13	14	17	36	9	6	6	11	13	20
	4%	5%	4%	2%	8%D	4%	7%	4%	4%	5%	3%	3%	5%	3%	4%	6%

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N13

Which state do you believe produces the best sweet corn?

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
Indiana	33	6	8	8	5	6	3	11	18	17	16	15	7	12	11	10
	3%	2%	5%	4%	3%	3%	2%	3%	4%	2%	6%J	7%	6%	3%	3%	3%
Michigan	38	8	8	8	7	6	6	17	15	30	8	8	5	14	12	12
	4%	3%	5%	4%	5%	4%	3%	4%	4%	4%	3%	4%	4%	4%	4%	4%
Ohio	50	17	10	8	8	7	12	22	17	43	7	6	2	26	16	8
	5%	6%	6%	4%	5%	4%	6%	6%	4%	6%	2%	3%	2%	7%P	5%	2%
Wisconsin	26	6	5	7	6	3	6	9	11	19	7	2	7	12	4	10
	3%	2%	3%	3%	4%	2%	3%	2%	3%	3%	3%	1%	6%	3%	1%	3%
Iowa	140	31	10	46	22	31	28	62	50	111	28	20	9	27	50	63
	14%	11%	6%	21%BC	15%C	18%C	14%	16%	12%	15%	10%	9%	7%	7%	16%N	19%N
Kansas	40	12	4	8	7	8	5	10	25	25	15	11	7	17	14	8
	4%	4%	2%	4%	5%	5%	2%	3%	6%H	3%	5%	5%	6%	5%	5%	2%
Minnesota	8	1	4	1	2	0	1	7	0	8	0	0	0	4	2	2
	1%	*	2%	1%	2%	0	1%	2%I	0	1%	0	0	0	1%	1%	1%
Missouri	14	7	1	5	0	1	6	4	4	12	2	2	0	4	6	3
	1%	2%	1%	2%	0	*	3%	1%	1%	2%	1%	1%	0	1%	2%	1%
Nebraska	66	19	21	14	4	7	13	21	32	43	23	16	12	29	18	19
	7%	7%	12%EF	7%	3%	4%	6%	5%	8%	6%	8%	7%	10%	8%	6%	6%
North Dakota	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Dakota	1	0	1	0	0	0	0	0	1	1	0	0	0	1	0	0
	*	0	1%	0	0	0	0	0	*	*	0	0	0	*	0	0
South (Net)	259	87	48	47	31	46	50	91	119	171	88	76	29	106	75	78
	26%	30%	28%	21%	21%	26%	25%	24%	28%	24%	31%J	35%	23%	29%	24%	24%
Delaware	2	1	*	0	0	*	*	*	1	2	0	0	0	0	1	1
	*	*	*	0	0	*	*	*	*	*	0	0	0	0	*	*

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N13

Which state do you believe produces the best sweet corn?

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
District of Columbia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Florida	49	16	7	14	5	7	9	20	20	35	13	11	4	20	13	16
	5%	6%	4%	6%	3%	4%	4%	5%	5%	5%	5%	5%	3%	5%	4%	5%
Georgia	25	10	5	5	3	2	7	7	10	17	8	8	3	7	9	8
	2%	3%	3%	2%	2%	1%	4%	2%	2%	2%	3%	4%	2%	2%	3%	3%
Maryland	28	7	2	3	4	11	1	19	8	21	7	4	3	10	4	13
	3%	3%	1%	1%	3%	7%CD	1%	5%GI	2%	3%	2%	2%	3%	3%	1%	4%
North Carolina	21	10	0	1	4	6	7	6	8	13	7	6	4	9	6	6
	2%	4%	0	1%	3%	3%C	3%	2%	2%	2%	3%	3%	3%	3%	2%	2%
South Carolina	3	1	0	1	1	1	0	2	1	3	0	0	0	1	1	1
	*	*	0	*	*	*	0	1%	*	*	0	0	0	*	*	*
Virginia	9	3	1	*	2	3	1	3	5	4	5	5	0	2	4	3
	1%	1%	1%	*	1%	2%	*	1%	1%	1%	2%	2%	0	1%	1%	1%
West Virginia	4	4	0	0	*	0	4	*	0	4	0	0	0	4	0	*
	*	1%	0	0	*	0	2%HI	*	0	1%	0	0	0	1%	0	*
Alabama	16	11	0	2	1	2	2	7	7	10	6	6	0	7	6	4
	2%	4%	0	1%	1%	1%	1%	2%	2%	1%	2%	3%	0	2%	2%	1%
Kentucky	14	2	3	6	1	2	*	2	11	6	8	7	3	5	5	4
	1%	1%	2%	3%	1%	1%	*	1%	3%	1%	3%J	3%	2%	1%	1%	1%
Mississippi	2	1	0	1	0	1	0	2	1	2	1	1	1	1	1	1
	*	*	0	*	0	*	0	*	*	*	*	*	1%	*	*	*
Tennessee	12	2	5	1	1	3	2	0	10	5	7	6	3	4	6	3
	1%	1%	3%	1%	1%	2%	1%	0	2%H	1%	3%	3%	2%	1%	2%	1%
Arkansas	13	5	4	4	0	0	7	3	4	10	3	3	0	5	4	5
	1%	2%	3%	2%	0	0	3%	1%	1%	1%	1%	1%	0	1%	1%	1%

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

ORC STUDY #808261 ONLINE CARAVAN CORN SURVEY JUNE 24-26, 2013

Question N13

Which state do you believe produces the best sweet corn?

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
Louisiana	3	1	1	0	0	2	0	0	3	0	3	3	2	2	1	0
	*	*	*	0	0	1%	0	0	1%	0	1%J	1%	2%	*	*	0
Oklahoma	14	4	6	2	2	0	2	6	5	13	1	0	1	10	3	1
	1%	1%	3%F	1%	1%	0	1%	2%	1%	2%	*	0	1%	3%	1%	*
Texas	45	10	14	7	6	8	7	14	25	26	19	17	6	21	13	12
	4%	4%	8%	3%	4%	4%	3%	4%	6%	4%	7%	8%	4%	6%	4%	4%
West (Net)	162	48	28	35	20	30	31	59	72	111	51	40	20	52	56	55
	16%	17%	16%	16%	13%	17%	16%	16%	17%	15%	18%	18%	16%	14%	18%	17%
Arizona	6	0	2	1	0	3	1	1	4	2	4	4	1	2	1	3
	1%	0	1%	1%	0	1%	*	*	1%	*	1%	2%	1%	1%	*	1%
Colorado	9	2	0	*	2	5	2	5	2	7	2	2	1	1	3	6
	1%	1%	0	*	1%	3%D	1%	1%	1%	1%	1%	1%	1%	*	1%	2%
Idaho	20	4	7	2	6	1	1	9	10	16	4	4	0	12	7	1
	2%	1%	4%	1%	4%F	*	1%	2%	2%	2%	1%	2%	0	3%P	2%	*
Montana	2	1	1	0	0	0	0	2	0	2	0	0	0	2	0	0
	*	*	1%	0	0	0	0	1%	0	*	0	0	0	1%	0	0
Nevada	1	0	0	0	0	1	0	0	1	0	1	1	1	0	0	1
	*	0	0	0	0	1%	0	0	*	0	*	1%	1%	0	0	*
New Mexico	7	0	3	3	0	1	1	2	4	3	4	4	0	1	6	0
	1%	0	2%	1%	0	*	*	1%	1%	*	1%	2%	0	*	2%P	0
Utah	6	1	0	4	0	1	1	3	1	4	1	1	1	2	3	*
	1%	*	0	2%	0	1%	*	1%	*	1%	*	1%	1%	1%	1%	*
Wyoming	6	5	1	0	0	0	4	0	2	4	2	0	2	2	0	4
	1%	2%	*	0	0	0	2%H	0	1%	*	1%	0	2%	1%	0	1%
California	89	26	14	21	10	18	17	31	41	61	28	19	12	21	29	38
	9%	9%	8%	10%	7%	10%	9%	8%	10%	8%	10%	9%	10%	6%	9%	12%N

Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

Question N13

Which state do you believe produces the best sweet corn?

		Household Income					H.H. Size			Children In H.H.				Education		
	Total (A)	LT $35K (B)	$35K-LT $50K (C)	$50K-LT $75K (D)	$75K-LT $100K (E)	$100K Or More (F)	1 (G)	2 (H)	3 Or More (I)	None (J)	Any (K)	Under 13 (L)	13-17 (M)	HS Grad or less (N)	Coll Incom-plete (O)	Coll Grad (P)
Weighted Total	1000	285	173*	220	148	174	198	380	423	719	281	219	123*	364	309	326
Oregon	7	5	1	0	0	1	1	1	5	3	4	4	1	4	3	1
	1%	2%	*	0	0	1%	1%	*	1%	*	1%	2%	1%	1%	1%	*
Washington	7	4	0	2	0	1	2	4	0	6	1	1	0	1	4	1
	1%	1%	0	1%	0	1%	1%	1%	0	1%	*	*	0	*	1%	*
Alaska	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0
	*	0	0	*	0	0	1%	0	0	*	0	0	0	*	0	0
Hawaii	2	0	*	0	2	0	0	0	2	2	*	*	0	2	*	0
	*	0	*	0	1%	0	0	0	1%	*	*	*	0	*	*	0

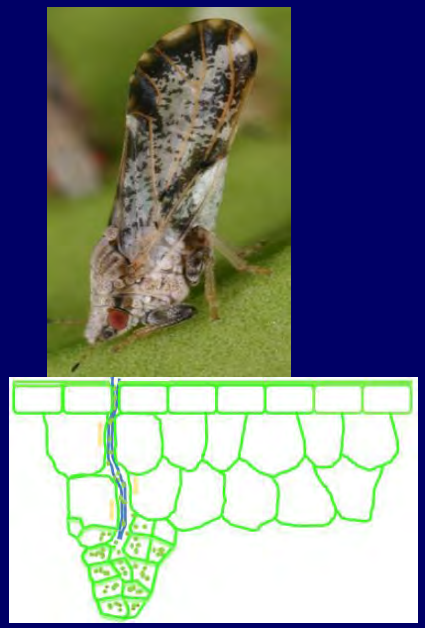
Proportions/Means: Columns Tested (5% risk level) - B/C/D/E/F - G/H/I - J/K - N/O/P
Overlap formulae used. * small base

Appendix to Project (13): University of Florida - Management of Citrus HLB by Overcoming the Salicylat Hydroxylase

Characterization of salicylate hydroxylase of *Candidatus* Liberibacter asiaticus and its role in plant defense suppression

Nian Wang, Pankaj Trivedi, Chuanfu An,
Gene Albrigo, Zhonglin Mou
Citrus Research and Education Center
Department of Microbiology and Cell Science
University of Florida

Ca. L. asiaticus has been known to suppress plant defense



Candidatus **Liberibacter asiaticus**

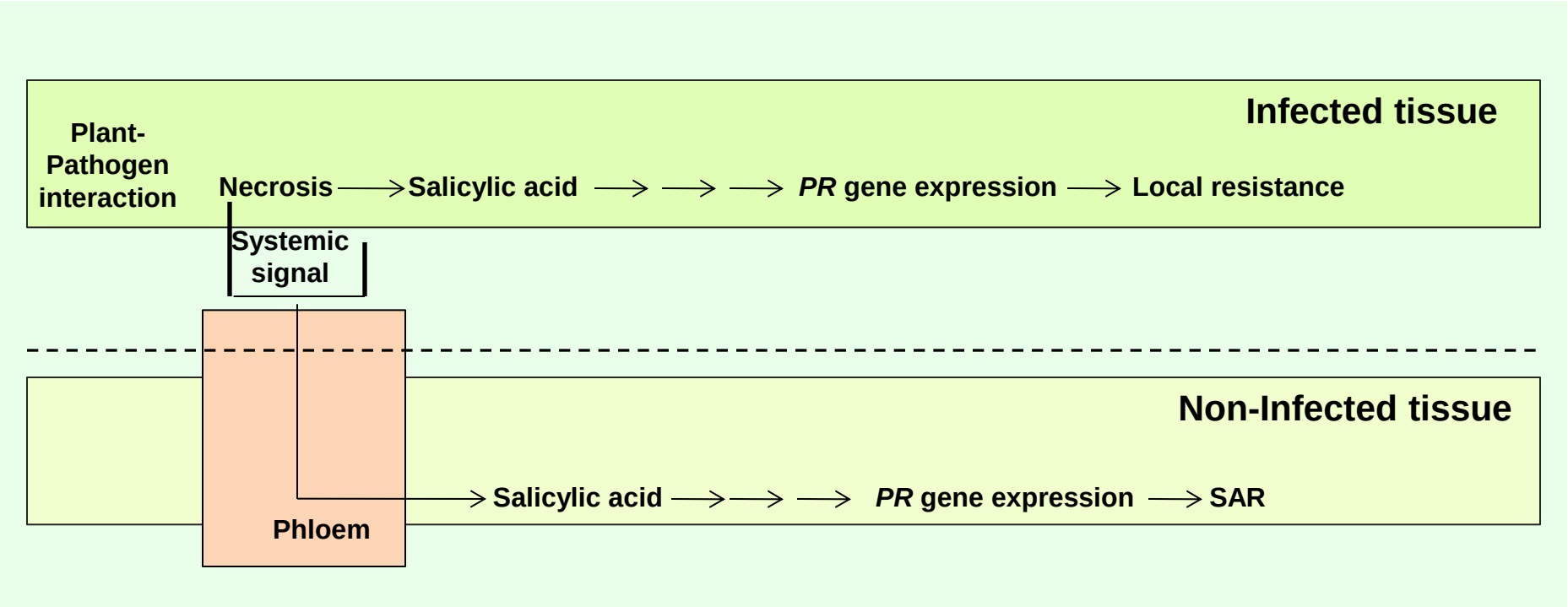
Suppress host defense

The reduced genome of *Ca.* L. asiaticus and transmission by psyllids might allow it to avoid PAMP-triggered immunity.

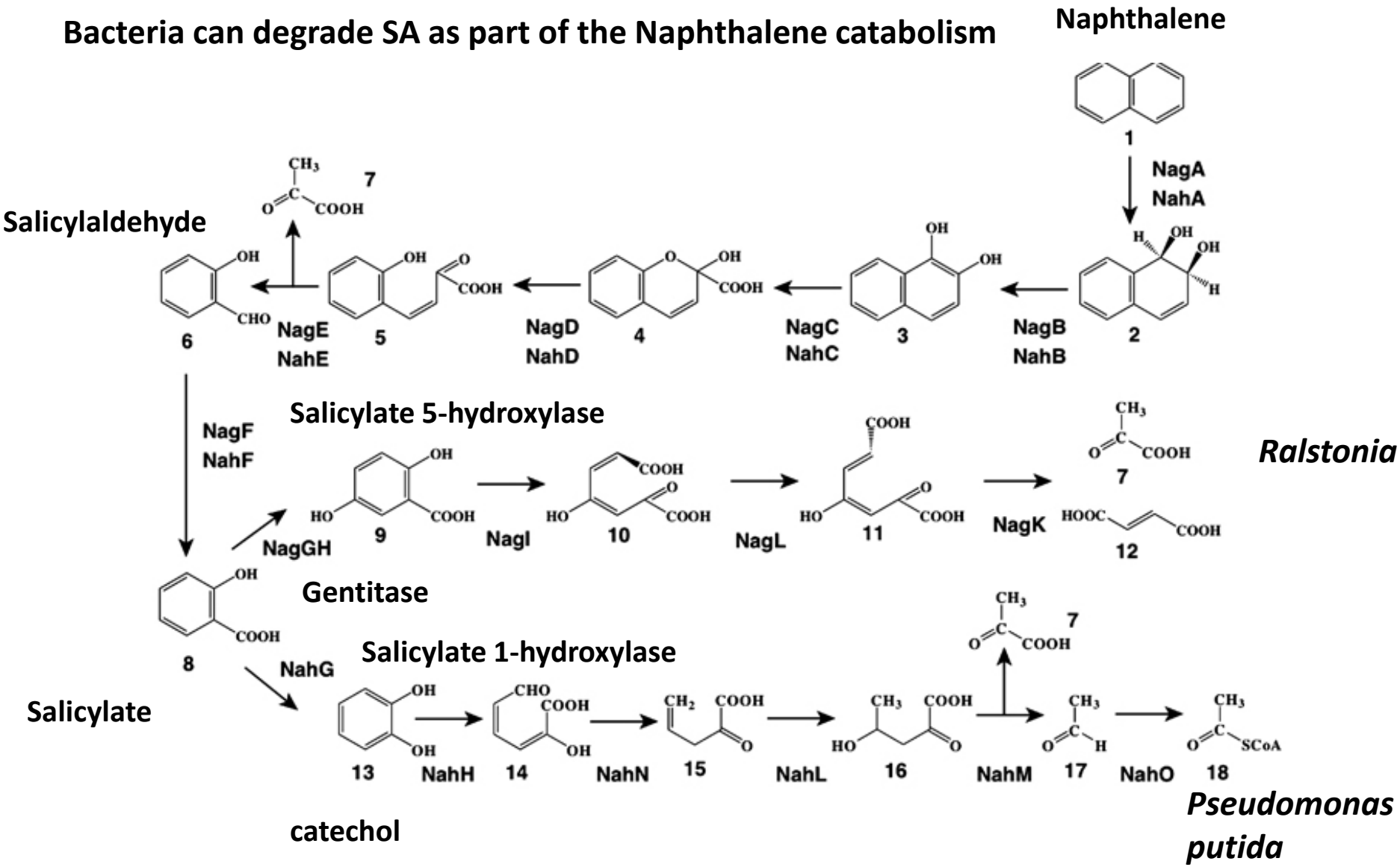
It has been suggested that the infection of citrus with *Ca.* L. asiaticus does not lead to a significant induction of defense-related genes.

How dose Ca. L. asiaticus suppress plant defense?

Salicylic acid (SA) plays an important role in plant immune response

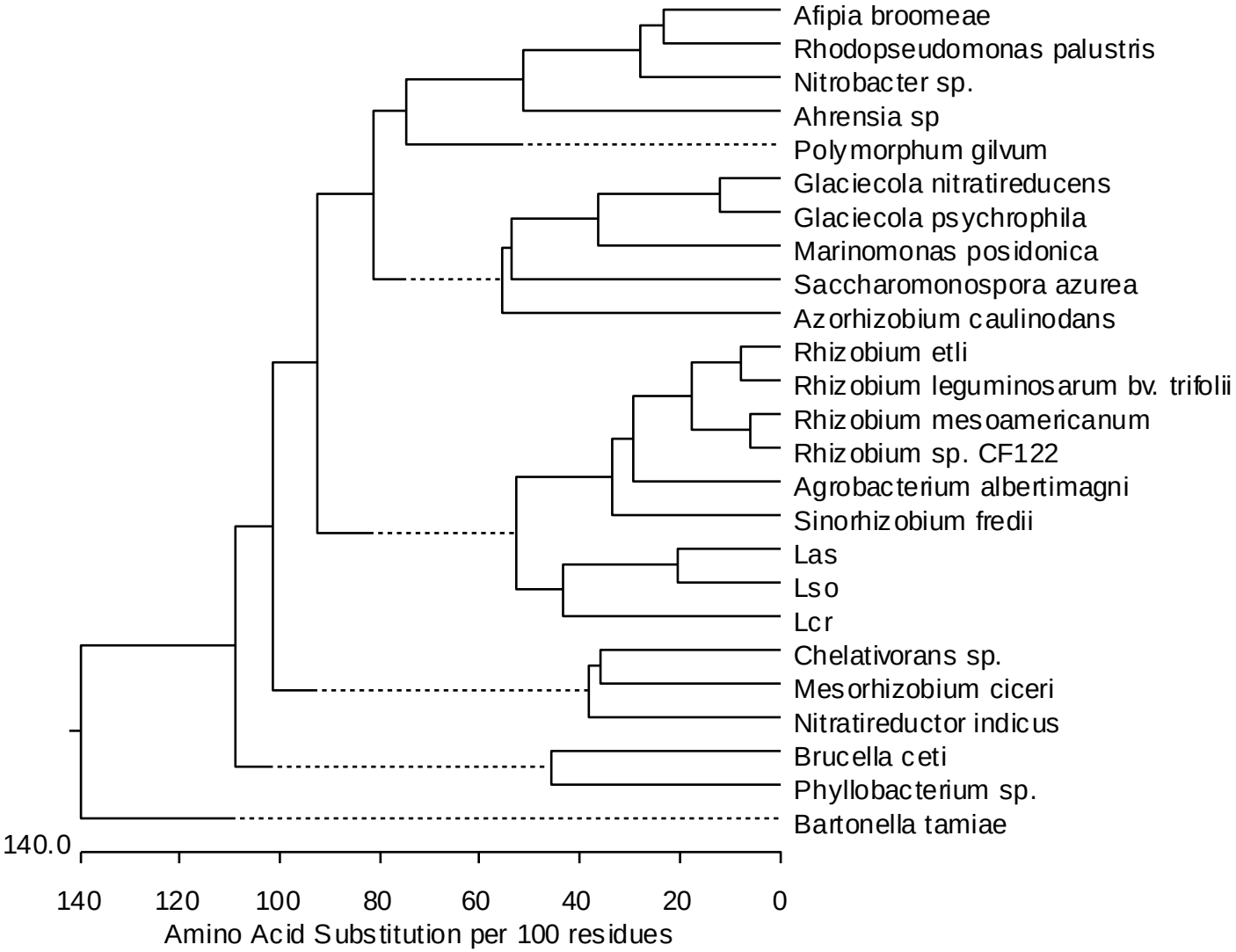


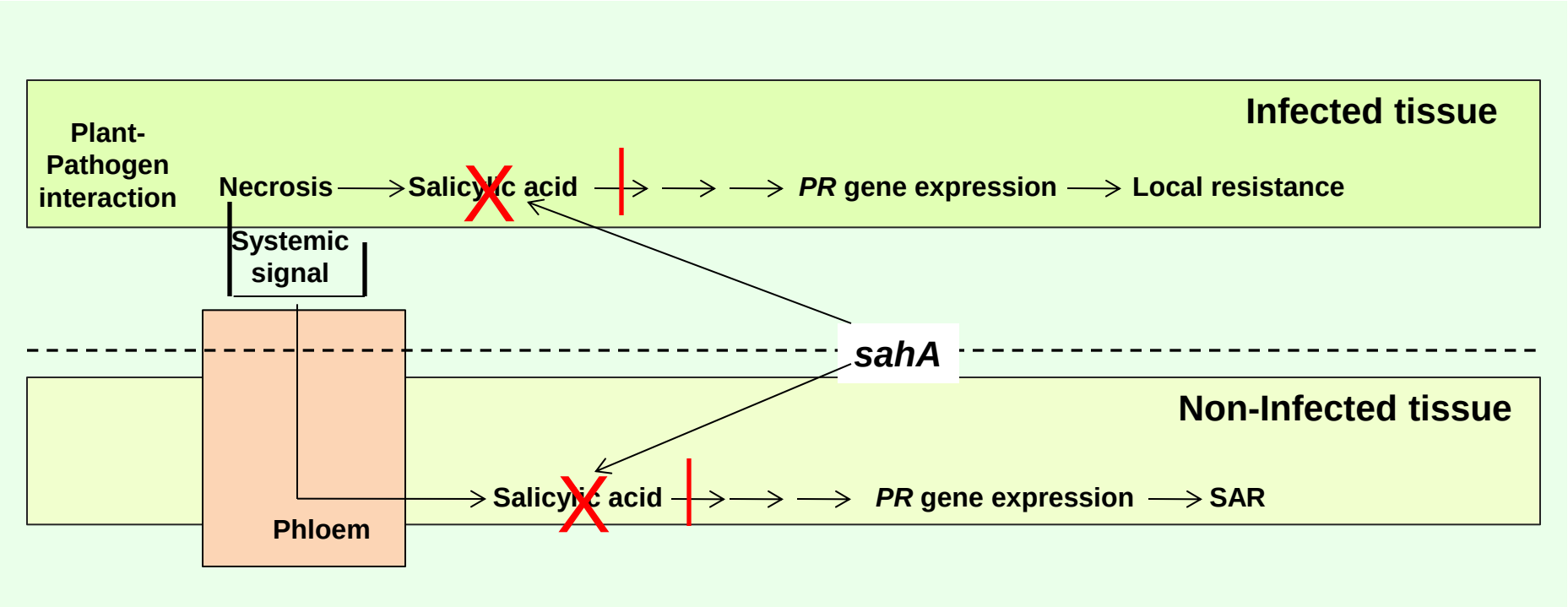
Bacteria can degrade SA as part of the Naphthalene catabolism



In bacteria, SA is an intermediate of the naphthalene catabolism which is further degraded via the catechol meta-cleavage, ortho-cleavage, or gentisic acid pathway to Krebs cycle intermediates.

SA hydroxylase is present in Candidatus Liberibacter spp. and related bacteria





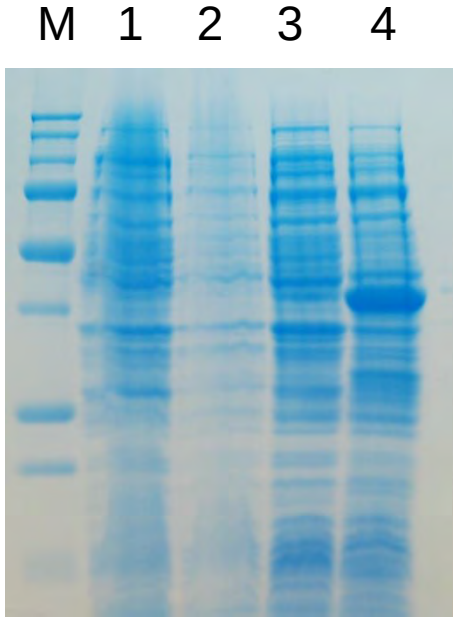
Hypotheses:

***Ca*. L. asiaticus uses salicylate hydroxylase to degrade SA which contributes to the suppression of plant defense.**

Restoration of the SA in planta will have control effect against HLB

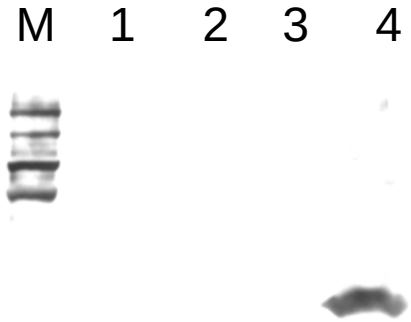
Salicylate hydroxylase encoded by *Ca*. L. asiaticus is functional

A



SDS-PAGE

B

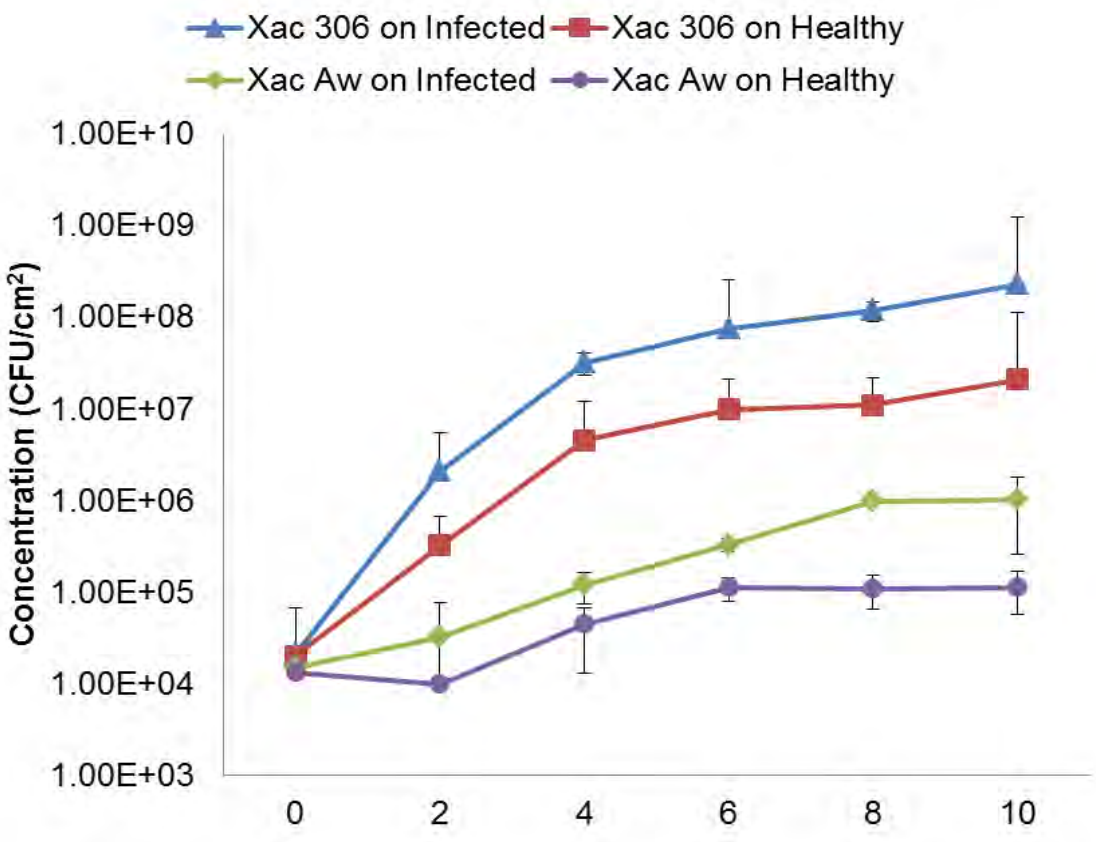


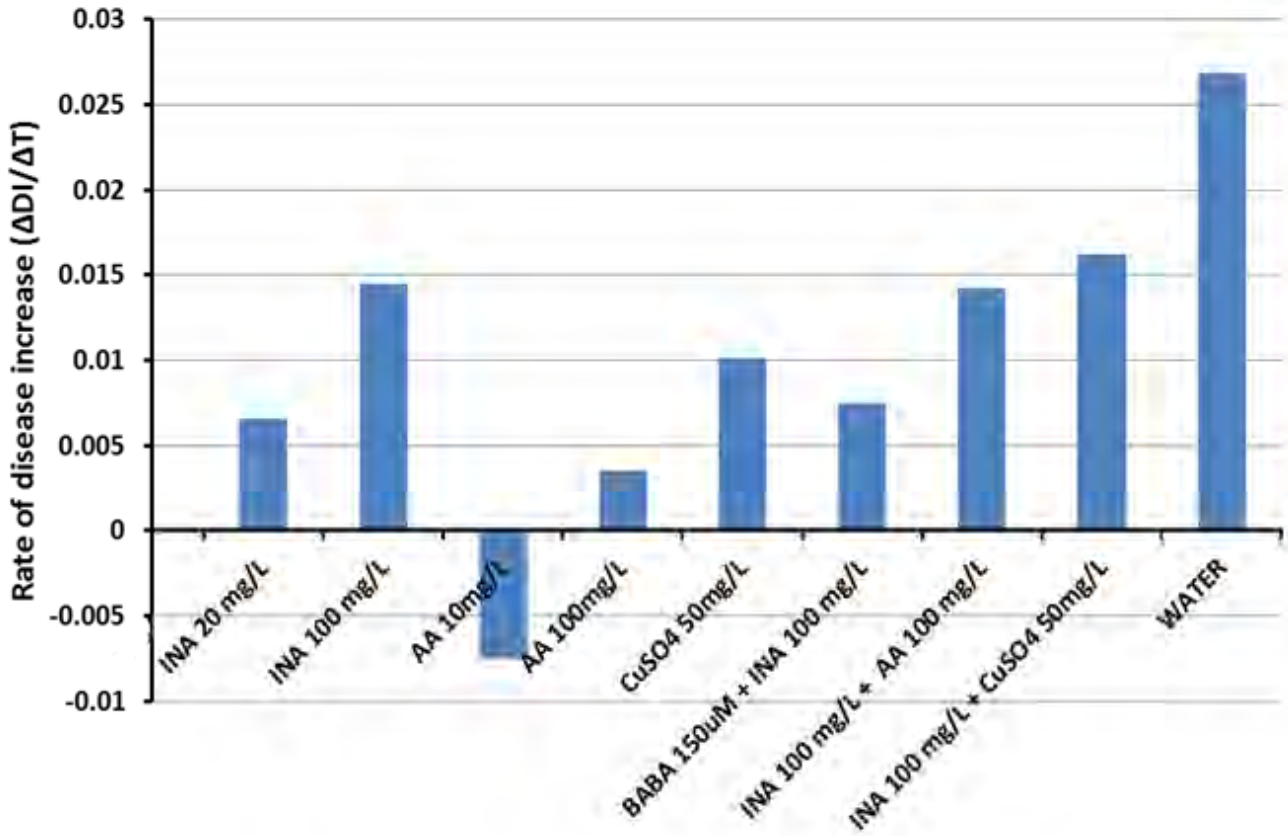
Western Blot

Substrate[a]	Enzyme activity[b]	
	mmol NADH min^{-1} mg^{-1}	%
Sodium salicylate	0.512	100
3-Methylsalicylate	0.311	60.74
4- Methylsalicylate	0.234	45.70
3-Chlorosalicylate	0.128	25.00
5-Chlorosalicylate	0.134	26.17

$$\text{Salicylate} + \text{ß-NADH} + O_2 \xrightarrow{\textbf{Salicylate hydroxylase}} \text{Catechol} + \text{ß-NAD} + H_2O + CO_2$$

HLB makes citrus more susceptible to infection by *Xanthomonas citri*




Rate of disease increase (ΔDI/ΔT)
0.03
0.025
0.02
0.015
0.01
0.005
0
-0.005
-0.01
INA 20 mg/L
INA 100 mg/L
AA 10mg/L
AA 100mg/L
CuSO4 50mg/L
BABA 150uM + INA 100 mg/L
INA 100 mg/L + AA 100 mg/L
INA 100 mg/L + CuSO4 50mg/L
WATER

Conclusion

Modulation of SA production by salicylate hydroxylase and subsequent regulation of defense related genes could be one of the mechanisms deployed by *Ca*. L. asiaticus to evade plant defense responses.

The HLB infected plants compromised with defense responses could further succumb to the infection by other pathogens.

Neutralizing SahA by optimizing the application of SA elicitors and usage of SA hydroxylase inhibitors on citrus may lead to reactivation of plant defenses against *Ca*. L. asiaticus infection.

Acknowledgements

Collaborators

Dr. Gene Albrigo

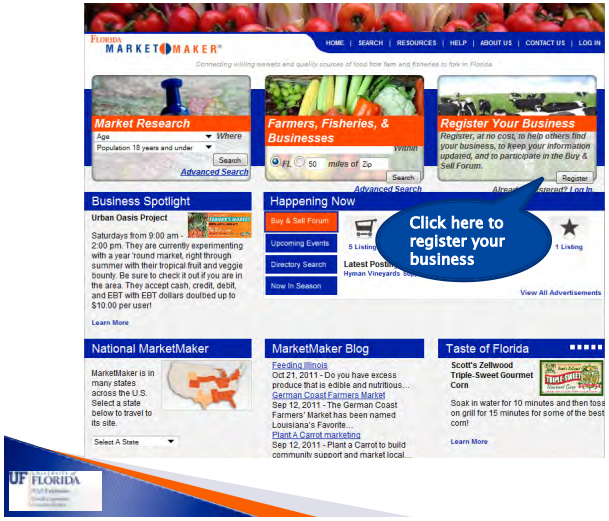
Dr. Zhonglin Mou

Specialty Crop Block Grant

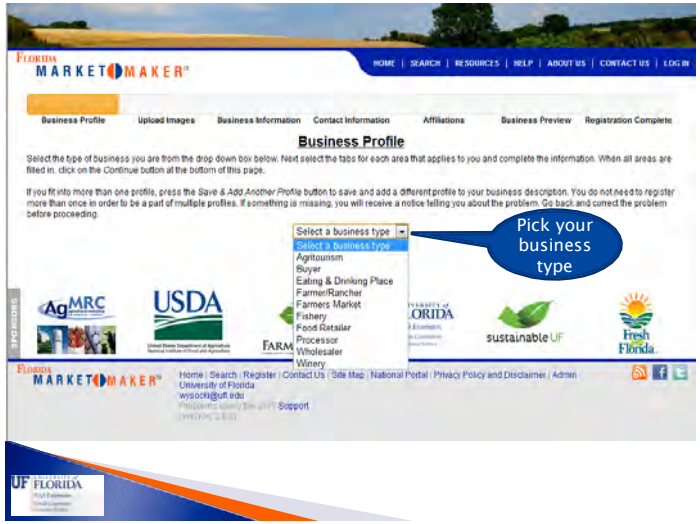
Appendix to Project (14): University of Florida - Bring Marketmaker to Specialty Crop Growers in Florida and Extend it into Ornamental Crops

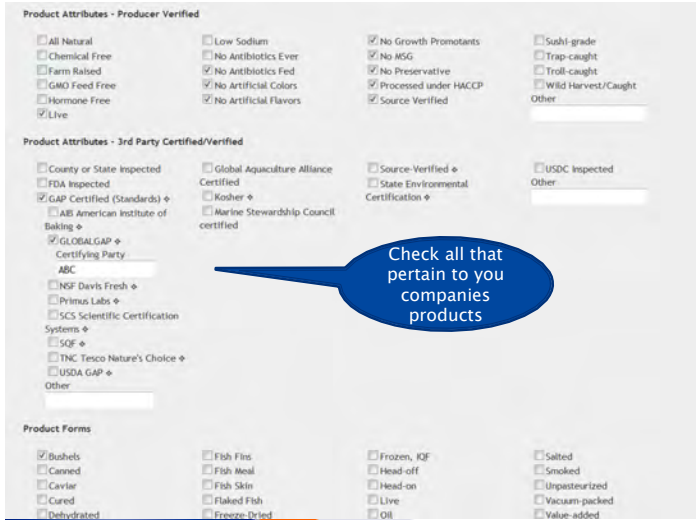
Appendix 1: Presentations and Educational Materials for Marketing Campaign I

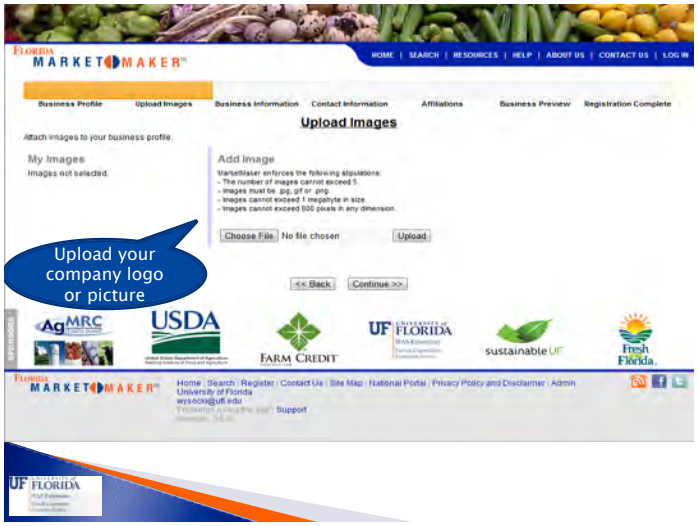
Florida Sea Grant Meeting November 15, 2011



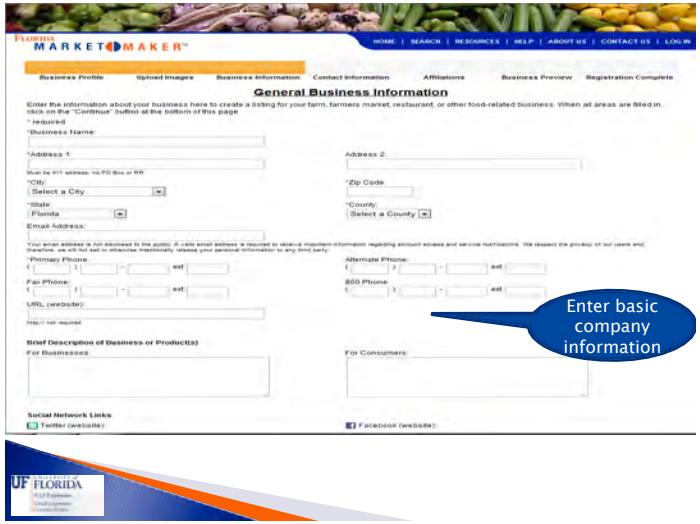
Appendix 1: Presentations and Educational Materials for Marketing Campaign I

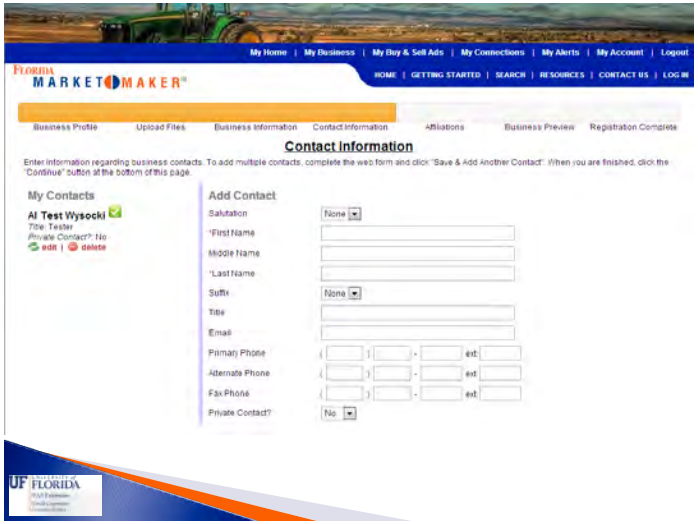


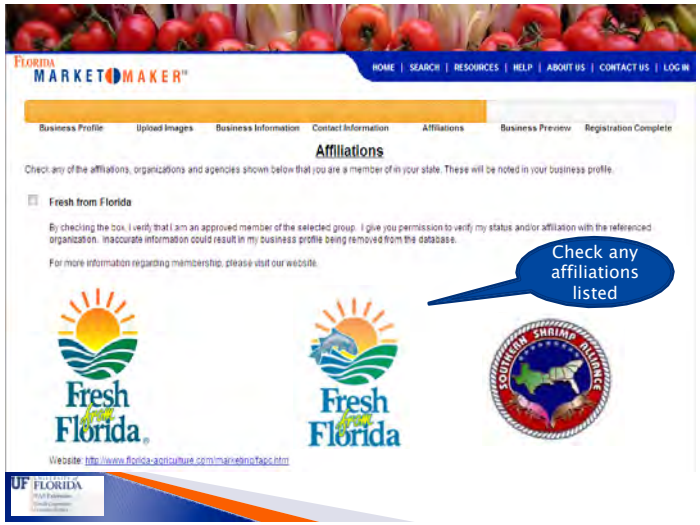




Appendix 1: Presentations and Educational Materials for Marketing Campaign I





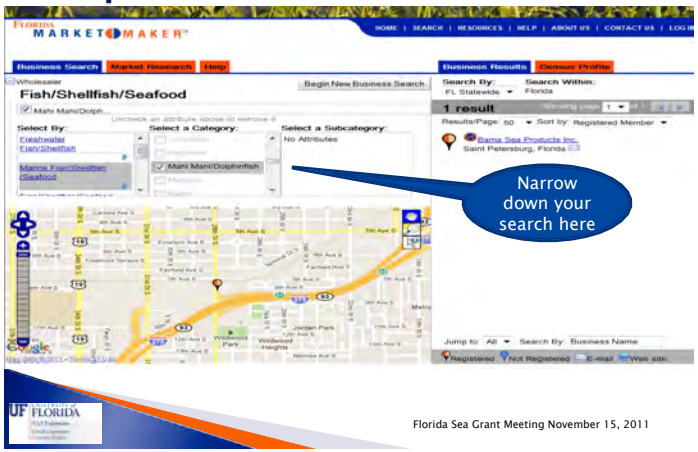


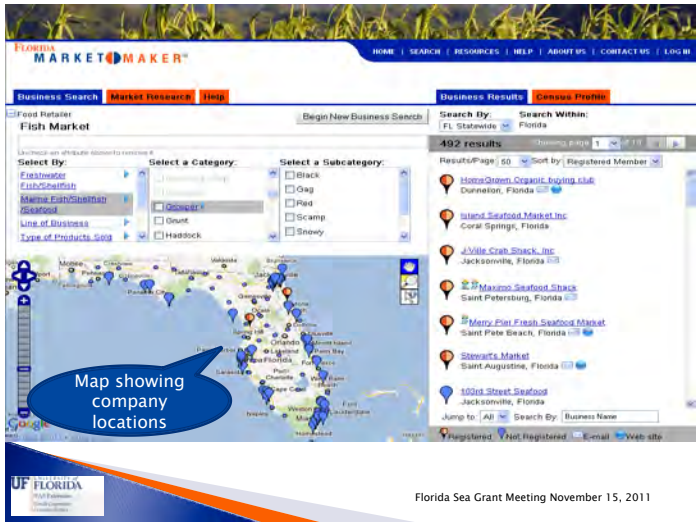
Once completed

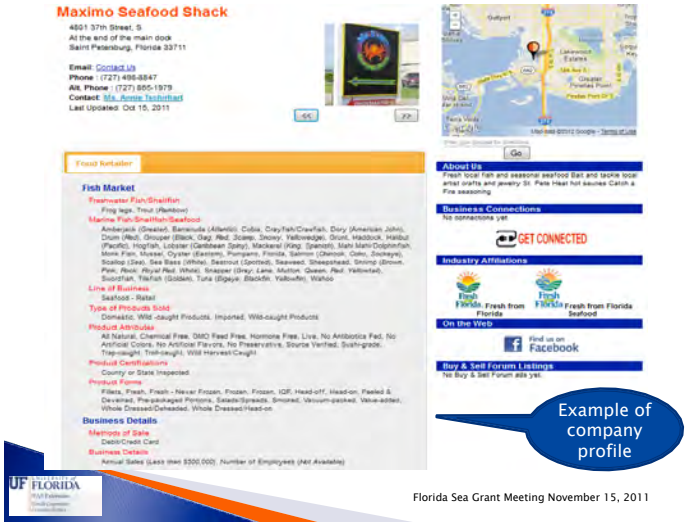
- Once all you affiliations are checked it will then ask you to confirm all the information that was entered
- After your company profile is completed people searching the site will be able to search for your company
- It will also all the user to look at were you company is located within the state

Appendix 1: Presentations and Educational Materials for Marketing Campaign I

Steps to search for a business



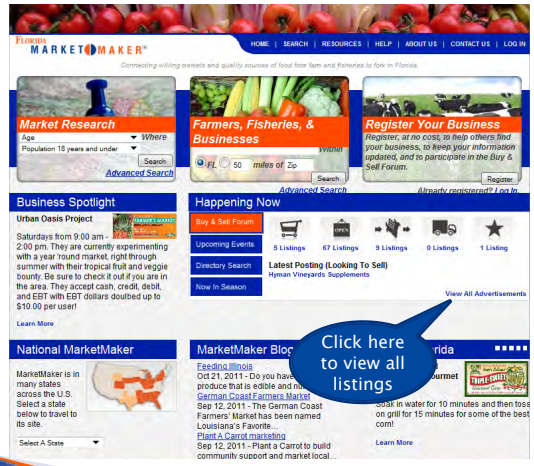




Appendix 1: Presentations and Educational Materials for Marketing Campaign I

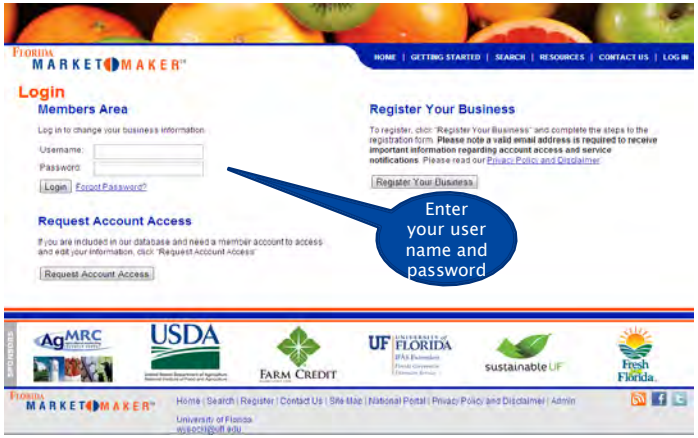
Looking to buy or sell your product?

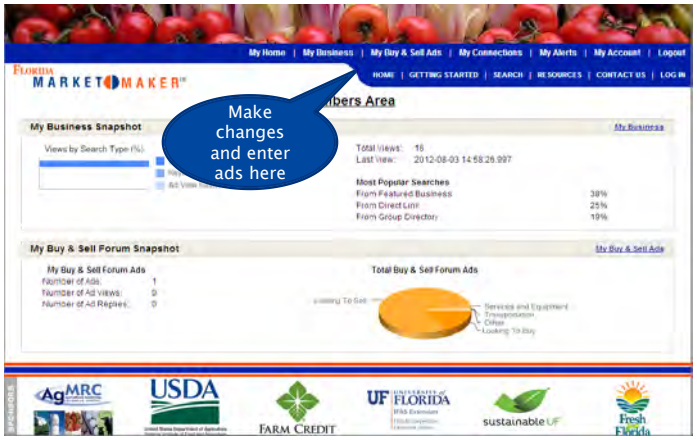
- Once you have created a company profile you can then add your products to the sites buy and sell forum
- This will allow anyone to see the products your company has on hand



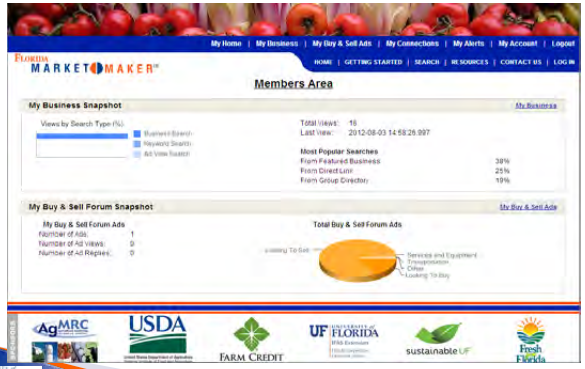
Appendix 1: Presentations and Educational Materials for Marketing Campaign I

How to update and edit your existing profile





This lets the user how many people are looking at their company profile



Appendix 1: Presentations and Educational Materials for Marketing Campaign I

REGISTER. CONNECT. SUCCEED.

- Enter your profile on line at
  - http://fl.foodmarketmaker.com
- See the handout for details.

FLORIDA MARKETMAKER
Linking Agricultural Markets

UF FLORIDA

FLORIDA MARKETMAKER™

Linking Agricultural Markets

UF UNIVERSITY of FLORIDA IFAS Extension

REGISTER. CONNECT. SUCCEED.

Why MarketMaker?

When you **REGISTER** with MarketMaker your customized business profile is available for consumers to access via powerful search features, wherever they are.

MarketMaker's tools allow you to **CONNECT** with consumers by communicating through marketplace forums or accessing information via an interactive search and mapping system.

Your business can **SUCCEED** in marketing its products with these features as well as through additional opportunities like the Business Spotlight, Taste of Florida and Now in Season highlighter.

It is **FREE** for Florida producers, consumers, retailers, wholesalers, processors and others within the food supply chain.

What is MarketMaker?

- MarketMaker is an electronic infrastructure that:
  - » Consists of a comprehensive and interactive database
  - » Connects the food supply chain
  - » Offers innovative tools that facilitate more effective marketing for enterprises from farm to fork
- MarketMaker is a service of the Florida Cooperative Extension, and is sponsored by the Agriculture Marketing Research Center, USDA's National Institute of Food and Agriculture, the Applied Sustainability Center, the Institute of Food and Agricultural Sciences and the Office of Sustainability at the University of Florida.

http://fl.foodmarketmaker.com

Entering a School Foodservice Profile in Florida MarketMaker

Step 1: Access the Florida MarketMaker website: http://fl.foodmarketmaker.com.

Step 2: New to MarketMaker? Click on the "Register" button in the Register Your Business box located in the upper right corner. ***Go to step 4***.

Step 3: Returning user? Click on the "Log In" button under the "Register Your Business box.

- If you are a returning user, you will have received an email with instructions regarding your username and password.
- The "Request Account Access" link is for profiles that have already been loaded into the database from purchased lists.
- Schools are not pre-loaded, only retailers, farmers markets and other intermediaries that are part of data that National MarketMaker has purchased.

Step 4: Select "Buyer" as a business type.

Step 5: Select the "Institutional/School tab.

- **Organization.** Check "Education."
- **Farm to School.** Check all that apply. When there are multiple products, such as meals served, you will see an asterisk. If you click on meals served, the menu will expand and you will have additional options.
- **Preferences.** Check all that apply.
- **Product Area.** Check all that apply.
- **Certifications.** Check all that apply. For each certification indicate if the certification is preferred or required.
- **Risk Management Requirements.** Select level of liability insurance required.
- **Facility Details.** Disclose the capacity of your freezer, refrigeration, and storage capacity as you deem necessary.
- **Transportation Details.** Check all that apply. These are the types of transportation you will accept.
- **Markets Purchased From.** Check all that apply.
- **Business Details.** State specific information you wish producers/distributors to know about your operation such as hours of operation.

When you are done entering ALL categories on this page, click on continue.

Step 6: Upload images. You have the option to upload a maximum of 5 pictures relating to your operation in Florida MarketMaker. Click continue once you have finished uploading pictures, or if you do not wish to upload pictures.

Step 7: General Business Information. There are a number of required fields on this page. This information is used for MarketMaker to build the searchable database.

Step 8: Contact Information. This information will be made public on your profile.

Step 9: Affiliations. Very important if you are part of these programs to check the appropriate boxes. This information will be made public on your profile.

Step 10: Business Preview. Review all the information you have provided. When the information is correct hit the submit button.

Step 11: Receive a confirmation email from the National MarketMaker with your username and password. You may edit and update your profile at any time.

Any questions? Contact Dr. Allen Wysocki at FloridaMarketMaker@ufl.edu (updated August 6, 2012)

FLORIDA MARKETMAKER™ Linking Agricultural Markets

UF UNIVERSITY of FLORIDA IFAS Extension

FLORIDA MARKETMAKER™

Linking Agricultural Markets

UF UNIVERSITY of FLORIDA IFAS Extension

REGISTER. CONNECT. SUCCEED.

Why MarketMaker?

When you **REGISTER** with MarketMaker your customized business profile is available for consumers to access via powerful search features, wherever they are.

MarketMaker's tools allow you to **CONNECT** with consumers by communicating through marketplace forums or accessing information via an interactive search and mapping system.

Your business can **SUCCEED** in marketing its products with these features as well as through additional opportunities like the Business Spotlight, Taste of Florida and Now in Season highlighter.

It is **FREE** for Florida producers, consumers, retailers, wholesalers, processors and others within the food supply chain.

What is MarketMaker?

- MarketMaker is an electronic infrastructure that:
  - » Consists of a comprehensive and interactive database
  - » Connects the food supply chain
  - » Offers innovative tools that facilitate more effective marketing for enterprises from farm to fork
- MarketMaker is a service of the Florida Cooperative Extension, and is sponsored by the Agriculture Marketing Research Center, USDA's National Institute of Food and Agriculture, the Applied Sustainability Center, the Institute of Food and Agricultural Sciences and the Office of Sustainability at the University of Florida.

http://fl.foodmarketmaker.com

How to create a buy or sell listing on the Florida MarketMaker website

Step 1: Access the Florida MarketMaker website: http://fl.foodmarketmaker.com.

Step 2: Click on the "Log In" button on the upper right corner of the home page.

- If you are a returning user, you will have received an email with instructions regarding your username and password.
- If you are new to the MarketMaker site you will first have to create a user name and profile. Refer to the "How to put in a profile" specific to your business.

Step 3: Once logged onto your homepage click on the button "My Buy and Sell Ads".

- The member area page allows you to change all aspects of all your companies profile including managing ads.

Step 4: Select the "New Listing" or on an existing Ad you would like to edit.

- The new listing link leads to the page where any type of ad can be created

Step 5: Manage Listing Page. Enter information into all fields that apply and or are needed

- Category: lets you select what type of listing you will be placing.
  - Looking to Buy
  - Looking to Sell
  - Service and Equipment
  - Transportation
  - Other
- **Sub– Category**
  - Fruit
  - Vegetable
  - Specialty Product
  - Fish and Seafood
  - Livestock
  - Grains
- **Title:** Create your own unique title.
- **Description:** Write a detailed description that best details all the information that would be relative to the product or service.
- **Product Availability:** Enter the date you are either looking for or selling the listed item.
- **Duration:** Enter the amount of time you would like the ad to appear on MarketMaker

When you are done entering ALL categories on this page, click on continue.

Step 6: Upload images. You have the option to upload a maximum of 5 pictures relating to your listing in Florida MarketMaker. Click continue once you have finished uploading pictures, or if you do not wish to upload pictures.

Step 7: Listing Preview. Look over the entered information and make sure everything is correct and then press submit.

Step 8: Receive a confirmation email from the National MarketMaker with your listing will be added within one to two business days.

Receive Email Alerts

To receive email notifications about new buy and sell listings:

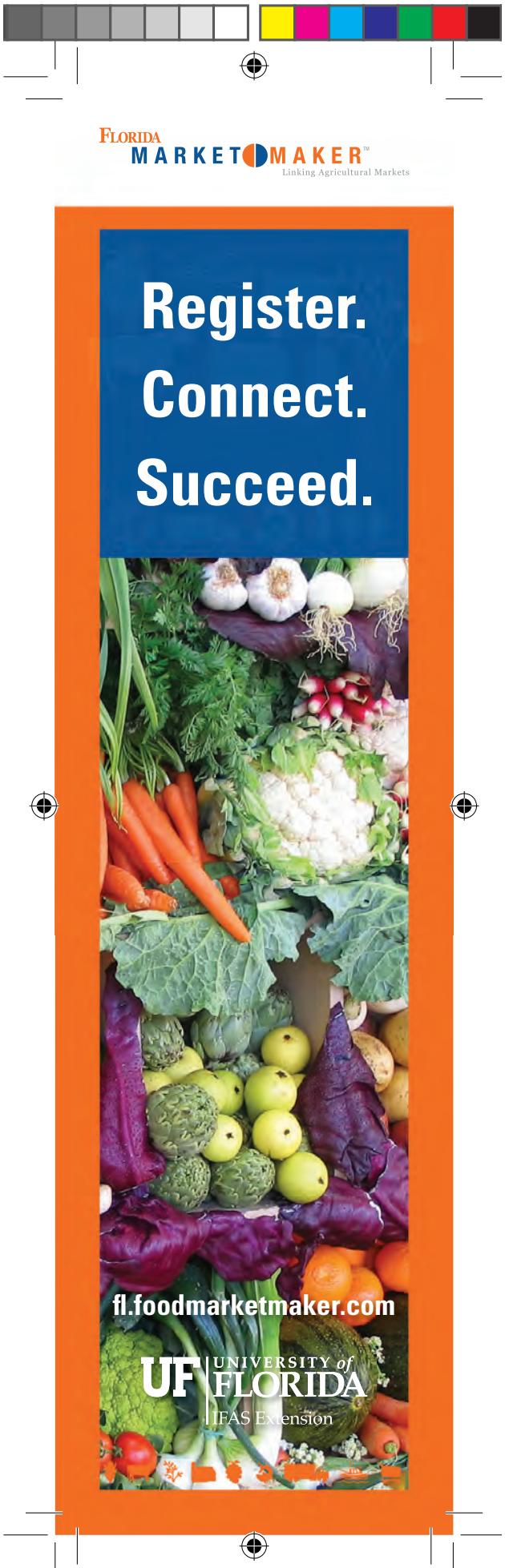
- Once you are logged into your homepage click "My Alerts" .
- Click all products you would like to be notified about with an email.

Any questions? Contact Dr. Allen Wysocki at FloridaMarketMaker@ufl.edu (updated August 8, 2012)

FLORIDA MARKETMAKER™ Linking Agricultural Markets

UF UNIVERSITY of FLORIDA IFAS Extension

Appendix 1: Presentations and Educational Materials for Marketing Campaign I



FLMarketMakerBM.indd 1 3/11/13 11:35 AM

Ask me about

MARKET MAKER™

FL.foodmarketmaker.com

FLORIDA MARKET MAKER™
Linking Agricultural Markets

SOLUTIONS

Helping Farmers Successfully Market Their Products

Register. Connect. Succeed.

An interactive mapping system that locates businesses and markets of agricultural products in Florida, an important link between producers and consumers.

Connections

A resource for all businesses in the food supply chain

Finding Customers

Contains searchable demographic and business data

Solutions

Buy & Sell Forum has time sensitive posts including:

- requests for specific food products
- freight sharing opportunities
- products available for immediate delivery

http://fl.foodmarketmaker.com

UF UNIVERSITY of FLORIDA
IFAS Extension

Appendix 2: Promotional and Educational Materials for Marketing Campaign II

FLORIDA MARKETMAKER™

Linking Agricultural Markets

UF UNIVERSITY of FLORIDA IFAS Extension

REGISTER. CONNECT. SUCCEED.

Why MarketMaker?

When you **REGISTER** with MarketMaker your customized business profile is available for consumers to access via powerful search features, wherever they are.

MarketMaker's tools allow you to **CONNECT** with consumers by communicating through marketplace forums or accessing information via an interactive search and mapping system.

Your business can **SUCCEED** in marketing its products with these features as well as through additional opportunities like the Business Spotlight, Taste of Florida and Now in Season highlighter.

It is **FREE** for Florida producers, consumers, retailers, wholesalers, processors and others within the food supply chain.

What is MarketMaker?

- MarketMaker is an electronic infrastructure that:
  - » Consists of a comprehensive and interactive database
  - » Connects the food supply chain
  - » Offers innovative tools that facilitate more effective marketing for enterprises from farm to fork
- MarketMaker is a service of the Florida Cooperative Extension, and is sponsored by the Agriculture Marketing Research Center, USDA's National Institute of Food and Agriculture, the Applied Sustainability Center, the Institute of Food and Agricultural Sciences and the Office of Sustainability at the University of Florida.

http://fl.foodmarketmaker.com

Entering a Producer Profile in Florida MarketMaker

Step 1: Access the Florida MarketMaker website: http://fl.foodmarketmaker.com

Step 2: If you are new to MarketMaker,click on the "Register" button in the Register Your Business box located in the upper right corner. Go to step 4.

Step 3: If you are a returning user, click on the "Log In" button under the "Register Your Business box.

- If you are a returning user, you will have received an email with instructions regarding your username and password.
- The "Request Account Access" link is for profiles that have already been loaded into the database from purchased lists.
- Producers are not pre-loaded, only retailers, farmers markets and other intermediaries that are part of data that National MarketMaker has purchased.
- You can do a search if you want to see if your firm is in the database by entering a name in the search box found in the box "Farmers, Fisheries, & Businesses box on the home page. The default is FL, but you can search by miles from a zip code as well.

Step 4: Selecta business type, for example: "Farmer."

Step 5: Enter all the products/services you wish to list on your profile in Florida MarketMaker. For farmers, there are currently 7 different categories of products/services you can enter including: Dairy, Fruits & Nuts, Grains, Herbs, Meat & Poultry, Specialty Products, and Vegetables. Each category consists of a number of subcategories (the more information you provide, the easier it will be for buyers).

- **Product type.** Check all products that apply. When there are multiple products, such as beans, under the vegetable category, you will see an asterisk. If you click on beans, the menu will expand and you will have additional options to select from.
- **Product Attributes – Producer Certified** Check all attributes that you certify for your operation such as hydroponic and pesticide free.
- **Product Attributes – 3rd Party Certified/ Verified.** Check all attributes that can be certified by third parties such as GAP certified, Certified Organic, etc.
- **Product Form.** Check all that apply.
- **Methods of Sales.** Check all that apply.
- **Markets Served.** Check all that apply. Remember, buyers from other states may wish to purchase from you.
- **Business Details.** State specific information you wish buyers to know about your operation such as hours of operation.
- When you are done entering ALL categories of products (e.g., Dairy, and Meat & Poultry, etc.), click on continue. If you have additional categories to enter, click on "Save and Add Another Profile" until you have entered all your categories

Step 6: Upload images. You have the option to upload a maximum of 5 pictures relating to your operation in Florida MarketMaker. Click continue once you have finished uploading pictures, or if you do not wish to upload pictures.

Step 7: General Business Information. There are a number of required fields on this page. This information is used for MarketMaker to build the searchable database.

Step 8: Contact Information. This information will be made public on your profile.

Step 9: Affiliations. Very important if you are part of these programs to check the appropriate boxes. This information will be made public on your profile.

Step 10: Business Preview. Review all the information you have provided. When the information is correct hit the submit button.

Step 11: Receive a confirmation email from the National MarketMaker with your username and password. You may edit and update your profile at any time.

Any questions? Contact Dr. Allen Wysocki at FloridaMarketMaker@ufl.edu (updated January 27, 2012)

FLORIDA MARKETMAKER™
Linking Agricultural Markets

UF UNIVERSITY of FLORIDA
IFAS Extension

Appendix 2: Promotional and Educational Materials for Marketing Campaign II

Appendix 2: Promotional and Educational Materials for Marketing Campaign II

FLORIDA MARKET MAKER™
Linking Agricultural Markets

SOLUTIONS

Helping Consumers Find Florida Fresh Produce

http://fl.foodmarketmaker.com

An interactive mapping system that locates businesses and markets of agricultural products in Florida, an important link between producers and consumers.

Connections

A resource for all businesses in the food supply chain

Finding Customers

Contains searchable demographic and business data

Solutions

Buy & Sell Forum has time sensitive posts including:

- requests for specific food products
- freight sharing opportunities
- products available for immediate delivery

UF UNIVERSITY of FLORIDA
IFAS Extension

Appendix 2: Promotional and Educational Materials for Marketing Campaign II

FLORIDA MARKETMAKER™
Linking Agricultural Markets

SOLUTIONS

Effortlessly Connecting Consumers and Producers

Register. Connect. Succeed.

An interactive mapping system that locates businesses and markets of agricultural products in Florida, an important link between producers and consumers.

Connections

A resource for all businesses in the food supply chain

Finding Customers

Contains searchable demographic and business data

Solutions

Buy & Sell Forum has time sensitive posts including:

- requests for specific food products
- freight sharing opportunities
- products available for immediate delivery

http://fl.foodmarketmaker.com

UF UNIVERSITY of FLORIDA
IFAS Extension

Appendix 2: Promotional and Educational Materials for Marketing Campaign II

Appendix 3: Standardized MarketMaker Profile Template for Ornamental Industry

Structure of Market Maker for Ornamental Plant Commodities

Business Type
- Wholesale Nursery Grower
- Landscape Service Provider
- Re-Wholesaler
- Retailer
  - Lawn and Garden Center
  - Florist
  - Mass Merchandiser or Home Center (garden department)

Products (plants)
- Deciduous Shade Trees
  - Maple
  - Oak
  - Elm
  - Poplar
  - Willow
- Deciduous Flowering Trees
  - Crape Myrtle
  - Magnolia
  - Redbud
  - Dogwood
  - Ornamental Pear
  - Ornamental Cherry
- Evergreen Trees
  - Southern Live Oak
  - Southern Magnolia
  - Holly
  - Palm
  - Pine
  - Cedar
  - Spruce
  - Juniper
- Evergreen Shrubs (conifers)
  - Juniper
  - Taxus
  - Chamaecyparis
- Broadleaf Evergreen Shrubs
  - Azaleas
    - Indica
    - Dwarf Kurume
    - Multi-Seasonal Flowering
    - Deciduous
  - Rhododendron
  - Hollies
  - Boxwood
  - Gardenia
  - Indian Hawthorn
  - Cleyera
  - Camellia
  - Viburnum
  - Loropetalum

- Bayberry
- Ligustrum
- Sweet Olive

Deciduous Shrubs

- Rose
  - Hybrid Tea
  - Floribunda/Grandiflora
  - Landscape/Shrub
  - Ground Cover
  - Miniature
  - Climbing
  - Antique/Old Garden Rose
- Holly
- Barberry
- Lilac
- Hydrangea
- Mock Orange
- Weigelia
- Spirea
- Beautyberry
- Viburnum

Ground Covers

- Liriope
- Mondograss
- Ardesia
- Vinca
- Ivy

Vines

- Asian Jasmine
- Honeysuckle

Herbaceous Perennials

- Lantana
- Verbena
- Phlox
- Echinacea
- Gaillardia
- Rudbeckia
- Shasta daisy
- Hosta
- Ferns
- Iris
- Daylily

Annuals

- Begonia
- Salvia
- Marigold
- Vinca
- Coleus
- Geranium
- Impatiens
- Petunias
- Pansy

Vegetable Transplants

- Tomatoe
- Pepper
- Eggplant
- Cucumber
- Watermelon
- Squash
- Spinach
- Lettuce
- Broccoli

Culinary Herbs
- Rosemary
- Thyme
- Parsley
- Sage
- Mint
- Oregano

Christmas Trees

Tree/Shrub Fruit Plants
- Peach
- Plum
- Pear
- Pecan and other nuts
- Citrus
- Fig
- Apple
- Cherry
- Blueberry
- Raspberry
- Blackberry

Vine Fruit Plants
- Bunch Grape
- Muscadine Grape

Tropical Foliage Plants
- Ficus
- Spathiphyllum
- Pothos
- Aglaonema
- Cactus
- Palm

Flowering Potted Plants
- Chrysanthemum
- Poinsettia
- Easter Lilly
- Kalanchoe
- Gloxinia
- Cyclamen
- Florist Azalea
- African Violet

Fresh Cut Products
- Flowers
- Foliage
- Deciduous Stem

Trufgrass Sod

- Warm Season
  - Centipedegrass
  - Zoysiagrass
  - St. Augustinegrass
  - Bermudagrass
  - Buffalograss
  - Seashore Paspalum
- Cool Season
  - Tall Frescue
  - Fine Fescue
  - Bluegrass
- Bamboo
- Aquatic or Bog Plants
  - Water lilly
  - Sedge
  - Rush

Environmental Products

- Biologs
- Coir Mats
- Stabilization Blankets
- Live Stakes
- Facines/Wattles

Plant Product Form

- Nursery Container
  - 1 gallon or less
  - 3 -7 gallon
  - 10-20 gallon
  - 25 gallon and larger
- Greenhouse Container
  - Less than 4"
  - Larger than 4"
- Hanging Basket
  - Less than 8"
  - 8"-18"
  - Larger than 18"
- Height
  - 12"-15"
  - 18"-24"
  - Larger than 24"
- Balled and Burlapped Rootball
  - Less than 8"
  - 8" or larger
- Fabric Root Bag
  - 12" or less
  - 14"-18"
  - 20" and larger
- Caliper (tree stem diameter)
  - 2" or less
  - 2 1/2-3"
  - 4" and larger

- Bare Root
- Cell Tray Plug
- Cutting
  - Rooted
  - Unrooted
- Fresh Cut

Product Attributes

- **Producer Verified**
  - Greenhouse grown
  - Shadehouse grown (low light acclimated)
  - Care information tag
  - Smart tag (readable/scanable)
  - Decorative container
  - Biodegradable container
  - Pesticide Free
  - Native Plant (native to producer's geographic area)
  - Drought tolerant
- **Third Party Verified/Certified**
  - Organic (USDA)
  - State Environmental Certified (specify certifying agency)
  - Sustainably Produced (specify certifying party)

Method of Sale / Order Fulfillment

- Mail Order
- Debit/Credit Card
- Delivery
- Export
- Internet

Brands

- Commercial
  - Proven Winners
  - Monrovia
  - Plants That Work
  - Other
- State (specify brand)

Appendix 4: Detailed Listing of Events from January 2011 - March 2013

- January 29, 2011: MarketMaker how to presentation to 250 people at the Agritunity Meeting in Bushnell, FL.
- February 7, 2011: MarketMaker how to presentation to 75 people at the Milton Agribusiness Conference in Milton, FL.
- April 5, 2011: Cooperatives: Basics and how to organize and market: MarketMaker was offered as a tool for this group of 20 people at the Johnston Market in Monticello, FL.
- There were 8 counties that participated in the 2011 Annie's Project (a program designed to promote entrepreneurship and networking for women in agriculture). During this 6-week program, participants are exposed to many concepts and opportunities. During the marketing sessions, Florida MarketMaker is introduced to the participants as a tool for their marketing toolbox. Approximately 150 women were involved in this project.
- April 16, 2011: MarketMaker booth at the 150 person Farm-to-Table event in Ocala, Fl.
- April 18, 2011: MarketMaker how to presentation at the Food Safety Planning Program at the North Florida REC, Suwannee Valley to 20 people (agents).
- April 27, 2011: MarketMaker how to presentation and sign up to 75 attendees at the Stone Fruit Field Day in Citra, FL.
- April 28, 2011: MarketMaker how to presentation to 110 county extension personnel as part of the UF/IFAS Central District meeting, Osceola County Extension Office (agents).
- May 10-11, 2011: MarketMaker booth and discussions with U/IFAS Northeast County Agent Staff meeting with 35 people (agents).
- June 4, 2011: MarketMaker how to presentation and sign up to 60 people at the Sunbelt Growers meeting in Moultrie, GA. In addition to peanuts, a number of these producers are involved in specialty crop production.
- June 5-6, 2011: MarketMaker booth and how to presentation to 135 attendees of the annual Florida State Horticulture Society meeting in St. Petersburg, FL (agents).
- June 21, 2011: MarketMaker how to presentation and sign up to 15 people at the Washington County Extension Office, Monticello, FL.
- July 15-16, 2011: MarketMaker Booth, how to presentations, and sign for the attendees of the 3rd annual UF/IFAS Statewide Small Farms and Alternative Enterprises Conference in Kissimmee, FL. Approximately, 250 people attended the workshops and stopped in at the booth.
- July 26, 2011: MarketMaker Presentation to members of the Washington County Cattlemen Association in Chipley, FL. Travel for this event was funded by other sources. Approximately 3 people present were also involved in specialty crop production.

Appendix 4: Detailed Listing of Events from January 2011 - March 2013 continued

- July 27, 2011: MarketMaker Presentation to 18 Extension agents from UF/IFAS and UGA in Quincy, FL (agents).
- August 1, 2011: MarketMaker Booth, how to presentation, and sign up to 50 participants the 2nd annual Farm-to-Restaurant Workshop in Gainesville, FL.
- August 5-7, 2011: Florida Council of Cooperatives Annual Leadership Conference. Florida MarketMaker was a sponsor at this meeting and banners were put up and flyers were distributed to over 60 producers who attended this annual leadership conference that focuses on introducing cooperatives to people who often have little knowledge of how cooperatives are different from other forms of business.
- August 17, 2011: Conference Call with Gloria Van Treese, Deb May, and Yolanda Roundtree, FDACS personnel to discuss ways to collaborate on promoting FDACS fruit and vegetable producer programs through Florida MarketMaker and how FDACS can promote Florida MarketMaker to producers and buyers.
- August 25, 2011: Danny Raulerson, FDACS meeting. UF/IFAS MarketMaker personnel met with Danny Raulerson of FDACS to discuss ways to reach more specialty crop producers through the State Farmer's Market programs.
- August 29 – September 1, 2011: Annual Extension Professional Associations in Florida meeting in Orlando where two displays for fruits and vegetables, seafood, and consumers were used. Displays viewed by over 400 extension agents around state (agents).
- September 8, 2011: Local farm tour with Aramark in North Central Florida. Attended a tour of three farming operations as part of Aramark's efforts to connect producers with chefs in North Central Florida. As a participant on this tour, UF/IFAS MarketMaker personnel had the opportunity to discuss the benefits of MarketMaker with Aramark staff, FreshPoint (a produce distribution company) buyers and managers, chefs from the Jacksonville area, and the three producers, whose operations we visited (25 people total).
- Sept.13, 2011: A presentation to the Union County AG Advisory Committee on the MarketMaker's selling and research features and distribution of Producer Profile sheets (15 people).
- September 20, 2011: Jay, Florida. MarketMaker how to presentation and sign up for 25 producers who belong to the Panhandle Fresh Marketing Association (PFMA). This was part of a listening session where PFMA members told UF/IFAS what some of their needs were and what additional extension programming they desire.
- September 22, 2011: MarketMaker Webinar with Localecopia for continued efforts in partnership. Localecopia provides network of producers, consumers, and foodservice enterprises in the Palm Beach area (4 people).
- September 22, 2011: Hastings Area Potato Grower Meeting. MarketMaker was highlighted as another tool that the 21 Hastings potato growers who participated in a marketing session could adopt.

Appendix 4: Detailed Listing of Events from January 2011 - March 2013 continued

- September 29, 2011: Florida Organic Growers Certification program in Bell. As part of a marketing panel discussion, the Market Maker tool was presented to 25 growers who were encouraged to sign up. Also present as part of the panel, were the FDACS Farm to School representatives and an industry person.
- UF/IFAS continued to deliver Annie's Project (a program designed to promote entrepreneurship and networking for women in agriculture) in the spring of 2012. Columbia County is the first location to start. A total of 10 women are participating in Annie's project in Columbia County. This 6-session program began on Tuesday October 4. Participants are exposed to many concepts and opportunities. During the marketing sessions, Florida MarketMaker is introduced to the participants as a tool for their marketing toolbox.
- October 6 – 8, 2011: MarketMaker Booth at the 70th annual Florida Farm Bureau Federation meeting of 200 attendees. Efforts are being made to move the Farm Bureau's current online producer listing to MarketMaker.
- November 17, 2011: MarketMaker Presentation and Booth at the annual Localecopia Meet-N-Greet in Palm Beach, Florida. There were a total of 40 participants present.
- January 28, 2012: MarketMaker Booth was displayed at Agritunity 2012 at the West Central Florida Agricultural Education Center in Bushnell FL. Agritunity is a regional farm conference and trade show with various vendors of agriculture products and presentations on new opportunities in the industry. 100 people stopped in at the booth.
- February 14, 2012: MarketMaker Presentation and Booth at the 2012 Florida Berry Expo located at the University of Florida/IFAS Gulf Coast Research and Education Center in Balm, FL. 300 people attended this exposition.
- April 25, 2012: MarketMaker Booth was displayed at the First Annual All Florida Ag Show located at the Highlands Count Fair and Convention Center in Sebring Florida. Dr. Allen Wysocki spoke on the benefits related to using Market Maker and other media devices to promote Florida Agriculture. This Ag Show showcased companies from around Florida with a broad spectrum of products and services. It is estimated that 150 people stopped by the booth.
- April 26, 2012: MarketMaker Booth was displayed at the Central District Meeting at the West Central Florida Agricultural Education Center in Bushnell FL. This symposium gathered all the extension agents from the central district to discuss and share projects and ideas they have been working on throughout the year. 50 agents stopped by the booth.
- June 28, 2012: MarketMaker Presentation at the Central Florida Young Farmers and Ranchers Meeting located at Glisson's Animal Supply in Sebring. Presentation was given to upcoming agriculturalist from the Highlands County area. 20 people attended this meeting.

Appendix 4: Detailed Listing of Events from January 2011 - March 2013 continued

- July 18, 2012: Presented to the Young Farmers and Ranchers group of Highlands County at the Farm Bureau office in Sebring, Florida around 20 people attended the meeting.
- July 26-27, 2012: MarketMaker Booth, how to presentations, and sign up to the 675 attendees of the 4rd annual UF/IFAS Statewide Small Farms and Alternative Enterprises Conference in Kissimmee, FL. 150 stopped at the booth.
- August 10-12, 2012: Florida Council of Cooperatives Annual Leadership Conference. Florida MarketMaker was a sponsor at this meeting and banners were put up and flyers were distributed to over 60 producers who attended this annual leadership conference that focuses on introducing cooperatives to people who often have little knowledge of how cooperatives are different from other forms of business.
- August 13, 2012: MarketMaker Booth, how to presentation, and sign up to 50 participants at the 3rd annual Farm-to-Restaurant Workshop in Gainesville, FL
- August 15, 2012: Attended the Florida Citrus Expo and talked to producers and handed out fliers about MarketMaker and its benefits. Approximately 75 people stopped by the booth.
- September 4, 2012: MarketMaker Presentation to around 20 producers at the Lake City Extension office. The meeting consisted of small farmers wanting to learn more about marketing.
- September 13, 2012: A presentation at the extension office in Bushnell to 30 producers about the benefits of using MarketMaker. The class was on direct marketing and online resource to help companies in the Ag industry.
- October 15-17, 2012: The MarketMaker booth was displayed at the Sunbelt Agriculture Expo in Moultrie, GA over 2,055 people stopped at the booth. We handed out informational brochures and registered companies at the event.
- October 29, 2012: Attended the 2012 MarketMaker annual meeting to discuss changes to the sight and different ways in which the website is being used.
- November 24-25, 2012: Attend and had a booth at the Farm Bureau Annual Meeting in Jacksonville, FL. 200 people stopped by the booth.
- November 7, 2012: MarketMaker booth was displayed at the Florida Ag Show in Balm, FL where exhibitors showcased agriculture companies from around the state for farmers and people in the industry. 150 people stopped at the booth.
- November 17, 2012: MarketMaker booth was displayed at the Desoto County Ag Fest located at the Turner Center in Arcadia, FL. This event is held to help educate and promote agriculture in Desoto County and is organized by the Desoto County extension office. 45 people stopped at the booth.

Appendix 4: Detailed Listing of Events from January 2011 - March 2013 continued

- November 27, 2012: A meeting was held with individuals from FDACS that are working on the Farm to School program discussing the potential opportunities of using MarketMaker to enhance the program. Staffs from national MarketMaker were also in attendance and progress was made to use the website as a tool to find producers that can provide schools with local products.
- November 29, 2012: The MarketMaker team met with the representative Tim Woods from the Kentucky MarketReady program to discuss opportunities for Florida. MarketReady is a program that helps provide technical and business development services to facilitate the profitable production, processing and marketing of locally produced and processed food by Kentucky-based enterprises and entrepreneurs. MarketMaker facilitates with the networking of the companies that are involved in MarketReady.
- January 13, 2013: Starting a Successful Hydroponic Business - Marketing Session. Workshop designed to help small farmers start a hydroponic business using controlled growing systems to provide high quality grown specialty crops for local markets. 75 people attended the workshops.
- January 15, 2013: Vegetable Producers Roundup Jay, FL. Explained variety of uses of MarketMaker in the marketing of vegetables. 20 producers attended.
- January 25, 2013: Small Farms Academy (Mushrooms) - Marketing Sessions. Hands-on one-day workshop to teach participants how to select, grow, harvest, and market gourmet mushrooms appropriate for the Florida market. 25 people attended the sessions.
- January 26, 2013: Personnel manned a MarketMaker Exhibitors Booth at the West Central Florida Agricultural Education Center in Bushnell, FL for Agritunity 2013. Agritunity is a regional farm conference and trade show with various vendors of agriculture products and presentations on new opportunities in the industry. Approximately 125 people stopped at the booth.
- February 8, 2013: Personnel manned a MarketMaker Exhibitors Booth at the 2013 South Georgia / North Florida Vegetable Production Meeting. Used the opportunity to explain to specialty crop farmers how MarketMaker could be used to enhance their internet-marketing footprint. 100 people stopped at the booth.
- March 17, 2013: provided informational flyers and other materials to the North South Institute’s 10th Annual Symposium held in Miami, FL.

March 2013

Research Report

Florida MarketMaker

USDA & FDACS

Written by Laura Conaway

Center for Public Issues Education
IN AGRICULTURE AND NATURAL RESOURCES
UF|IFAS

Contents

Background 4
Methods 4
Results 5
Current Marketing Practices 6
Word-of-Mouth 6
Create a Personal Connection 7
Maintain Correspondance 9
Ag Tourism 11
Outside Marketing 12
Marketing Angle/Uniquness 15
Use of Social Media 18
Problems Faced 20
Future Aspirations 22
Plans 22
Methods of Selling 23
Florida MarketMaker Initial Discussion 25
Positive 25
Negative 26
Aware of Florida MarketMaker 31
Currently Signed Up with Florida MarketMaker 31
How Farmers Heard About Florida MarketMaker 31
Business Received as a Result of Florida MarketMaker Account 31
Suggestions 32
Questions About Florida MarketMaker 34
Florida MarketMaker Detailed Discussion 35
Positive 35
Negative 36
Suggestions 40
Overarching Themes 44
Findings 45
Participants Current Marketing Strategies 45

Problems Faced When Marketing Local Food 46
Florida MarketMaker Overall Problems 46
Florida MarketMaker Design Problems 47
Overarching Findings 47
Recommendations 47
General Recommendations 48
Overall Recommendations for Florida MarketMaker 48
Recommendations for Florida MarketMaker Design 48
Appendix A: Florida MarketMaker PowerPoint Presentation 50

Background

Currently funded by the Florida Department of Agriculture and Consumer Services (FDACS), the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS) and other contributing organizations, Florida MarketMaker is a free, web-based marketing tool created to assist producers and consumers of specialty crops to establish relationships in local and regional markets. Since the creation of Florida MarketMaker, more than three years ago, the resource has approximately 160 registered users with profiles, considerably less than anticipated. By developing and utilizing targeted messages that are effective with producers and consumers of Florida specialty crops, the number of users is expected to increase.

By further understanding the needs of small producers and consumers, researchers may be able to analyze and determine how to enhance Florida MarketMaker to meet needs and be used to its full potential, resulting in an increase of users. Ultimately, increased usage would lead to the growth and support of the Florida agriculture industry as a whole.

In an effort to determine the effectiveness of the marketing tool, Florida MarketMaker, the UF/IFAS Center for Public Issues Education in Agriculture and Natural Resources (PIE Center) sought out and received a Florida Specialty Crop Block Grant (SCBG) from FDACS, with the funding originating from USDA. The grant enabled the PIE Center to conduct a qualitative analysis of small farmers within the state and discover their opinions and perceptions of the tool.

Methods

Problem

This research investigated the cause of the disconnect between Florida specialty crop producers and the use of Florida MarketMaker in an effort to gain a better understanding of what message strategies should be used to promote Florida MarketMaker. Additionally, research provided information about what aspects of the design might be inhibiting the usability of the resource. All research was conducted in an attempt to better position Florida-grown specialty crops as the choice for local consumer-based buyers.

Research Design

Based on components outlined in the SCGB, the PIE Center used a qualitative, focus group design. The qualitative methodology was used to analyze producers' beliefs, attitudes and perceptions regarding Florida MarketMaker. The objective of using focus group methodology was to assess the target audience's perceptions of current usability and brand salience of Florida MarketMaker and to test for new branding and usability strategies before redeveloping the marketing plan and website. Additionally, the research provided a more thorough understanding of current marketing and sales strategies used by small producers.

The PIE Center conducted six focus groups to identify messages that could resonate with producers and consumers using Florida MarketMaker as a marketing tool to connect these two groups in local markets. Two focus groups, comprised of Florida producers of both small and medium-scale operations, were conducted in Quincy, two groups in Kissimmee, and one in Sarasota. A final focus group took place in Orlando involving UF/IFAS extension agents who are involved on the Small Farms team to determine their opinions of the effectiveness of Florida MarketMaker, seek feedback on how their clients view the tool and how to improve the website. Qualitative design provided the researcher with information and findings that have yet to be hypothesized and can therefore not have been predicted. Such findings allow the researcher to build off of the data for further detailed research about this area of interest.

Florida MarketMaker

To maintain a level of consistency and accountability, the PIE Center utilized an outside firm to recruit participants from the predetermined population. The Florida Survey Research Center (FSRC), a UF auxiliary, was responsible for participant recruitment and developing screening questions to ensure the target audience was accurately represented. Potential participants were also asked questions to determine whether or not they fit the definition of a Florida small-farm producer for the purpose of this study, as well as their level of awareness of the online marketing tool.

Target Audience

The target audience was Florida small farmers growing and producing agricultural products for the purpose of sale. Names and contact information of small farmers in Florida were provided to the PIE Center to be included in participant lists. All selected participants had some connection with the agriculture industry. Examples of participants included and were not limited to growers and producers of fruit and vegetables, produce, beef, lamb and dairy, bees, herbs and other specialty crops. Some participants were members of Community Supported Agriculture groups (CSAs), while others produced and marketed on an individual basis. The size of each participant's operation varied, with some businesses operating on a more corporate level with employees and assistants while others had an operation for personal enjoyment and worked independently. The experience level of the participants ranged from farmers who produced as their primary source of income to hobby farmers and part-time farmers.

Instrumentation and Data Collection

Prior to conducting focus groups, the PIE Center developed a moderator's guide, which was reviewed by a panel of experts. The written moderator's guide remained constant throughout the five focus groups with specialty crop producers to allow for comparisons, differing only with the group of extension agents.

Present during each focus group was a moderator, assistant moderator/note taker and a second note taker. The purpose of note takers was to provide back up data. The use of note takers ensured the reliability of the data in the case that the electronic equipment malfunctioned. Additionally, the use of video and audio recorders during each focus group ensured the accuracy of data collected. Video and audio recorders allowed for a more thorough understanding of participants' feelings in order to better apply findings to the entire population. An outside transcription analyst was used to provide thorough, word-for-word transcripts for analysis. All research was conducted under approval of the UF Institutional Review Board to ensure the protection of human subjects.

Data Analysis

Qualitative data analysis was conducted on the transcripts, via the qualitative data analysis software, Weft-QDA. Transcripts were analyzed by the researcher going through each individual question across each focus group so one question was analyzed across the entire group of focus groups before the next question was examined. An audit trail to secure chronological records and provide documentary evidence of the sequence of events of research was implemented and maintained throughout the research process.

Results

The moderator's guide was set up in four sections to move the conversation along in a progressive manner. Participants were first asked about their current marketing strategies, followed by their awareness of Florida MarketMaker and then were asked to give specific opinions of each page of the Florida MarketMaker website. Lastly, participants were asked for suggestions and changes they would make to increase the usage of Florida MarketMaker.

Current Marketing Practices

When discussing the current communication practices used by participants, common methods of marketing included a business website with up-to-date information about the farm and the services or products it provides, as well as weekly or monthly newsletters via email and some hand-written communication. Below are the different strategies in which participants have marketed or are currently marketing their products:

Word-of-Mouth

A major theme reiterated throughout the discussion was the importance of word-of-mouth and how vital it had been to spreading awareness about a small farm. In fact, many participants described word-of-mouth as the most important method of communication and essential to business success. It is crucial that a reputation be positive in order to ensure new customers and sales. In addition, presence at Farmer's Markets allowed many producers to share information and spread news by word-of-mouth. The following quotes are examples of discussion surrounding this theme[1]:

- A participant discussed the value of a creating a specific environment in addition to maintaining a good reputation that will travel by word-of-mouth. The participant said, "You said the word-of-mouth thing, which is the best marketing you can get. But, one of the things we found that you have to do is you have to give them some kind of experience when they come. It's not always about the product; it's about the experience. And particularly in the small markets, and so we go out of our way. . . . We change things up quite a bit every year, and we learn every year."

- In response to the previous statement, one participant agreed and added the importance of maintaining frequent communication. This participant said, "Yeah, a lot of ours is word-of-mouth. And then following up on . . . once we get the information, just like what he was saying, it is really important to stay up on emailing them and letting them know . . . communication is just huge."

- One participant mentioned how a nearby farmer, selling different products, sends customers to them and vice versa. This participant said, "(name omitted)'s email that she sends out, she has links to our farm, we have links to her farm. So, that it really is a community effort by the small farmers in the community to make sure that our community knows what is going on."

- An extension agent shared the value of word-of-mouth combined with other marketing techniques. This participant said, "Well, I think what you are saying is right. And I don't care what kind of product or service you have, you can't use just one vehicle to get you there. And what I have found is that the over-60 crowd, word-of-mouth is the way you market. We had a guy, a group of guys, that started growing Satsuma citrus, and they got their name out by doing a fundraiser sale through the schools. They only did that for two years. It was enough to get a name out there, now people come directly to the farm to buy it year after year. It is a short duration, you know, it is right between Thanksgiving and Christmas, every year. And they have built a following. So, really all we are talking about is using a variety of methods to get there."

[1] Grammar and punctuation within the quotations appear as transcribed and may therefore not be grammatically correct. This is common practice for focus group methodology to maintain the credibility of the statements.

Create a Personal Connection

Good communication is key in successful businesses as it showcases the strength of the relationship between the producers and consumers. Participants emphasized the importance of staying up-to-date with consumers, stating that it helped create a personal connection that did not feel corporate.

Creating and Maintaining a Personal Relationship with Customers

Participants in each focus group emphasized the importance of maintaining a personal connection with consumers. Not only was it important to maintain a local, small-farm feel but also to create a relationship and loyalty with their consumers. The following quote is an excerpt from discussion surrounding this theme:

- Reiterating what had already been said about treating customers like friends, one participant said, "Well, you hit the nail on the head when you said that you had friends and not customers. That is a big part of why those people come back to you every year. It is the same thing at our place."

Personal vs. Corporation Feel

Creating a "buying from the farmer" mentality is crucial to creating a lasting business. In order to stand out, participants stated they must create a different buying experience than what is available in corporate stores. The following quotes are examples of discussion surrounding this theme:

- A blueberry farmer discussed how he creates a total experience for consumers when they come to U-pick stating, "Once everybody is done, we have got a pitcher pump right there. They pump the pitcher pump and rinse their hands. 'Oh, my grandmother had one.' The whole thing is . . . perpetuate being at the farm. When they see the old tractors and the stuff like that, they don't see the pesticides and the fertilizers and everything else."

- A participant mentioned how the idea of experiencing life on the farm and meeting a farmer is trending at the moment. He said, "Being in touch with the farmer is one of the greatest things that is going on right now, these days. OK? These people are coming out of places and going and visiting the farmer to see how their food is grown. To see what we do to make it happen and everything. And they are enjoying the heck out of it. They think it is better than Disney World."

Personal Guarantee

Participants stressed the importance of building relationships between the seller and consumer based on loyalty. The following quotes are examples of discussion surrounding this theme:

- One participant, who said he has people who now expect a hug, talked about the importance of creating a different, personal experience to stand out among other businesses. This participant said, "I mean, that is the only thing that keeps it really special . . . is what is different about what we are doing as opposed to the normal place that is getting the product that is already out there. What does the small farmer have to do to make it any more special? And it might just be that personal service. And I mean, the hugs do an awful lot. It's amazing, you know?"

- Another participant expressed the value of selling directly to customers and offered some insight into the online world. This participant said, "There's a real loyalty that develops though, whether it's online or whether it's direct, whether they come to your farm to purchase or whether you take it to a market. That loyalty develops, and it's pretty hard to shake. And so, we see that loyalty developing online as well. As long as they are served well, you know?"

U-pick

Some participants discussed the growing demand and public interest for U-pick at a farm. The following quotes are examples of discussion surrounding this theme:

- One participant discussed how much people like their children to experience the farm life by stating, "You put strawberry onions in, and they get a big kick out of coming out, particularly organic people, of coming out and taking a picture of their kid pulling the onion up. And you will say, 'Well, what does it cost?' Two bucks."

- Another participant discussed their operation as, "It is a little diversified. It is a little of each and then we did U-pick this year for the first time, which is wonderful."

- A participant discussed part of his specific U-pick strategy for selling blueberries. He said, "For instance, if you pick a gallon of blueberries and pick me a gallon of blueberries, I'll give you the blueberries free. We have a . . . your blueberries free, your gallon free, that kind of thing. And they bring the kids out, they do all that kind of stuff and we encourage it. One of the things we're very careful about and strawberry growers are notorious for, 'If you come out in my strawberry grove, don't eat any strawberries.' Well, we give a lecture to everybody that comes on the place, very short, 30-second lecture, 'Watch out for rattlesnakes, haven't seen any, but they could be there, blah, blah, blah.' But, the most important thing at the very end is, 'Eat all you want while you're out there and have a big time doing it.' And they enjoy that experience. They come back every year because they know their kids can be out there and nobody's gonna be over their shoulder watching them and that kind of thing."

Create a Positive, Casual Buying Environment

Amidst the discussion, participants stressed the importance of creating a casual, comfortable buying environment where consumers feel as though they are purchasing from a local farmer instead of a corporation. Emphasis was placed on this as many stated this was crucial to the success of a small farmer wanting to market and sell his or her products. The following quote is an excerpt from discussion surrounding this theme:

- A participant shared how he creates an environment around the necessary operational equipment to attract customers. This participant said, "Now, the packing shed is an open shed. It is not fancy at all. It looks like an old farm building that just happens to have a washing machine inside of it. And then we have piles of oranges, grapefruit, tangerines, lemons, and so on and so forth. They are right there piled out, ready to go. All of those are my forms of advertising."

Provide Samples

Participants seemed to agree that by providing samples at farmer's markets or at the farm, consumers would pay premium prices once they have tasted a quality product. The following quotes are examples of discussion surrounding this theme:

- One participant who used to attend farmer's markets talked about how people would pay premium price for quality products after sampling them. This participant said, "We would take a basket of strawberries, set them out there . . . now, our hydroponic strawberries . . . we sell for $5.00 a pound. It doesn't matter what time of season it is, it is the same price if we come in before California, or after. We set out a basket, let people try them. They will walk right past the truck farmers once they try them. Because we do, we pick them. . . . I am out there at first light picking to open by 10:00."

- Another participant agreed with the previous participant and said, "Yeah, samples are worth a million bucks."

- A third customer reiterated the same idea and said, "$3.50 a pound, I sell them right across the sidewalk from somebody who is selling them for a buck and a half. And the slices are out on the table and when you have them face-to-face, it is all about the samples."

- A participant stressed how by providing samples, they create a scenario where every purchaser is already satisfied because they decide to buy based on price. This then creates a sense of loyalty in a their customer base. This participant said, "We give free first time, like we've give them a pound of meat or some fleece or, you know, a couple of our vegetables and let them try them. And then they come back if they want it instead of buying something and not liking it, we give them a chance to buy."

Provide Recipes

Providing recipes was one of the ways participants shared information with the public about local food. The following quotes are examples of discussion surrounding this theme:

- One participant shared how they will seek the help of a local chef to do cooking demonstrations at farmer's markets. This not only promotes the products but also provides consumers with new ideas as to how to prepare the food. This participant said, "One of the ideas that we have been doing is that one of the local farmer's markets has . . . we have a chef who does food demonstrations. And she will take our produce and cook like . . . this weekend we had eggplant and squash. We do vegetables. So, the eggplant and the squash and the zucchini, she would do in a wrap on the grill. And it kind of helps promote the sales of what we have because people sometimes just don't know what to do with vegetables."

- Another participant shared the importance of sharing recipes to help sell their products. This participant said, "So, sometimes I will hand out recipes or this or that, or I will go online and I will research a lot of different things. And I will share that research with them to give them an idea that they can do a lot more with that than what they have been accustomed to. So, that alone kind of broadens my market a little bit with the little that I have to work with."

Maintain Correspondance

By sending out weekly or monthly newsletters, producers were able to notify consumers of new products available as well as keep in touch to maintain a business relationship. Many participants discussed the variety of communication tactics used to reach a wide array of audiences. In addition to email listservs, lists of customers were obtained for email and mail purposes by personal signups at many of the individual farms.

- An extension agent offered advice on creating a brand and gaining repeat customers through frequent communication. This participant said, "They have got a newsletter, and they will send that out every month. It may be an e-newsletter, maybe a hard copy, depending on who their clientele is. But, they are constantly putting themselves . . . they are not dependent on them to go search on the Internet for them. . . . They are getting their name out intentionally themselves to whoever they have on a mailing list or an email list or whatever. Because out of sight is out of mind. And if I have got to physically go and look something up . . . I mean, how many websites do we have on campus? Hundreds of thousands, I am not going to go search everybody's website. I might go look at [name omitted]'s, if I thought well, he has got something and I want to see what he is doing today, I have worked with him some. Or, I might look at one that [name omitted] has or somebody else. But I am not going to search the mass jillions of people's websites. But, if I get your email address and I can send you a little newsletter

about once a month, a little thought for the day or something that is timely and whatever . . . if it's produce, what is fixing to be harvested; if it is livestock, what is fixing to be marketed . . . whatever. It gives me a chance to sell myself, sell my brand, to you."

Personal, Handmade Mail

Some participants stated their personal value of a hand-written note and its ability to surpass electronic communication by creating a more personal relationship between the producer and consumer. The following quotes are examples of discussion surrounding this theme:

- A participant who still includes hand-written notes in his mailings to customers said, "We do run a computer label, but we put a hand stamp on it. And then I sit there at night watching TV and write little personal notes up where it has my name on the return address on it. I will write something like, 'Hope to see you this year,' or, 'How is your granddaughter?' We like to tell people that we don't have customers; we have friends that buy and ship fruit with us. We are very personable."

- A participant agreed with that, saying "And sometimes that little handwritten thing . . . it is true, that is what gets them coming."

Electronic Mail

Participants discussed communication via the Internet by using email correspondence. One participant stated he did not have time to keep up with emails, but most of the other participants shared that emailing consumers allowed them to quickly notify customers of the products available as well as, in some instances, let consumers know where the farms will be selling their products, if at other venues aside from the actual farm, such as a farmer's market. The following quotes are examples of discussion surrounding this theme:

- One participant shared how she has developed a listserv of customers, whom she will notify what is available the upcoming week. She said, "Over two years . . . I started with 17, in the first year we ended up with over 700 and now she is somewhere around 1,500 individuals who I have on a, what I call a 'Customer Notification List. And I take and every week, on a Sunday, I sit down and figure out what I am going to have for that week, and I make up that list and I shoot it out."

- Another participant shared how their farm notifies customers by email of what they have preordered for that week. This participant said, "And then we do the emails to the customers with what they are going to be getting that week, so that they can kind of prepare and not buy other things and duplicate what they are getting from us. But, it helps."

Newsletters (Weekly, Monthly or Quarterly)

A number of participants stated that they use weekly, monthly, or even quarterly newsletters to share information about the farm and upcoming sales with consumers. The following quote is an example of discussion surrounding this theme:

- A participant discussed how their newsletter included information about their farm as well as updated news and new products. This participant said, "The other marketing tool we use is, we do send out a newsletter, which is basically a 'Life on the Farm,' . . . we are selling this or that, or this is happening."

Florida MarketMaker

Throughout the discussion, the need to educate consumers about local agriculture and products available as well as the benefits associated with purchasing local food was discussed. Some participants combined marketing tactics such as a newsletter to also assist and educate consumers.

- Another participant shared how their newsletter includes information about other farms as well. This participant said, "We use the weekly newsletter also as a platform to educate people about what is in season...about what other farmers are doing, what is going on in the community. So, it really becomes . . . if I don't do it, I get in a little bit of trouble with people because they are depending on it for information."

Use of Website

Due to the shift from traditional marketing techniques, such as print and radio, participants stated that a web presence has almost become a necessity. A website allows for constant communication between the producer and consumer and many participants listed their website as the primary method to get information about their farm to the consumers. The following quotes are examples of discussion surrounding this theme:

- One participant stressed the need for an Internet presence when the participant states in a stern manner, "A web presence is almost mandatory now. If you have absolutely nothing on the web, you're kind of sunk."

- A participant agreed and added, "Our website has brought all those people to the farm. That is our biggest marketing tool."

In addition, participants also stressed that the quality of the product should not decrease as a result of online sales. Maintaining the same quality online as would be available in person was important for the participants.

Ag Tourism

Participants stated how they take advantage of the possible agritourism available in Florida. The following quotes are examples of discussion surrounding this theme:

- A participant who used U-pick as a way to market and sell their products talked about how they take advantage of tourists traveling to amusement parks in Florida. This participant said, "We also do a little bit of [agritourism]. You are welcome to go . . . you bring Grandma down from Michigan, and she gets to go out in the grove and actually pick an orange off the tree and we encourage them to take a picture."

- In response, a participant said, "Yeah, they will drive in, they will come in to Disneyland, Epcot, stuff like this. A lot of them will come in and hit Clearwater to vacation on the beach. As they are traveling over, they will stop and pick up 10 or 15 pounds of berries for the kids to eat on the way."

- Another participant discussed how they create an entire farm tour of sorts to offer an experience for visitors in the state. This participant said, "And from there we went to inviting people out for little tours of our farm, bring your family and they really liked being able to see what farm life is like. We'll let the children collect eggs and then the parents will buy the eggs that their kids collect so we sell those eggs right off the farm."

Road Signs/ Billboards

In order to advertise the presence of a local farm, some participants communicated about the usage of road signs on heavily populated highways to lead tourists and other travelers to their farm. Of those participants who utilized this

marketing tactic, participants stated that it was effective in drawing people in, particularly on their way out of the state. Participants also reported being able to develop a customer base from road sign marketing because customers would often request to be on an email list and, as a result, became return customers.

Although not used extensively to market products, one participant discussed the use of billboards to promote his products to tourists or others who may be interested because he is located off the interstate. The following quote is an excerpt from discussion surrounding this theme:

- A participant who takes advantage of travelers and uses signage to attract their attention said, "Yeah, our whole farm is only a 100-feet wide. But, it is a quarter-mile long. It is a little over three acres. So, we have the Burma-Shave signs, 'Welcome to our farm.' And we have some others with catchy sayings like, 'A plump wife and a big barn never did a man harm."

Campground Brochures

One participant stated they used the strategy of leaving brochures at campgrounds throughout the area to promote their business. The following quote is an excerpt from discussion surrounding this theme.

- She said, "We also stop by the local campgrounds and leave a stack of brochures there. You would be surprised the people that stay and they want to take a bag of fruit with them and all that. But, we don't buy mailing lists from anywhere or anything like that."

Outside Marketing

Aside from direct marketing and selling from individual farms, participants discussed involvement in other organizations as ways to market products.

Web-Based Services

Websites such as LocalHarvest and Red Hills Alliance were brought up often during discussion, with the former being mentioned in every focus group and the latter mentioned frequently in focus groups in North Florida. The following quotes are examples of discussion surrounding this theme:

- A participant discussing past involvement on LocalHarvest said, "When I was on there and had a presence there, I did get responses from a few people there."

- Another participant who wanted to use the Internet more but was limited with time said, "I mean, I have got some mornings where I have got things to do, and I end up spending my entire morning in the office just answering the phone with people calling looking for organic chicken, organic eggs, or some type of a value-added product. They are calling around wanting somebody to point them in the right direction. And it really doesn't exist out there with the exception of LocalHarvest."

- One participant shared how her entire community came together to make plans to attract tourists and promote agriculture in their town. She said, "Our community is putting together bed and breakfast packages to get people to come and to stay in Jefferson County. And Jefferson County really considers themselves, honorably, a very rural county. And they are striving to maintain that atmosphere and ambiance and all, and actually trying to develop it as a destination spot because of our rural roots."

Farmer's Markets

The opinion of farmer's markets varied among the participants. While some shared that farmer's markets were where they really got started selling their own products, others blamed them, stating they are a waste of time. Food demonstrations at markets seem to be a positive driving force for purchasing local food. The following quotes are examples of discussion surrounding this theme:

- One participant shared how she gained most of her market by attending farmer's markets and becoming known in the community. She said, "Marketing . . . I started out, let's see, marketing by going to the local farmer's markets and that's where I met [name omitted] and [name omitted]. That was very successful for me, and it actually created a market that we have now that means that we really don't have to go to those outdoor markets anymore."

- Another participant, just getting into farming with his wife, stated how he quit his day job to farm full time. This participant said about his business and farmer's markets, "We do the little things that you are talking about, the farmer's market. But we are starting out, my wife and I. I have been doing farmer's markets for 10 years, but it has always been a part-time deal, because I always had a full-time job. This is the first year where it is our only income, and we are now committed to doing it full time. So, we are trying to expand our farm. So, we've . . . we are grateful for the farmer's markets, but everything you say . . . you work so hard and get a rainout or something, it is a huge disappointment. Of course, we are dealing with a very conventional product, citrus. So, how do you make it different from a Costco? And we are not completely organic either, at this point. We haven't transitioned yet. So, we tell people what we are and how we grow it and why it is a good product. And we do less than 24 hours off the tree, is generally almost always our principle or practice that we follow. Sometimes we do 48 hours off the tree."

- One participant talked about their involvement with farmer's markets and demonstrations. This participant said, "But the food demonstrations have been something that potentially can help us move things forward with the farmer's market that we are working with."

- Another participant shared how the environment of the farmer's market is what she missed most. Speaking about her experiences, she said, "Well, we have a distributer. And he sells to the high-end market, high-end restaurants. We tried to market at the farmer's market a couple of times and loved it because I like people. I like teaching them and telling them what my belief in what food should be. But, there is just not enough manpower to go around. It is just me and my children."

- Irritated by the amount of time required to attend multiple farmer's markets in a week, one participant said, "But . . . and going through the whole marketing thing, you know, I started with farmer's markets, man what a waste of time, what a frigging waste of time. You grow it, you harvest it, you transport it, you spend all that energy and cost, and getting it just to that point. Then you put it in a truck, you carry it to a market and it gets rained out. Or it's an off day and everybody's at the football game or, you know, you end up with all this product, all this investment for nothing. You know, it goes right back to the compost pile. So, farmer's markets are a total waste in my book."

Become Member of CSAs

A number of participants discussed their involvement with CSAs. While some stated the importance of it to their income, others mentioned that it required a lot of time and effort that was not always available to give. The following quotes are examples of discussion surrounding this theme:

- A small farm participant said in response to discussion about CSAs, "I guess I would say CSA is good if you've got a crew, if you've got a labor force."

- A participant, who farms on his own, discussed how being a part of a CSA provides insurance for his farming. He said, "I'm also a one-person operation basically, so a CSA is, I think, a very viable model. And maybe the ideal because then you've got folks that are vested and if the crop doesn't do all that well, you just substitute more carrots or whatever, you know. So, you got their money, they're supporting you as a farmer growing it locally, and growing it for them. And that's a safeguard, that's an insurance, that's crop insurance and it's also a guaranteed market. So, I don't know of a better thing out there."

One participant discussed the value of taking part in a community garden:

- "Yeah, we have got . . . on our farm, we gave them about a 200-by-200 section. And we partnered with the Hyde Point Community Center to get the families. They do all the screening and background checks and everything. And then they would come out like Saturday morning and Thursday afternoon and work on the farm. And we had the first USDA-certified community garden in the state of Florida. So, you know, it is kind of neat."

Red Hills Involvement

Some participants stated their involvement with Red Hills Farm Alliance and credited involvement with some of the success of selling their products. The following quotes are examples of discussion surrounding this theme:

- A participant discussed the ease that comes along with involvement in the Red Hills Farm Alliance. This participant said, "It has some advantages. You are not going to a farmer's market where you're picking everything and then hoping you can sell it. You have an exact amount that you are picking. It is already prepaid for. Everything is done, and the online market pays you, writes you a check."

- Another participant said Red Hills helped their business. This participant said, "And then the other very good marketing tool for me is using Red Hills online. That is really the only outside thing that we do at this point."

- A participant who was pleased with their involvement in Red Hills said, "Now, we do the online market, the Red Hills Online Market, and that is growing like grass."

Farm Tour

A number of participants stated that they were able to gain notoriety by taking part in farm tours that would promote their farms and products to other farmers and, as a result, the public. The following quotes are examples of discussion surrounding this theme, specifically the New Leaf Market Tour:

- A participant who garnered loyalty from customers as a result of a farm tour said, "One of the biggest things actually that helped me, which goes along with the people that know you are a farmer type thing, was a New Leaf Market tour. That has made the difference. People come out to the farm, they see the animals, they know how they are raised, they see just how things look. And people like to deal with people that they feel like they know or they trust. Well, this is my farmer, basically. To these loyal customers, you are their farmer. And they feel very proud of that. And I don't care how low the price would go at Walmart, they are still going to go to [name omitted]. But that personal attention of being able to come to your location or your farm really makes a big difference. And I think that was the turnaround for us."

- A participant with ideas for a statewide farm tour shared, "So, I have talked with them . . . early on I talked with them about, how can this farm tour benefit the farm community? What could we do? Could we have a scholarship? Could we have . . . ? You know? And it never really has gotten off the ground. And now with the Small Farm Alliance, we are working with New Leaf as a sponsor. But we are hoping that our member farms will then show their membership in the Small Farm Alliance, which will develop some recognition. And I think anything that we do to benefit the community, we are going to have to do. New Leaf is not going in that direction. But, the state for instance, could do something statewide where people bought a ticket. That money could go to . . . Agriculture in the Classroom . . . although I know that Monsanto supports Agriculture in the Classroom very heavily now."

Marketing Angle/Uniquness

Participants discussed the different angles they took to market their products. Angles included the types of products sold as well as the way the products were sold and distributed.

- A participant who stressed the need to be unique in today's market stated, "Or they are grown without the pesticides, it is organic. I mean, that is the only thing that keeps it really special . . . is what is different about what we are doing as opposed to the normal place that is getting the product that is already out there. What does the small farmer have to do to make it any more special?"

Fresh Products

Providing fresh products for consumers was discussed as a way to segregate a local product from one sold at a corporate, large store. The following quote is an excerpt from discussion surrounding this theme:

- One participant who has his trees picked every day uses that as a marketing tool to stand out amongst retail stores. This participant said, "I have got a fellow that comes and picks every day and that is part of our advertising. 'Guys, we pick it every day.' It is not been off the tree . . . you can go to the grocery store and get an old orange. You can come here and you know that it was on the tree less than 24 hours ago. And so the sweetness, the freshness, the people's faces, they light up, they go, 'Wow.'"

Organic Products

During the discussion some participants stressed their value of organic products and how such products can be marketed in a unique manner to target specific audiences and stand out among other products. The ability to price the products at a higher rate was also mentioned by some participants. The following quotes are examples of discussion surrounding this theme:

- One participant shared what he thought were the best marketing tools in farming today. He said, "And now being organic, being local, being small farmer; those are so big marketing tools right now."

- Another participant said he is able to ask a premium price for his unique, organic products. This participant said, "You know, for us when we started there and we were the only organic growers there . . . aside from being one of the only growers there, we were the only organic growers, and we priced our things higher. And resellers and other farmers look at and go, 'You what?' 'You're getting three dollars a pound for tomatoes?' Or, 'You're charging this much for beans?' And for us, we're like, 'Well, yeah. We have to, we're doing the work, we're trying to stay alive, we're trying to stay in business,' and maybe there's some . . . the resistance is not there now, there was

some resistance and the people that have a resistance to the price, bless them, somebody else will come and buy it at the price that we need."

Diversified Products

A number of participants discussed marketing diversified crops to create a demand for multiple products. The following quotes are examples of discussion surrounding this theme:

- A participant who stressed taking the time to look at your market before deciding what to grow said, "The first question about how would we market all of this stuff, I mean you have got to look at your markets. Is it a posh market? Is it a local market? Is it a fruit stand market? I mean, I think that is the kind of marketing that I am approaching. And I can probably presume everybody else is, too. We are looking at choosing out of those markets: posh, local, marketing, distributing . . . at a lower level. Do I have something special that is going to make my product more special than the lemons that you can get over at Publix? What is different? You have got all that kind of stuff."

- Another participant agreed and said, "But you know, to be diverse, that is important, to try to."

- Lastly, a participant discussed having a special customer base for his unique products. This participant said, "Fortunately everything we grow at the farm, we grow and we put on the availability list for our customers, and it is to have something different that another distributor might not have. So, I also have a market for my products, so I am blessed that way as well. But, without those we would have had to have sold the farm a long time ago. It's tough."

Quality Products

Consistency and quality of products was discussed often amongst participants to ensure loyalty of customers. The following quotes are examples of discussion surrounding this theme:

- Discussing quality of products, one participant said it is one of the most valuable aspects of having a good business. This participant said, "Like [name omitted] said, when people come to the market, they look at that stuff you got on your table, and if it doesn't look good, they're not gonna buy it. You know, so you're the . . . especially when we're direct marketing. Your customer is gonna tell you what they want and what quality they want."

- Simply put, one participant said of quality, "And it's consistency, you know, you gotta be consistent."

Meet Personal Requests by Restaurants

Some participants, one in particular, made great strides in the expansion of his business by meeting the individual requests of restaurant chefs and dropping the products off when they become available. In some instances, this was valuable as farmers were providing chefs with unique products that were sometimes unavailable in the store, causing farmers to get a high price. The following quotes are examples of discussion surrounding this theme:

- A participant who grows unique vegetables and herbs for restaurants said, "But, the high-end restaurants we service . . . we grow the unusual. Anything different."

- Another participant agreed with the last and shared how by understanding chefs one can create lasting relationships to sell unique products. This participant said, "You have a unique product, it is fresh, it is local, and it is delivered daily. We are in the same boat right there. We are in a very unique position being in Vero Beach. It

is a retired executive area. We have been there almost 20 years; we have been certified since 1996. We started working with the chefs back then. And you have to listen to those guys. They are artists, and they can be hard to deal with and stuff. But, once you start growing what they want or . . . if you are limited by where you are and what you can grow on your farm. And what you want to do is make sure what you are growing is profitable. You know if you are trying to grow something that is not profitable and not marketable, then you go backwards. We deal with a lot of the high-end restaurants . . . like we do a spring mix and it is double what Earthbound sells for."

- A participant who also works closely with chefs reiterated those thoughts and said, "It is incredible. And you have to use those. What we do is, we have been out there a while, so we know what we need to plant. But we have a chef leave a voicemail, an email, Twitter, Facebook; anyway that they want to drop orders for us now. And we pick them up at the morning that they leave their message, however they do it and we cut to their order, we deliver that day. We charge what the market will bear."

- A participant who takes a casual approach with the chefs in her area said, "We just took our product, walked into the back door of the restaurant and dropped it off. They can't say no if you have a quality product."

Sell Year Round

While a great deal of farming is seasonal, some participants stated that by growing crops year round, they were able to meet demands of customers during specific times of the year and generate more profits year round. The following quotes are examples of discussion surrounding this theme:

- A participant who finds value in selling year round products said of another participant who does, "There are some producer-only markets that have kind of branched off. It might suit your needs to create one like that. It is tricky because you do need to attract a big group, but in your case, what is interesting is that you were saying that you are providing product year round. Oftentimes, markets want the resellers because they can provide the year round product."

- Another participant chimed in to offer some advice on selling year round and said, "Some are year round and others are strictly seasonal. But, for those year-round markets, that is a compelling reason. They want to have that year-round product. If you can provide enough volume and you can draw enough people, and find a happy medium, it might be viable for you to do that."

Provide Custom Delivery

While one participant elaborated on their strategy to custom deliver products to customers and the success it has brought to their business, others mentioned doing such a thing but did not elaborate on the topic. The method of offering a personal delivery was most common among specialty flower producers. This method allowed producers who used this method of selling to have a personal relationship with their customers. The following quote is an excerpt from discussion surrounding this theme:

- The participant who offers personal delivery to customers said, "So, we started making, kind of custom deliveries, and that has worked out well for us."

Retail Stand

Although there was some discussion about utilizing a retail stand to provide customers with an opportunity to purchase local food, it was not discussed in a great amount of detail. The following quote is an excerpt from discussion surrounding this theme:

- A participant who attracts people traveling to and from a shopping mall discussed the value of having a retail stand, "Yeah, and we also do a farmer's market and we also have a retail stand. You know, we are down a dirt road, we are not out far, we are right next to . . . we are about a mile away from a big mall, so we do have people coming out there. But I don't have . . . I can't justify putting somebody in there. We have an honor system."

Partnerships and Referrals

Participants stated the value of working together with other farmers to not only provide products to consumers but also to support and recommend one another. The following quotes are examples of discussion surrounding this theme:

- A participant discussed partnerships and the value of working with other farmers. This participant said, "We've developed quite a few partnerships with people throughout the county and tri-state area to where they take the products that we have and they take it to the next level. We work with them and then we benefit from what they sell. So, not only is income derived locally, income is derived from other people doing the work, so it's worked for us."

- One participant shared how they support other farmers in the community by referring customers to them. This participant said, "…… Farms down in Punta Gorda. …… there helps us a lot because she doesn't sell meat. So, people ask her and I am sure like they ask you guys, "Where can I get beef or pork or chickens?" And so, she does...referral is a big one for us from the local farms that we have around us."

- A participant who valued the word-of-mouth from other customers said, "And repeat customers. Referrals from them."

Use of Social Media

Social Media was brought up multiple times during discussion with the understanding that it targets the younger generation who expects a wide web presence. Facebook was the most common social media platform used among the participants, with Twitter mentioned in a secondary manner. Some participants stated that they used their personal Facebook page to display pictures and increase word-of-mouth, while others had specific business pages that they updated more regularly than their website. However, one participant mentioned that social media has the expectation of more frequent updates and more up-to-date presence than a website. The following quotes are examples of discussion surrounding this theme:

- A participant with positive thoughts about social media but no experience themselves said, "Now, the social media is certainly something that I have heard works."

- Another participant echoed the thoughts of the first participant and said, "And a web presence is almost mandatory now. If you have absolutely nothing on the web, you're kind of sunk."

- A participant who names all of her animals and lets people come out and experience sheep sheering and goat milking days on the farm said, "We post pictures of our animals and give updates. All of our animals have names and that seems to draw a lot of attention because everybody likes to have some connection with farm animals. You know, everybody's got a name. When we have babies born, we'll post videos of the little babies, so that keeps drawing people in."

- An extension agent credited people's lack of understanding of the Internet to why social media is not used much

for marketing products. This participant said, "I think, or at least in my experience, it is growing; your blogs and your Facebooks, any of the social media. And I think one of the challenges that was said before, about we have producers that are not comfortable or not very eloquent in expressing who they are or what they stand for. But, they can get on and have a Facebook account or a blog where they can put in their daily kind of journal or whatever what that are doing. And over time, those people that visit there can come to know them, which kind of builds that brand, I think."

- Another extension agent agreed and added, "You are talking about a clientele that is 40 and younger. In the 60s and older are not doing it because they are intimidated by it, they are uncomfortable with it. There is a need for somebody to help. They are interested in it, but they don't have the expertise. They have not been raised up through the computer world, and I mean, you know, they came along when there were still manual typewriters. And so those people are not comfortable. There is a need there, they are interested in it, certainly they want to get the visibility, they don't know how to go about doing it."

The following quotes are examples of discussion surrounding Facebook:

- A participant offered advice concerning the importance of using Facebook as a marketing tool and said, "I look at the Facebook thing as a way of hitting the younger generation, you know? Anybody over 40, I mean, Facebook to me is another forum for business. You know, but it's a good media if you're in business, you know, I mean it just is."

- A participant who stumbled upon sales through a post on Facebook cheerfully said, "I did something, this is kind of crazy, on Facebook this year because I haven't gotten into the whole thing yet, but our first berries were huge, huge. So, I put one on my finger and took a picture beside my ring and it was so much bigger than my ring. And I put it on Facebook, and I mean, the sales started coming in. I was like, 'Whoa, this is amazing.' You know? But, I started getting lots of contact and then I started sending out emails after that based on the people that. . . . I just did that one thing, you know, with Facebook."

- Another participant added, "Like he said, you get a comment. That comment generates people."

- A participant discussed using Facebook as a way to be advertised on multiple pages said, "Well, what I've done is I've leveraged it because the places I sell product to, they're on Facebook. So, they put me and my stuff on their page and all their thousands of communications or connections and you that helps me be connected one level away."

- A participant discussed using Facebook more so to update customers about new crops to be offered at upcoming farmer's markets said, "We use a lot of Facebook. Every time we go to market, we post what we are going to have. If we know what other people have, we will post that, too."

- A participant who saw no use for Facebook said, "I do Facebook, and I get no sales off Facebook."

- A participant agreed but said, "Of course, I don't try to get sales off of Facebook, but . . . I update it almost weekly. And you get a lot of comments, but as far as somebody saying, 'Hey, I want to buy it,' I haven't."

- An extension agent shared how farms have garnered customers as a result of posts on Facebook. This participant

said, "I would say that there is a . . . going back to like Facebook, there are several farms that do log daily, and I mean, especially the farms that are small farms where probably younger farmers are going in and selling a specialty or niche market that they developed. You see it all the time, and you see postings all the time of what they are doing. Eat Wild, again, I mean, I have heard some statistics, but I am not sure. And I would say, at least in our area, the most successful small farmer marketers, they use email all the time. That is something that they use. One of them recently said . . . his sales were about $300,000 last year, so, I said, 'You are not a small farmer anymore.' (laughter) He didn't really like that. They do not have a lot of time on their hands, and when they develop a big clientele of people, they have a lot of people coming to them. They get orders online and . . . I mean, it is amazing what some of these people are already doing."

Problems Faced

Participants were asked to describe the frustrations and problems associated with marketing and selling their products, as well as issues faced within the agriculture industry as a whole. Below is a summary of the problems most commonly discussed by the participants:

Hindered by Regulations

Regulations such as those implemented for food safety and the Cottage Law were mentioned as detriments to successful business. Participants mentioned the difficulty they faced when trying to make it as a small farmer with so many government regulations implemented. Additionally, potentially false labeling of organic and natural products, as well as resellers at farmer's markets were labeled as great concerns and caused tension from actual producers. The following quotes are examples of discussion surrounding this theme:

- A participant discussed the problems with strict rules and regulations by the government and said, "So, how they interpret the regulations and the processing, it is a major issue in marketing."
- Echoing what the first participant said, another participant added, "Yeah, we find the laws to be highly prohibitive to being successful in Florida."
- Providing specifics about her production, one participant said of the Cottage Law, "The issue with state and local markets is still regulation. You have to be permitted. If you want to sell your eggs, you have to have a big cleaning facility, a commercial kitchen. If you want to sell jams and jellies, according to the Cottage Food Law, you're supposed to sell pretty much off the farm."

Produce Vendors

In two of the focus groups, a great deal of discussion centered on the frustrations of vendors at farmer's markets who sell recently purchased products unbeknownst to consumers. The following quotes are examples of discussion surrounding this theme:

- A participant who felt vendors should not be allowed at farmers markets said, "We are about half and half between produce vendors and farmers, but I personally think that is something that needs to be taken into account statewide is produce vendors at farmer's markets. Farmer's markets should be reserved for farmers."

- A participant who strongly agreed said, "And I think collectively the farmers need to stand up and scream about having all these produce vendors there. Because I see it throughout the state at different markets. Ours is being run by a produce vendor now."

- Another participant added, "It is not a level playing field, is what it is. Because they can buy wholesale someplace, you know, off the train or whatever."

- On the other hand, one participant saw the value of vendors at farmer's markets. This participant said, "Yeah, but you know what? At the farmer's market, there is a big balance there. To draw a lot of people, you need a lot of vendors. And if you are like any other . . . like where we are, we have four farmers in our area, five farmers, that is it. So, if there were only five farmers at the farmer's market, you wouldn't have a crowd. So, they let a produce company in, and they let bakers in, they let a lot of different people in."

- One participant mediated the discussion by stating a major problem with vendors selling at farmer's markets. This participant discussed the fate of the customer and said, "But then all of a sudden, there is more of them than there are of you. And the people, unfortunately, are not educated enough to know. They walk in, 'Oh, I am at a farmer's market, it has got to be fresh, local produce.' Well, gee, last week I don't know exactly where you were growing a head of cabbage in the state of Florida, let alone the South. You know? But, they have got it there."

Logistics

Participants discussed the location of their farms in relation to the population of consumers as a problem in rural areas. The following quotes are examples of discussion surrounding this theme:

- A participant mentioned the location of their farm being what they considered the largest hindrance to sales and said, 'The biggest thing that we ran into was logistics. And logistics alone is almost shutting us down before we even get going.'

- Another participant discussed the same problem as a result of living in a rural area. In a disappointing tone the participant said, "And that's our biggest concern is . . . you know, the niche market is there, but I live in Jackson County and as you know, we're in the middle of nowhere. (laughter) And that's, that's where our marketing . . . we have some ups and downs, it's never gonna be a complete perfect circle, it's gonna be an oval or an egg, but trying to get it better."

Pricing

Some participants discussed the problem with restaurants and consumers not being willing to pay higher prices for quality food. The following quotes are examples of discussion surrounding this theme:

- A participant who experienced restaurants committing to purchasing products and then backing out due to prices said, "If you have restaurants that are willing to do it. We have got a few very local restaurants, the next county out of Leon County, which is Tallahassee. And the local restaurants are like, 'Oh, yeah, we want it, we want it, we want it.' Until it comes to price, and then they go right back to the cheap crap that they order."

- A participant who understood the problem with customers not being willing to pay the set prices contributed to the conversation and said, "Our biggest problem is the price that we charge. Normal-everyday-going-to-the-IGA people cannot afford to buy our products and you can't . . . we can't bring them lower because it's what we have

involved in our animals. And also they're naturally grown; we don't have chemicals. So, we have to spend extra money even on top of that keeping them, you know, healthy and viable."

Future Aspirations

Participants were asked to describe where they would like to see their business go in future years and what they would like to achieve. Below is a synopsis of their responses:

Online Grocery Store

Some participants stated interest in selling their products online and on their own websites. The following quotes are examples of discussion surrounding this theme:

- A participant with ideas to offer customers all of their grocery shopping online said, "What I was talking about was being a full online grocery store . . . and they do exist."
- Another participant with experience in online sales shared, "With the online market, it has to be top quality, that's what we learned. And it makes sense, you're the eyes and the . . . you are the shopping for them, as the farm selling online. And so, we've had people that didn't really think about it that way and brought things that were not of the quality that we thought were . . . what had been advertised, and so there's some education there with working with farmers and figuring out expectations. And because at an open-air market, if something doesn't look good, then they're just not gonna buy it. You're not gonna have the kind of feedback you get with the online market if something shows up and it's poor quality."

Plans

In regard to the previous question about future business aspirations, participants were asked to share how they foresaw getting their business to the level of accomplishing said aspirations. Below is a synopsis of their responses:

Niche

One participant stated the importance of being unique. The following quotes are examples of discussion surrounding this theme:

- A participant discussed future plans to stand out and have a lasting business in the industry. This participant said, "And I have figured out that that has got to be my niche is to grow what they can't grow."
- An extension agent discussed farmers taking advantage of niche markets as well. This participant said, "I have some greenhouse guys that are doing some pretty good Facebook marketing right now. Only a small percentage of them are bold enough and brave enough to try it. And they basically take the niche market things."

Change With the Times

Some participants stated the value of being willing to change with what is popular now versus what perhaps was the case in years past. The following quote is an excerpt from discussion surrounding this theme:

- A participant discussed her many years as a veteran farmer and offered advice to anyone coming into the profession. She mentioned what she had learned throughout the years and said, "When I was coming up, the big thing was . . . OK, be sustainable, you need to sell direct. You get your best price selling direct. Whether it is the backdoor of the restaurant or to the people at the farmer's market or a CSA, it is all direct. Not have to go through the proverbial middleman. The second thing you do is value added, put it in the jar and in my case, we put it in

the bottle. So, that gives us a year-round product when we have got a six-week window with our fresh fruit. But I sell wine all year round. So, those were the two key points. But, then you know, starting out, I tried it all. I have been doing it probably longer than most people at the table and I probably look weary for it. But I have had to change, you know. You don't do the same thing 24 years, every year. You change. You meet the challenge, and you do something different before somebody else gets it or . . . and then you have to change again because everybody else sees a good idea and has jumped on it."

Community Garden

Plans to develop a community garden were discussed as a future aspiration by one participant as a means to promote his products as well as get a larger supply of his product out to his consumers. The following quote is an excerpt from discussion surrounding this theme:

- "I wanted to do a segment where we did community gardens where people can come, we have harvest parties, sometimes we could have harvest parties, but then there is other things growing."

Methods of Selling

Participants were next asked to share how they currently sell their products. The following is a synopsis of their answers. The methods of selling products ranged a great deal, from farmer's markets to personal deliveries and everything in-between. A few participants used a distributor to market their products and one producer was only willing to sell within a specific mile radius of his farm. Depending on the targeted audience, whether they are restaurant chefs or just an average consumer seeking local food, the selling methods of the participants were tailored to the needs of the customer while remaining beneficial to the producer. Many participants were members of CSAs and some of Red Hills Alliance, while others offered U-pick programs and online shopping. Very few participants used distributers outside of their personal business.

U-pick

Participants described providing a U-pick service to consumers with mixed feelings. Some participants found U-pick to be difficult, requiring a constant presence at the farm, as well as highly liable, while others described U-pick as beneficial, providing the small-scale, friendly farmer appeal desired by many customers. Most participants providing a U-pick were also selling their products via additional routes such as online distribution. Many participants stated their selling strategy to not simply be based on one, particular avenue but a combination of many such as online selling, U-pick and personal delivery. The following quote is an excerpt from discussion surrounding this theme:

- One participant mentioned the value of being diverse; not only in what one grows but also in how one markets and sells products. This participant said, "So, you know, you keep rolling with the times, and right now it's direct marketing and value added. And selling more to local stores and also direct, U-pick."

Online Sales

Due to participants' perception for the need for an online presence, many participants found selling online to also be appealing through the use an online order form and payment by check or credit card. In some instances, pre-orders provided producers with the convenience of knowing how much to product and avoiding excessive waste. Both the Organic Online Market and Red Hills Online Market were referenced as examples where participants have taken part in online sales. The following quote is an excerpt from discussion surrounding this theme:

Florida MarketMaker

- A participant with experience in marketing products online discussed the advantages and opportunities available to farmers. She said, "And the cool thing about the online market is we have so much data that you don't get at a physical market. If we wanted to do something with that data, which we really haven't done yet, we could. I mean, we could figure out the demographics as far as like location. Where are all these people coming from?"

Farmer's Market

More than half of the participants were currently involved or had previously been associated with farmer's markets. Some participants stated that they got their business started by selling at farmer's markets and have since moved to different strategies, while others continued to solely market and sell their products through that particular venue. The following quote is an excerpt from discussion surrounding this theme.

- A participant with years of experience in farming offered advice as to how a farmer's market can support a small-scale operation. She said, "But generally the market, if you plan properly, so that everything doesn't come in at once . . . if you stagger it a little bit, then a weekly market can absorb the lion's share of what you produce. A lot of people do more than one market; there are some midweek markets that would help too. I am able to stagger it so that there is not much that goes to waste. And of course we consume a lot ourselves, too."

Pre-orders

Some participants stated that by selling their products before growing them, they avoid excess costs and waste. The following quotes are examples of discussion surrounding this theme:

- A participant who avoids growing in excess by having customers pre-order said of the system, "Well, it is like what I do in the summer with my . . . mainly fruit, tropical fruit that we have, is in the summertime . . . is that we take the orders ahead of time and we harvest to order. Yeah, shipping is like the same or twice the cost of the actual fruit, so yeah. It's hard. So, we do . . . it is all harvested to order. But, because I have got those orders ahead of time and they are paid for, I know that I am not going to waste . . . I harvest what I need."

- Another participant mentioned that their farm grows products only after they have been ordered. This participant said, "I grow to order, I have a sprout business, but I will not grow them and throw them away. I grow them when people order them, and they get them fresh, optimally harvested at the right time, certified organic micro-green that I can charge a viable price for . . . for me to grow it. I just quit doing the stuff that I can't market."

- A participant discussed how to deal with the restaurant industry and shared, "Because we sell to chefs, we email out to our chefs twice a week, an order form. And we use Infusionsoft, which I don't really like that program, but it is the only program I could find that is an actual order form. And so, it is just an order form that they just say, deliver this, deliver that. So, they order it on a Monday . . . they are supposed to order on a Sunday night or early Monday morning and then we deliver it on Tuesday. And so, we try to get them all to place orders on a regular basis."

CSA Members and Red Hills Farm Alliance

A significant amount of participants were members or had some relationship with a CSA and/or Red Hills Farm Alliance. In addition, a great number of participants were either currently using or at one time in the past had used LocalHarvest, with a few mentioning EatWild as well. Many participants mentioned the enjoyment of camaraderie among members and the ability to provide a quality product to consumers. The following quote is an example of discussion surrounding this theme:

Florida MarketMaker

- A participant responded by stating how he joined forces with other farmers to provide larger quantities to his customers. This participant said, "Well, I am working with, not just my farm, but a coalition of farmers. So, there are like four of us that have combined together and growing different things and trying to stagger it as such. And being able to provide, on a larger scale, what we need to . . . from the small farmer to the next level, only because we combined our forces together."

Florida MarketMaker Initial Discussion

Next, and prior to actually showing the website, the participants were asked about Florida MarketMaker. Positive perceptions about Florida MarketMaker included its lack of advertisements and classes made available in counties. Negative perceptions about the overall concept of Florida MarketMaker are that the site is simply an attempt to reinvent the wheel and that other sites such as LocalHarvest are already well known and operating successfully. For those aware of the service and currently signed up, there were complaints about its effectiveness and how the site has not impacted business growth. For approximately half of the participants, the existence of the site was unknown and for others, the purpose was not clear. Many complained of the user interface and layout of the website, stating that it was too crowded and covered too many audiences as well as areas of industry. A common perception among participants was that Florida MarketMaker is not for the small farmer and instead is corporate and academic, perhaps associated with the government. Below is a synopsis of the discussion:

Positive

Good Idea

While some agreed that Florida MarketMaker sounds like a good idea with true intentions, many were skeptical of its purpose and effectiveness. The following quotes are examples of discussion surrounding this theme:

- A participant who saw value in Florida MarketMaker shared, "I would say, that it is a great idea. But, for our farm in particular, it doesn't seem to apply as much . . . in it's current form."

- Another participant who discussed taking all he could get with free marketing said, "Anything can help. That is what I think."

- A participant who applauded Florida MarketMaker for its efforts said, "There isn't a lot of education, if you were to ask any of our CSA members, or farmer's market customers, 'What do you think of . . . or have you heard of Florida MarketMaker?' They have never heard of it. I understand that there are some more developed MarketMaker models in other states, and I commend the effort of the MarketMaker program in Florida."

- A participant who seemed confused as to why Florida MarketMaker was not advertised in many ways said, "I ask customers constantly when they come in, 'Tell me where you found out about us from, MarketMaker or who?' And MarketMaker is the new one on the block. And I thought, well, with the state backing it, it is something that we could really use. Nobody knows that it exists. I mean, I will actually sit there and take a sheet and brought it up on the computer with a website on it and give it to customers as they come in and say, 'Hey, go looking for this.'"

- An extension agent reiterated the thoughts of the other participants and shared the opportunities that could potentially become available through Florida MarketMaker. This participant said, "Well, once you get used to it, it is user friendly. But, it takes a little bit of time and a little bit of effort. And you need to play around with it. It isn't

something that you are just going to go right in there and pick it up. But, there is some pretty interesting stuff in there, I must say."

- Another extension agent shared how opportunities exist for future generations of farmers. This participant said, "One of our challenges has been that a huge segment of the folks that are small growers/direct marketers don't have either Internet access or Internet skills. And again, I have talked to some folks that I am just convinced are never going to adopt those skills, but they do have sequential generations that can work with it. And I think that a piece of that is that it is a great opportunity to go across generations and get the production skills and wisdom from these older folks and get the input from the young folks."

Workshops Offered

Additional positive feedback associated with Florida MarketMaker was the workshops offered in different counties to assist producers in the setup of profiles. This was considered to be both beneficial and considerate to participants. The following quote is an excerpt from discussion surrounding this theme:

- A participant who found value in classes on how to set up a profile on Florida MarketMaker said, "They actually provide workshops where you can go in there and sit down, and they have their laptops set up in there, and they will actually walk you through the process on how to set your own little website up."

No Advertisements

Participants in a few of the focus groups mentioned how nice it was that the Florida MarketMaker website was not overwhelmed with advertisements, hence making it more attractive to those individual participants. The following quote is an excerpt from discussion surrounding this theme:

- A participant with knowledge about Florida MarketMaker was pleased with the site for not including a lot of advertisements as compared to other similar sites. This participant said, "LocalHarvest is more geared to . . . when you go on LocalHarvest, half of your page is paid advertisements on the borders and around the edges. With these others, many of them, you don't run into that."

Negative

Unaware of Existence

Prior to the focus groups the participants aware of Florida MarketMaker stated hearing about the service through the Institute of Food and Agricultural Sciences (IFAS), extension agents, at conferences such as the Small Farms Conference and by word of mouth. However, participants stated that they did not know the website existed. The following quotes are examples of discussion surrounding this theme:

- An older participant discussed his lack of awareness of Florida MarketMaker and said, "And this is gonna sound real stupid, but I've been doing this a long time, and I didn't even know about this one."

- Another participant stated his opinion of the website in a clear manner when he said, "It is as thought they put the program together and they are keeping it a secret, you know?"

Furthermore, it was oftentimes mentioned in discussion that the public is just as oblivious to the existence of the service.

- One participant echoes this thought when he said, "But talking about the general public, the general public is completely unaware that it exists."

- Another participant added, "And not only that, but it's not being advertised. The consumer doesn't even know this is out there. More people know about LocalHarvest than . . . nobody has ever heard of this."

- A participant who felt there is really little to no need for the service if it is not being advertises said, "But talking about the general public, the general public is completely unaware that it exists. So, unless they call me and ask me, 'Well, where can we get to your website, how can we get to your website to find out about your farm?' You are already there, I just give you my website information. So, there is no reason for them to go to it."

- An extension agent echoed the same thoughts about the lack of awareness of Florida MarketMaker from both producers and consumers. This participant said, "On the MarketMaker, one of the problems that I find with MarketMaker is that a lot of the producers and a lot of the individuals out there don't know that it exists. You turn on the television today and one of the commercials you are going to see over the next 30 minutes, you are going to see an Angie's List. And that is basically what MarketMaker is; it is an Angie's List for produce or whatever else we are producing. It is not recognized for it. We are just not known out there. MarketMaker is just not there. The only places that I have ever been associated with it are in some of the different tradeshows or some of the different things we have done. That is a very, very limited amount of folks that have been exposed to it. If you are going to make MarketMaker really have an impact, you have got to reach out there to find people that are going to use it. You have got to have a reason for them to go use it."

Unclear/ Difficult to Understand

Almost complete consensus was found among the participants in regard to the lack of understanding of Florida MarketMaker. Participants stated that the site's purpose and services were unclear and difficult to use with ease. The following quotes are examples of discussion surrounding this theme:

- A participant who tried to register his business but experienced problems shared what happened when he said, "I really struggled to find the utility for it even though . . . like our avocados are mainly wholesale, for example. I don't know. I just can't make it work. I can't get my hands around it."

- An older participant discussed the difference between working a website as an older person compared to a younger person. He said, "That makes . . . the way that we run a computer . . . I run a computer as an old guy, is a lot different than you run a computer, as somebody else runs a computer, you know? We didn't grow up with computers, so we are looking for the easy way to do things. And you all have clicked 50 buttons by the time we figure out where we are going. So, I think a lot of it would be what demographic you are marketing the whole thing."

- A participant confused about the purpose of Florida MarketMaker said in an uneasy manner, "It is personal marketing. I think it is personal marketing."

- One participant simply stated, "It is amazing to me that they have made it this difficult."

Unsure of Its Purpose/ Lack of Clear, Defined Purpose

Participants stressed how they were not aware of the purpose of Florida MarketMaker and how they could use the service for their businesses. The following quotes are examples of discussion surrounding this theme:

Florida MarketMaker

- A participant discussed her experience of browsing the website and said, "I quickly traversed it last night for the first time. I have no idea how I stumbled on it, but I really couldn't figure out what it was for."

- A frustrated participant said, "And the way it was described to me was that it would be a way to bring buyers and sellers together. And if you sign up, you will have people knocking at your door, all these buyers, people looking for product. So, I signed up, and it wasn't worth the few minutes that it took me to sign up and so, you know, I can tell you everything I don't like about it."

Just as Florida MarketMaker was criticized for not serving a specific purpose, the tool was also criticized by participants because it did not having a clear, defined purpose. The following quotes are examples of discussion surrounding this theme:

- A participant discussed how Florida MarketMaker tries to accomplish too many things at once. This participant said, "I think this is trying to be too many things to too many people, it is just not specific enough."

- A participant said a similar notion when they stated the website is, "Trying to be all things to all people and it's just too much"

- Another participant firmly stated their opinion about the effectiveness of Florida MarketMaker. This participant said, "It definitely doesn't target the general public."

Ultimately the feeling among participants was that this attribute, among many others of Florida MarketMaker led to a lack of participation in the tool.

- One participant said about the difficulty of use of the site, "Because people . . . if the site is not easy and fast, they just move on to something else."

In addition to being confused, the lack of clarity offered by the website led to frustration.

- One participant added, "No, I cannot imagine a consumer readily sitting down and quickly going through this and feeling good about anything."

Corporate/ Not for the Small Farmer

Frequent comments were made by participants concerning the appearance of Florida MarketMaker and how it did not seem to be set up for the small, local farmer and instead was corporate, academic and business-like. The following quotes are examples of discussion surrounding this theme:

- A participant who was unsure of the target audience of Florida MarketMaker said, "Yeah, I can't tell who the target is here. It certainly doesn't look to me like it targeting individual buyers. It may be commercial buyers, but not . . . anyway, it doesn't look to me like it is aimed at a person who wants to find blueberries."

- One participant who felt Florida MarketMaker was out of their league said, "It would be more appropriate for people dealing with a lot more volume than most of us."

- One participant was sure the website was for large corporation use when he said, "Well, if you look at it closely . . . and the more time you spend in there, you will see that it is developed more towards your Walmarts and

everything. It was developed, if I am not mistaken, wasn't it developed at the University of Illinois and then we eventually picked it up?"

- One extension agent discussed the possible feelings of small farmers and why they may not use Florida MarketMaker. This participant said, "It is pretty advanced, it is pretty advanced for the rank-and-file small farmer, perhaps. I think that to some degree they do have the ceiling limitation that they have X amount of product and if they are already moving that, they may not have a perception that MarketMaker really fits for them. So, it maybe isn't the smallest of the small, it is sort of that small to midsize group that really would be the best targeted ones. The ones that are just taking a little bit of stuff and selling a hundred dollars at the farmer's market on Saturday, you know, maybe not."

- Another participant shared, "It just seems like it is totally geared for business. In my opinion."

Participants stated that LocalHarvest had a small-farmer feel having been created by farmers themselves and that Florida MarketMaker did not have the same feeling.

- A participant said in a simple manner, "[Florida MarketMaker's] too sophisticated for me."

Reinventing the Wheel/ Successful Alternatives Exist

A common theme mentioned by participants in almost every focus group was the criticism that Florida MarketMaker was attempting to "reinvent the wheel" on an idea or tool that already exists and successfully brings a clientele to producers, such as LocalHarvest. The following quote is an excerpt from discussion surrounding this theme:

- One participant was skeptical of the purpose of Florida MarketMaker and said, "So, this marketplace kind of . . . it almost seems like everybody and his brother is trying to reinvent the same wheel, and there is just too much of it."

Lack of Effectiveness on Business Growth

Another common complaint for participants concerning Florida MarketMaker was its lack of impact on specialty crop producers who had signed up in the past or those who considered signing up for the service. The following quotes are examples of discussion surrounding this theme:

- A participant, unsure as to why their farm should be registered on Florida MarketMaker, asked, "I am not clear on how this would help my business, how this would bring customers to me, you know? I mean, it doesn't seem to be too terribly hard to register. And as an academic exercise, it looks kind of interesting, but I don't see really how it would bring customers, you know?"

- When asked about Florida MarketMaker's impact on the growth of her business, one participant said sternly, "It doesn't. There is no impact."

Several other participants mentioned that they would participate in any free marketing program, but others questioned why they would sign up if they felt Florida MarketMaker would not provide them with any results.

Academic

A common theme among participants, particular when compared to other websites such as EatWild and LocalHarvest, was that the site was too academic, reminding them of the government, instead of representative of farmers and local agriculture. The following quotes are examples of discussion surrounding this theme:

Florida MarketMaker

- One participant told the rest of the group, "This is a government program."
- Another participant asked, "Kind of like an IFAS-type project, isn't it?"
- One participant inquired, "Is there a charge for it, the service?"

No Place for Specialty Products

Some participants felt as though the site was not open to specialty crop producers and was only good for mass-production farmers. The following quote is an excerpt from discussion surrounding this theme:

- One specialty crop participant saw no place for his business on the Florida MarketMaker website. He said, "Because my market would particularly be a posh market, that I am more or less, wanting to get into. It is specialty."

User Interface and Website Layout

The layout of the website was also heavily criticized with almost unanimous opinions that the site was too crowded and unclear. The following quotes are examples of discussion surrounding this theme:

- A participant offered insight into how people view websites and said, "How long . . . the average person isn't going to spend long enough to try to figure out how a complicated website works; they are just going to move on."
- Another participant added, "Right, they will move on past it."
- One participant stated, "But this is like throw-up in a way, it is all just...all there."

Attracts Wrong Type of Customers

Throughout the discussion, a few participants stated that, although they had received some interested customers as a result of Florida MarketMaker, the customers were not from an area of close proximity or were looking for products the producers did not have available or grow at all. The following quotes are examples of discussion surrounding this theme:

- A participant who was not interested in attracting customers outside of the community said, "I use LocalHarvest . . . I use it a lot, I like it. I get calls and emails; more emails than calls of course, from South Florida, a lot. And I think maybe those come through MarketMaker, I don't know where they're coming from but . . . and they are, 'Oh well, we would like to buy your product for our restaurant, we're looking for.' Well, if I can sell everything that I grow to my community, at a good price, I'm not looking to sell in Orlando or Miami."
- A participant who had registered in the past shared about the experience with Florida MarketMaker. This participant said, "It has been several years since I signed on it, and like I said, LocalHarvest, I get hits all the time. I have never heard from an individual, there were a couple of wholesale inquiries that I got through this. But, I never heard from the kind of customers that we target."

Farm Not Open to Public

A few participants expressed issues with having to share their home address when they do not sell products directly from the farm. This created a privacy issue for such farmers. The following quote is an excerpt from discussion surrounding this theme:

Florida MarketMaker

- A participant who did not creating a profile due to a privacy issue shared, "One of the things that I have a problem with is that our farm is not normally open to the public, so we do not publish our street address, we publish our mailing address. There is no way to do that. You have one address, and it wants your street address, and it won't put anything else, and I have a real problem with that."

Aware of Florida MarketMaker

Participants who were aware of Florida MarketMaker prior to the discussion were asked to share what they knew about the tool. Throughout each of the focus groups, usually at least one participant had heard about Florida MarketMaker.

Currently Signed Up with Florida MarketMaker

Participants were then asked if they actually had an account on Florida MarketMaker and, if so, to discuss it. Less than 50 percent were ever signed up for the service and even fewer actively used the site. The following quotes are examples of discussion surrounding this theme when asked how Florida MarketMaker has impacted their businesses:

- A participant who was frustrated with the website said of its impact on her business, "It doesn't; there is no impact. So, we are registered . . . I should amend my statement. It has no known impact. So, we are registered, no one has ever contacted us from it to . . . no one has ever contacted us from it and stated that they found us through it."

- Another participant responded when asked if she was registered, "I am, I mean I was, as far as I recall. Haven't been back."

- One participant said, "I think we started to sign up for it but never had the time to finish signing up."

How Farmers Heard About Florida MarketMaker

Participants who mentioned they had previous knowledge of Florida MarketMaker were asked how they heard about the tool and from whom. Below is a summary of the discussion:

- One participant said, "I think I got an email from IFAS, originally, on it."

- Another said, "Small Farms Conference."

- One participant added, "We were at the conference here when we had heard about it, and it turned out that our extension office actually put our farm on for us."

- Another shared, "I heard about it at the Master Sheep and Goat Program."

Business Received as a Result of Florida MarketMaker Account

Participants were asked if their business or sales were affected in any way due to their account on Florida MarketMaker. Below is a synopsis of the discussion surrounding this question:

- One participant made it clear to the group that, "Now, I have had people contact me."

Florida MarketMaker

- One participant shared with the group, "I had a guy that had a CSA up in St. Augustine. He was asking if I had a certain thing. Unfortunately, the one thing he was asking for, I didn't grow."

Suggestions

Prior to looking at the actual Florida MarketMaker website, participants provided suggestions to improve the tool. The following are the suggestions made by the participants in this subject matter.

Local Harvest

A number of comparisons were made to LocalHarvest throughout each of the focus groups. Participants suggested Florida MarketMaker look at and take points from the design and structure of LocalHarvest. The following quotes are examples of discussion surrounding this theme:

- When asked about LocalHarvest, an extension agent said, "It is the first place that consumers start when they want to seek out local food."

- Another extension agent answered the same question with "It has a lot of farms listed on there. A lot of farms, for Florida, in particular."

- An extension agent with knowledge of Internet searching stated how easy it is to come across LocalHarvest when searching for local food on the Internet. This participant said, "I was just saying when you Google search, and you type in 'local' or something like that, it is usually the first choice that comes up. That is why I clicked on it for the first time."

- Another extension agent compared LocalHarvest to Florida MarketMaker when they said, "And it seems easier to get into than MarketMaker."

- An extension agent commented and said, "Not nearly as complex."

- A participant shared their opinion about online marketing and the use of websites when they said, "I find LocalHarvest, I think services . . . it provides the ability for us to do anything we want. Although I don't use it other than to list ourselves. I am not actually using their marketplace. I am now using Amigo for the CSA, and they have the little web store site . . . because my web sales are minor compared to the CSA activity, I focused on that. But, if I was just looking to market for small farm stuff, I probably would have just gone ahead and gone with LocalHarvest."

- Another participant stated, "And not that I am pushing LocalHarvest, per se. But, they are pretty successful."

- A participant added, "They [LocalHarvest] are more attuned to our level, absolutely."

- The feeling was reiterated when a participant said, "I get a lot of people telling me that, 'I found you on LocalHarvest.'"

- A participant spoke of Florida MarketMaker when they said, "And MarketMaker is the new one on the block."

- A participant shared his opinion of free advertising on a website when he said, "I mean, we deal with other ones like LocalHarvest and Small Farms and stuff like that. So, anytime you can increase your market space by doing a

half hour worth of typing your information into a computer site to get more people who will look at what you are doing."

- One participant said, "I would get a lot of information from there. They've got it set up and you could probably look how many thousands and thousands of hits they get, and that's what it all comes down to . . . is it working and how many hits you are getting."

- One participant who was satisfied with LocalHarvest said of the website, "LocalHarvest, I can just get in and out of it and do those things pretty quick, and we do get, if people go on the internet and type up looking for certain things we get . . . they find us on that, we're one of the local farms they find. And, so that's about the benefit of it for me as far as LocalHarvest is concerned. I . . . I've not had anybody say that they saw my name on Florida MarketMaker, but I'm not sure things are listed the same way."

- An extension agent with hopes for Florida MarketMaker compared it to LocalHarvest based on the capabilities of the two websites. This participant said, "And MarketMaker is a great tool for them to discover things about their market, but if the consumer is not there, there is not the incentive for them to take the time to do it. They want someplace where someone is going to go search and call them to buy their product. If the consumer is not there, and it is with LocalHarvest."

- Another extension agent added, "I think it depends, MarketMaker in comparison to LocalHarvest, LocalHarvest is simpler, and it seems to generally be positive anytime I ever hear people talk about it. But it is just a sort of a simple connection. What do I have? How do you reach me? And that is it."

Make Sure People Know the Service is Free and Do Not Associate With the Government

A number of participants reiterated the fact that the website appears corporate and like it was produced by the government. Some asked if there was a charge for its services. It was stressed by participants that the website make clear the fact that the service is free of charge to both consumers and producers alike. The following quote is an excerpt from discussion surrounding this theme:

- A participant unsure of the specifics of Florida MarketMaker said, "Whether it is free or not, I know for producers it is free, at least currently . . . but if it is free, stating that is free would be great. And maybe it could be fit into the tag line. 'A free service for connecting willing markets,' maybe that tagline is uniform across all the MarketMakers and you need to have a committee meeting about it, but the fact that it is free is important. Another thing is the agencies across the bottom. There is a balance between needing to give credit to the organizations that are involved and also not turn off the people who would potentially be involved. There are many people within the small farms producer and consumer movement who have an anti-government streak. And that might turn off folks from participating at all. It shouldn't be invisible, but when you look at the size of those logos, as compared to the actual utilities on the page, they could be a little bit smaller."

Change Wording

A number of participants had difficulty understanding the purpose of Florida MarketMaker and the functionality of the website, attributing some lack of clarity to the language used on the site. The following quote is an excerpt from discussion surrounding this theme:

- A participant suggested this concerning the wording and language used on Florida MarketMaker. "Well, you know, you need to update . . . ...marketing terms are so, so important and you know we have got three of them

right here. We have got organic, which is huge, local, which is huge, and small farmers. Those three words are marketing tools right now, and they definitely need to be incorporated in here."

Include a Wanted Section

It was suggested that a wanted section be included on the Florida MarketMaker website so consumers could list their needs and they could be paired with producers with the available products. The following quote is an excerpt from discussion surrounding this theme:

- A participant who wondered about the search possibilities on the website asked, "Is there a way to figure out who is looking for what on there? You know what I am saying? In other words, if you knew who in your market was looking for . . . whatever."

Event Listing/ Email Correspondence From Florida MarketMaker

Participants discussed how LocalHarvest utilizes a calendar to let both producers and consumers know about events, both large and small, within the agricultural community. The following quote is an excerpt from discussion surrounding this theme:

- A participant discussed listing events online and said, "When we have an event, yeah, when you have an event and it's listed on LocalHarvest, I've got it set up so that I can ask for events that are going on within a 50-mile range or 100-mile range, and those events will get emailed to me. And that's how I learned about that, 'farm to table' thin. I guess I've never investigated. I don't know if this market does that or not, but that's how I see LocalHarvest almost weekly is because I get emails from them . . . 'There is an event in your area' or 'Sorry, there is no event.'"

Develop a Facebook Page

Some participants valued the idea of social media and stressed that, in order to stay with the times and remain competitive in the industry, Florida MarketMaker needed to have a Facebook page to update recent news and promote sales and events. The following quote is an excerpt from discussion surrounding this theme:

- One participant discussed the opportunities for Florida MarketMaker with social media when they said, "They have to get a Facebook page, the MarketMaker Facebook page."

Provide an Evaluation of Customers as a Result of Florida MarketMaker

During the discussion the idea of evaluating the effectiveness of Florida MarketMaker on the producers who sign up for its services to let them know if the site is generating any business for the individual farmers. The following quote is an excerpt from discussion surrounding this theme:

- A participant suggested Florida MarketMaker provide a way to show the effectiveness of the website to registered users. This participant said, "I think there needs to be some kind of impact or evaluation system to evaluate . . . is anybody getting any bang out of this? Is this you know, how many customers have reached you through MarketMaker? That would be the one evaluation question that."

Questions About Florida MarketMaker

During the discussion about Florida MarketMaker, the following questions arose from interested participants concerning the service.

Florida MarketMaker

How Does It Promote to the Consumer?

A number of participants were concerned as to how Florida MarketMaker could and would target consumers. The following quotes are examples of discussion surrounding this theme:

- One participant asked about Florida MarketMaker with concerns to how it targets the consumer. This participant said, "How do they present themselves to the consumer?"
- Another participant asked the question, "I know that when you post something, it goes out to whomever else is got a posting on the website. But, do they have, like ads in Google? I mean, how do people, how does the general public?"

Does It Regulate Posts?

A number of participants expressed concern for what was allowed on posts on the site and whether or not there was any sense of credibility attributed to the site to ensure that false information about farms was not published. The following quote is an excerpt from discussion surrounding this theme:

- A participant, concerned with false claims made online, asked, "If you publish something on there . . . is there a mediation, or is there a review committee that reads over what you have listed, to make sure you don't have anything listed that you shouldn't? Is there any way to validate that they're making sure they're selling it like they should be?"

Does The Business Spotlight Change?

Multiple participants asked questions regarding the business spotlight on Florida MarketMaker to understand its purpose in a more in-depth manner and to learn whether or not the site changed the business spotlighted on a regular basis. The following quote is an excerpt from discussion surrounding this theme:

- A participant who saw possibilities for promoting local agriculture through the Business Spotlight inquired, "The 'Business Spotlight,' do they change that all the time?"

Florida MarketMaker Detailed Discussion

In order to gather specific evidence as to why or why not participants were using Florida MarketMaker, each page on the Florida MarketMaker website was shown to each participant and discussion took place as a result. Emphasis was placed on participant likes and dislikes and suggestions were made for future improvement. Below is a synopsis of the discussion surrounding each of the individual pages:

Positive

Although a great amount of discussion always turned to the negative aspects of the Florida MarketMaker website, there were some advantages and attributes of the site participants found useful and beneficial. The following displays conversation surrounding each of the positive themes.

Citrus Represents Florida

The following quotes are examples of discussion surrounding this theme:

- A participant who farmed citrus smiled and stated, "I like to see the citrus up at the top. I mean it tells you Florida, plus it's a little more geared towards me. You know, you wouldn't see that on a Wisconsin MarketMaker."

Florida MarketMaker

- Another participant added with a grin, "I don't know, when I see pictures of produce, I feel happy about it."
- Furthermore, a participant shared their opinion of the site and said, "Colorful."

Would Be Interested in Finding Out More About Florida MarketMaker As a Result of the Homepage

One participant stated how the Florida MarketMaker website showed enough promise that they would be willing to look into what it offered. The following quote is an example of discussion surrounding this theme:

- A participant who saw opportunities for his business on Florida MarketMaker stated, "I definitely would research it and figure out more about it. If it increased my marketplace, I would get on."

Youth Would Be Ok With This

In discussion surrounding the complexity of the site, some participants mentioned that it was important to look at the different audiences that would be looking at the site, stating that young people raised with the Internet would most likely be able to understand and navigate the site. The following quotes are examples of discussion surrounding this theme:

- A participant who discussed different audiences and their possible takes to the Florida MarketMaker website shared her opinion when she said, "Sometimes we have to look at who the website is going to. If you are under 40, I think that the younger set . . . the kids, the people that have grown up with computers, don't get as frustrated by a page like this."
- A participant responded and said, "Yeah, my situation . . . the vast majority of my customers are between 22 and 35. But yet, there is nobody between 35 and 55. I mean, nobody."
- The conversation was summarized by an older participant who said, "So, a 30-year-old is going to develop a marketing page differently than I would."

Negative

Of all the participants who took part in each focus group, not one was completely satisfied with the usability of Florida MarketMaker. Below are excerpts from the discussion surrounding the main negative themes involving the site:

Lack of Clear, Defined Purpose and Target Audience

A number of participants stressed how they were unaware of the exact purpose of Florida MarketMaker as well as the site's intended target audience. The following quotes are examples of discussion surrounding this theme:

- One participant who found the way MarketMaker appears to the viewer to be a problem and deterring factor to the website's success said, "If somebody is going to this website . . . it appears as though you are trying to make it for everything, whether it be for a farmer or a retail outlet. And if that is the purpose, then you have succeeded. But, for individuals that are wanting to say, 'Okay, I want to get some black-eyed peas, where can I find black-eyed peas at?' . . . .this 'Farmers, Fisheries and Business' needs to be the prominent thing on the page. Because if they are wanting, you have got to make it dummy proof. It has got to be simple. If it requires even correct spelling, you are in trouble. You have got to make it simple. And you have got to make it standout, so that when they go to that page, that is the big thing that you are producing and setting up."
- Another participant added, "Isn't there a big dichotomy in the purpose. I mean, it just seems kind of strange."

Florida MarketMaker

Cluttered

Participants in each focus group unanimously stated that the website is too cluttered and is not easily navigable. The lack of white space and large amount of information on the homepage leaves views confused, not knowing where to go next. The following quotes are examples of discussion surrounding this theme:

- Discussing the layout and contents of the website, a participant said, "I think it's way too busy."
- Another participant stated, "It's a very busy page."
- Similarly, a participant shared, "It is all in the pan."
- A participant asked in a statement, "That is why you are having this meeting, I presume."
- Another participant chimed in and said, "It is too busy, even for the consumer."
- Discussing the consumer again, a participant said, "It's too busy, it's not obvious where a consumer would go to look."
- One participant said with a smirk, "I would have to put my glasses on, and I don't know if it is worth it."
- An extension agent said of the layout of the website, "It is overwhelming."

Confusing/ No Thorough Directions

Attributed to the clutter of the website, participants stated that the site was confusing and lacking in any clear directions as to what a farmer or producer should do or what steps should be taken. The following quotes are examples of discussion surrounding this theme:

- A participant discussed the ease or lack thereof of the navigation of the website and said, "First impression is a little confusing."
- Another participant presented a hypothetical scenario to the group and said, "If the goal is for someone to come on here because they want to find local shiitake mushrooms, I am lost."

Corporate Feel? Does Not Appeal to the Small Farmer

Participants stated how the website appeared corporate and left out the smaller farmer. The following quotes are examples of discussion surrounding this theme:

- A participant discussed the corporate feel of the website and stated, "I think it does look more for a bigger grower, maybe . . . not even somebody as small as we are."
- A participant who felt there was no place for specialty crops on the website said, "But, it doesn't show some of our specialties."
- One participant spoke of the feeling they got when they viewed the site. This participant said, "Warm and fuzzy doesn't come to mind."
- A participant added to the conversation and said, "It doesn't look like I belong in that . . . I belong in there."

Florida MarketMaker

No Awareness

The majority of the participants stated that there is little to no awareness about Florida MarketMaker and that other, similar sites, such as LocalHarvest, are more well known. The following quotes are examples of discussion surrounding this theme:

- A participant discussed the lack of awareness of the website and said, "The only reason we know about it is because we attend functions that are trying to promote it."
- One extension agent simply stated, "You have to market the MarketMaker."

Extension agents offered some advice on how Florida MarketMaker could potentially be marketed. The following quotes are examples of discussion surrounding this theme:

- One extension agent discussed the need for repetition in order to successfully brand an item or a service. This participant said, "You got an article featuring it and here again, repetition. I mean, you can't put it in one time and forget about it. But, if you have an article in every trade journal, if it is Cattlemen's Magazine or the Florida Vegetable Grower or whatever else. There ought to be something about MarketMaker in every publication in the Southeast or the country or wherever."
- Another extension agent offered practical advice on how to promote Florida MarketMaker. This participant said, "Maybe it needs to be in flyers or newspapers or something else. We need to find some other avenue to get out there to reach people. It is not something that is being done today."

No Consumer Focus

Participants were frustrated and confused about the lack of consumer focus on the Florida MarketMaker website. Participants saw a need for both a producer and consumer focus but did not see where the website targeted the consumer. Furthermore, many participants wondered how consumers could be targeted if Florida MarketMaker was left in its current state. The following quotes are examples of discussion surrounding this theme:

- A participant who pondered the purpose and effectiveness of the site asked, "My big question would be is that, I mean, for the small farmer, if you are really wanting to interact with the public, how is this getting visibility to the public to the retail level?"
- A participant spoke in layman's terms and asked, "How are they trying to get this into the public eye? And to our regional area . . . center of the state? How are they making this available to the actual consumer who is going to come to see me and buy my stuff?"
- Another participant echoed the thoughts of the other participants concerning consumer usage of the site. This participant said, "If the consumer went to this space, they wouldn't know what to do. There is too many things going on."
- One participant said this of consumers. "Consumers aren't going to be needing to look or wanting to necessarily look at all this stuff. They want to know what there is."
- A participant firmly stated, "There is no direction whatsoever for a consumer on this page."

- Another participant chimed in and stated, "It is complicated and it seems like, from a consumer perspective, it might be a bit of a hassle."
- A participant voiced their opinion and stated, "That seems too, like, very problematic."
- A participant with insight into marketing asked, "Like, how do you search for this farm? How do you . . . you know the average time a person spends on a page is really short, so you gotta grab them. And if you're a farm wanting to come to this site to register, you're gonna spend more time trying to figure out how to do that, than a customer probably looking for a farm."
- An extension agent expressed similar concerns about the missed opportunity to attract the consumer. This participant asked, "We are still trying to get to the other side of it, it is the consumer on the other end of it. That is what they are putting their ads and stuff in MarketMaker for, is to get to the end product. Where are we getting to that end?"

Too Fancy/ Academic

A majority of the participants agreed that, in agriculture, especially small-scale agriculture, there is a need to appear down to earth and local. With that being said, participants stressed how corporate the website appeared and how it needed to look less academic and sterile. The following quotes are examples of discussion surrounding this theme:

- Simply stated, one participant said, "It's too fancy."
- One participant discussed the layout of the website and said, "This is way too busy. And like I say, you know, I look up there, and I see this thing come up, and it has all this pretty fruit and stuff up there, and I just figure it's out of my league."
- A participant who was not pleased with how the website appeared discussed their opinion with the group. This participant said, "It looks like it was very academically done. It looks like somebody in the School of Business at UF did it."
- Another participant shared advice and said, "For the public, it needs to look homey."
- A participant shared their experience with the website and said, "See, and when I see all that grapefruit or all these tomatoes or all of these things, you're talking 'big farm' to me."
- A participant discussed academics and said, "But, but that's the university, that's what they do, see? And that's the problem."
- An extension agent reiterated the same opinions of the participants concerning the website and how it appears academic and government based. This participant said, "Looks very complicated. Looks associated a lot with the government which seems to turn a lot of small farmers away when they see it."
- Another extension agent offered insight into the logos on the bottom of the website. This participant said, "I think the big thing on it, that probably takes away from the consumer wanting to look at it, you got the whole bottom tier of it so busy trying to give credit to everybody and their identity, when you are not really reaching your audience. I mean, I can see . . . well, there is USDA, and here is Farm Credit and here is UF, and here is Fresh from

> Florida, and so are we promoting the products or are we promoting these agencies? I mean, that is what we are promoting. Yeah, there needs to be somewhere in this thing . . . some minuscule thing, but your Red Hills deal jumps out at you and you say, 'Well, hey, that is what I am interested in.'"

Suggestions

Just as participants shared their likes and dislikes of the Florida MarketMaker website, they also shared suggestions that would increase their usage of the site. Below are excerpts from the discussion surrounding the main suggestion themes:

Producer Page/ Consumer Page

In an almost unanimous decision, participants in every focus group stressed the importance of targeting producers and consumers individually on the website. It was stated that there is no need for one group to get caught up in impertinent information that is only desired by the other group. Hence, it was suggested multiple times that the site make it available for viewers to state their identity on the homepage and be taken to different pages as a result. The following quotes are examples of discussion surrounding this theme:

- A participant with ideas on how to change the layout of Florida MarketMaker to increase its effectiveness shared them with the group and said, "One of the things that you sometimes see is identification for users. Like if you visit a university website, it might say . . . 'Prospective Students,' 'Alumni,' 'Visitors.' That kind of thing. So, maybe creating filters for different user groups."

- A participant echoed the same ideas and said, "You have to take like what Burpee does with their online catalog. They ask you, 'Are you a professional grower or are you a homeowner?' And then you can click either way and that is essentially the separation between consumer and businesses."

- A participant with the same opinion said, "And what I think is so . . . throwing everything on one page, there should be maybe a page, if you are a supplier or a farmer . . . go to this page. If you are wholesaler . . . go to this page; if you are a consumer . . . go to this page."

- Similarly it was said by another participant, "So, right there, right on that top panel, you've got block number one is farmer, block number two is consumer."

- Furthermore, another participant said, "It seems like there ought to be a farmer page or a consumer page, and it would simplify it. I think if you look at what the Red Hills Small Farm Alliance has done, it's really simplified that, if you're a farmer, that's where you go. If you're a producer . . . if you're a buyer, this is where you go, and it's very simple."

- A participant shared why identifying the viewers of the website would be beneficial when they said, "Because those are two totally different populations. A farmer needs to log in to one site or view of the site, and a person who's buying needs to have a different view."

- Another participant shared the same opinion and said, "Yeah, maybe have two areas to . . . one for consumers and one for businesses, rather than trying to cram it all on one page."

- One participant explained the concept in detail. This participant said, "Do you think it might be more helpful if you took what we are looking at here, eight various sections of this page and literally came up with a front page

that doesn't have all this on it but actually leads you to a second page, or a third page, or a fourth page? You see something on here, you have to just list . . . like basically, 'What are you wanting to do?' 'Find a crop.' OK, click that. It takes you to a page, which has this on it, which blows it up and makes it simpler. That way, people that are looking for crop search is not going to be interested in going to the 'Buy and Sell Forum' where farmers would go to, to see about buying a tractor or a disc. It is going to unclutter it."

Develop and Include Purpose On Homepage

As previously mentioned, participants felt the site was lacking in a clear, defined purpose. As a result, it was suggested that a direct, succinct, and comprehendible purpose be made available on the Florida MarketMaker site, perhaps in an About Us page. The following quote is an excerpt from discussion surrounding this theme:

- A participant expressed the importance of making a purpose evident on the homepage of the Florida MarketMaker website for viewers to read and understand. This participant said, "I think there should be a homepage that very simplistically says what this site is for, what this site is about. There has to be."

- One extension agent stressed the same need to include a purpose. This participant said, "Yeah, there is nothing here that clearly says, 'Here is where to find local stuff or buy local farm products.' And even their little statement at the top, 'Connecting willing markets and quality sources of food from farm and fisheries to fork in Florida.' I mean that is a little overboard. You need something more direct."

Remove National Presence

Amidst discussion surrounding specific pros and cons of the actual site, a number of participants stated how it was bothersome that the site provided information for national farms when they were looking at a state site in order to find local farms. It was stated that there could be links to a national site but that local, state agriculture should be the main focus of the site and in the search engine. The following quotes are examples of discussion surrounding this theme:

- A participant frustrated with national information on the state site said, "This is the Florida MarketMaker, so I would prefer not to see national. I would prefer to see just for Florida."

- In regard to the state versus national information a participant asked, "Or is this national? Because if I click in there, now I'm looking at the whole world and I don't want to."

- A participant shared his opinion with the group and stated, "You know, if I'm coming into Florida MarketMaker, my first drill should be into what's in Florida, and then if I want to expand, I can expand."

- A participant reiterated the thoughts of previous participants and stated, "For the small producer, having a statewide directory is not helpful."

- An extension agent discussed the extensive amount of information available on the site and how it could be too much for some users. This participant suggested, "You make it two stages, where one is a simpler form and then if they want more details, they can go in and spread their market out."

Change Market Research

A great deal of participants stated how they were unsure of the purpose of the Market Research page for consumers as well as for producers who were already in operation. Although a participant noted that the statistical information could have

been helpful when deciding where to start a farm, they shared that the information was not what they were looking for at present. The following quotes are examples of discussion surrounding this theme:

- A participant unclear of the purpose of the page said, "I don't understand what 'Market Research' is, I don't know."
- Another participant asked a similar question when they said, "And it says, 'Market Research' as one of the three boxes . . . what is the purpose of this? Is it to register? Is it to research? What is the research? Is there research out there? So, it is kind of confusing."
- Another participant displayed their confusion with the Market Research page when they asked, "Who is the user for the 'Market Research'? Is it market researchers?"
- A participant offered advice as to how the page should be presented. This participant said, "Put 'Market Research' under the 'Farmers Profile' in their section because I mean, the public doesn't care I mean, what the market is. I mean, I mean, most farmers already went through that with their business plan."
- Another participant discussed retrieving information from the Market Research page when they said, "This would not be my primary source for going to get information."

Edit Layout

A great deal of layout changes were suggested by each the participants. Changes dealt with tabs, colors, pictures, graphics, etc. The following quotes are examples of discussion surrounding this theme:

- One participant was frustrated with the complexity of the website. This participant said, "Yeah, I want to just be able to look and point. I don't want to have to read through each of these to find out what they do."
- Another participant reiterated the same thoughts when they said, "And just aesthetically, it's hard to see what the priority is, I guess."
- A participant discussed feeling like she was paying her bills when using the Florida MarketMaker website. She said, "And the layout thing, again, this bar at the top of the page makes me feel like I'm paying my bills, just the same kind of format."
- Another participant compared the website to another similar site. She said, "Yeah, I came in here and seeing this, I feel like I'm somewhat jaded because I've seen what the Red Hills Alliance website looks like and how easy it is to work."

Make Language More Simple

In an effort to appear less corporate, it was suggested by a number of participants that phrases and words be changed in order to be able to be more easily understood by all viewers of the Florida MarketMaker site. The following quote is an excerpt from discussion surrounding this theme:

- "I'm basically . . . I came up through the corporate world, but I'm basically a farmer at heart, and I want people to talk my language."

Florida MarketMaker

Add Organic Label

A number of participants, primarily those in the business of growing and selling organic products, expressed the desire for more options for organic growers on the website. It was suggested by said participants that a USDA Organic Label be included in the area where other labels were found near the bottom of the website. The following quote is an excerpt from discussion surrounding this theme:

- A participant concerned with the lack of organic advertising and options on the website said, "I think I would add the 'USDA Organic' label in there, a line down here, too."

Include Map for Areas

Often using the website LocalHarvest as a comparison and an example, some participants suggested Florida MarketMaker include a map for easy location searching for available products as is available to consumers on the LocalHarvest site. This would allow consumers to click on a region, decreasing their search as it got more specific instead of just typing in a zip code as is currently available on the Florida MarketMaker site. The following quotes are examples of discussion surrounding this theme:

- A participant who supported adding a map to the Florida MarketMaker website, as has been done by other websites targeting the same audiences, stated, "They aren't gonna go to this site and go 'Farmer/Rancher' and do that. If you had a map and say, 'Click on the area or the county,' you know, how they have maps?"

- Another participant added, "It says nowhere on here to click on map to look at county, or click on map to drill down. So, this is like . . . I go here, and I don't want to look at the whole state."

- A participant shared how another website utilizes a map for locating local farms. This participant said, "And the way they [Florida Wines] have done that website is, you go to that and it has a map of Florida. Much like this, doing what [S2] is suggesting, it has all the farm wineries identified, and you click on any one of them if you are passing nearby and that website comes up."

- A participant who was very pleased with the system used on LocalHarvest said, "I mean, LocalHarvest is way more intuitive because you just have a map and you like . . . I'm looking for stuff in this area, and you keep clicking down until you get to your really local, local area."

The System Should Apply Original Specifics to the Entire Site

Some participants were frustrated that they had to select certain options in each new listing instead of having each of the following listings maintain specifics already made in earlier listings. The following quotes are examples of discussion surrounding this theme:

- One participant offered ideas about the Florida MarketMaker system in response to another participant who said the tool should remember previous changes made to producer profiles and said, "On her note, what she is saying is that we are signed in, so that should recognize us . . . so, if I punch in on one group that I am organic, that should feed my information throughout the whole system that whatever I am doing is organic. But, what she is saying is that on each individual page that we have to fill out, we have to refill out all the same information before we get to . . . "

Florida MarketMaker

- A participant provided a specific example of a problem with the site as it pertained to their farm and said, "OK, but you can't assume, for example, that everything is organic because like I say, as an example our honey is not, so I would have to unclick it . . . it is okay if they give me a default if I can unclick it."

Provide Information as to What Steps to Take After Registering on Florida MarketMaker

Participants, who had registered for Florida MarketMaker, prior to the focus groups, stated how the site provided little assistance once someone was registered. It was suggested that instructions for next steps and things to look forward to be provided for the individual who chooses to register. The following quote is an excerpt from discussion surrounding this theme:

- One participant spoke about the need for follow up on the site once someone has registered. Various participants agreed when she said, "It might be interesting to have a completion page that has next steps for someone who has gone through the registration . . . aside from just saying, 'Congratulations and welcome' and all that . . . but that gives explicit next steps for maybe uploading more photos if they haven't done that, or submitting events, if there is a place for that, which I don't think there is. I know LocalHarvest has that. Whatever it is . . . maybe even a link that goes to Facebook that says, 'Tell your Facebook people that you just registered for this.' 'Tweet about this.' Because you know how sometimes if you buy something on Amazon, it will say, 'I just bought this fabulous book, and I want to tell all my friends.' So, that kind of thing could be easily incorporated."

Overarching Themes

Several themes became apparent throughout the course of the focus groups. The overarching themes included the need to focus on local agriculture and the need for simplicity in communication and marketing.

Local and Fresh Angle

Throughout each of the focus groups participants discussed the value of local agriculture. A number of participants felt as though a current opportunity exists to promote local agriculture, as the demand for it seems to be increasing. The following quotes are examples of discussion surrounding this theme:

- One participant spoke on where he felt the local movement was going and said, "It feels like it's becoming more of a mainstream idea to buy local food in general."

- Another participant responded and said,"Well, and I guess that's why I was asking about a particular community because I get the impression that there's an increasing number of people who value locally."

- A participant talked about how local food is a unique demand. This participant said, "A lot of them, they are like . . . here you are delivering them fresh product every day or something like that, and they can't get it anywhere else. They can't get anything like that. So, you have a unique product, and you are in a unique position to be doing that, too."

Neec for Simplicity in Communication

In a society where people are constantly inundated with information from multiple sources, participants oftentimes discussed the value of clear, succinct information delivered in an understandable manner for all audiences. The following quote is an excerpt from discussion surrounding this theme:

- One participant said, "And it seems to me that a lot of stuff going on, on this page and if you just had a page where, you know . . . before this, that was much simpler where you could register or find a farmer and then go to,

you know, be directed to the areas that you need to go to, specifically. I don't think a consumer would take the time to figure this out because most consumers aren't that sophisticated. I'm sorry, but they want it quickly."

Findings

After conducting six focus groups, five of which targeted small farmers in Florida, it was evident that a lack of overall awareness of Florida MarketMaker existed within the population. Ultimately there was a lack of awareness of Florida MarketMaker in each target group. It appears that a major challenge facing Florida MarketMaker is its lack of a defined purpose and target audience, as well as too broad of a reach. In an attempt to cover all bases, it did not resonate with any particular audience. Instead of "reinventing the wheel," participants suggested that Florida MarketMaker find a niche, define its target audience, and stand out as something unique and different.

Furthermore, a great amount of discussion focused on the aesthetics of the website and its lack of personal touch. As previously stated, the belief that the site was for large corporations and not for the small, local farmer was common and reiterated. A bottom-up approach to marketing instead of top-down approach was suggested to relate more to farmers and ranchers. This was suggested in an effort to avoid appearing academic and corporate.

- One participant stated his opinion of the major problem facing the Florida MarketMaker website. He said, "The problem with this is that it is top-down. We are bottoms-up people. And that is how we view the world."

Lastly, as touched on above, a major issue facing Florida MarketMaker is its lack of a clearly defined purpose. As far as the public represented in the focus groups is concerned, a clear purpose was not apparent to the participants and instead, the site seems an attempt to do something that has already seen success elsewhere in websites such as LocalHarvest or EatWild. The results of these focus groups provide a detailed look into the usage and lack of usage of Florida MarketMaker concerning the sale and distribution of local food. The summary below compiles the results.

Participants Current Marketing Strategies

- Participants promote their products a great deal via word-of-mouth by other farmers and past customers who share with people in their friend and business circles.
- Participants believe that by creating a personal relationship/connection with customers, a long-standing, loyal relationship will be created, unusual to some other business relationships.
- Participants agree that it is important to create a friendly environment that leaves customers feeling as though they are on the farm and purchasing from a local farmer. The buying environment is crucial to local business.
- Participants find value in maintaining frequent communication, via hand-sent mail or email, with customers to foster repeat business as well as maintain a local feel-type relationship.
- Participants already use or are considering using a website to better market their products.
- Participants agreed there is an opportunity to take advantage of agritourism in Florida.
- Participants agreed that it is beneficial to provide samples of products during farm tours or U-picks to provide consumers with a reason to pay premium prices for high-quality products.

Florida MarketMaker

- Participants found that utilizing outside marketing techniques through involvement in CSAs and other co-ops, as well as through farmer's markets and involvement on websites such as LocalHarvest help to establish a small farmer in the industry as well as prove beneficial in helping farmers market their products and find buyers for their products.
- Participants agreed that farmer's markets are good ways to disseminate information to consumers as well as a good way to create a customer base for future mailings and list serves. Additionally, farmer's markets provide producers with the ability to offer samples of their products, increasing the likelihood of consumer purchasing.
- Participants agreed that it is important for a farm to find a unique marketing angle to attract customers, whether it be through offering organic products, products available all year or simply rare products that are in demand in specialty restaurants.
- Participants agreed that social media is increasingly becoming more and more popular, especially Facebook, and that it is beneficial for a farmer to maintain an online presence as well as be willing to change with the times.

Problems Faced When Marketing Local Food

- Participants find laws halting specific agricultural practices and strict regulations about processing procedures to be a main cause inhibiting the sale of local food.
- Participants dislike produce vendors selling at farmer's markets, often unbeknownst to consumers, occasionally at lower process than actual farmers.
- Participants feel there is a major problem with false labeling, particularly involving the labeling of organic products, and as a result, true organic and natural growers get beat out as a result of these false claims.
- Logistics come into play when marketing local products as some farms are not adjacent to highly populated areas and sales oftentimes suffer as a result. This also affects farmer's abilities to travel to some farmer's markets at a low cost.
- Customers' unwillingness to pay premium prices for local food causes farmers to lose money or have products left over at the end of the season.
- Large, corporate stores have a negative affect on local farmers as some falsely advertise local food for a lower price than farmers have the luxury of setting.

Florida MarketMaker Overall Problems

- Participants were generally not aware of the existence of Florida MarketMaker.
- Of those aware of Florida MarketMaker, many had no continued use of the service due to confusion or lack of impact on the business and sales.
- Participants found the purpose of Florida MarketMaker to be unclear and the target audience to be unknown.
- Participants did not think Florida MarketMaker is suited for the small farmer but instead is set up to attract corporate farmers and big businesses.

Florida MarketMaker

- Participants did not see where Florida MarketMaker targets the consumer or how that could be done.
- Participants strongly agreed that Florida MarketMaker is attempting to reinvent the wheel of websites, such as LocalHarvest and EatWild, that already successfully achieve the purpose of the website.
- Participants have continued to experience little to no business growth as a result of being registered on Florida MarketMaker.
- Participants felt that Florida MarketMaker was academic and more suited for a corporate farmer.

Florida MarketMaker Design Problems

- Participants agreed unanimously that the website is cluttered with too much information in one place.
- Participants found the website to be difficult to understand, especially from a consumer's standpoint.
- Participants agreed that the website should be divided into a producer side and a consumer side to queue viewers in the right direction.
- Participants thought the colors on the Florida MarketMaker website are not representative of local agriculture.
- Participants found the language used on the website to be too technical and not easy to follow.
- Participants agreed there is no need to include national information on the state website.
- Participants found little need for the market research section of the website to be as prominent as it is at present.
- Participants agreed that the website gives an overall feeling of corporate, big business instead of local, small-town agriculture.

Overarching Findings

- Avoid appearing corporate in all instances in agriculture.
- Participants agreed that personal relationships are what drive sales in agriculture.
- Participants agree value lies in being unique and providing unique products or common products in a unique manner to be beneficial in sustaining a business. Finding a niche is a major marketing tool.
- Participants stressed the importance of revamping the Florida MarketMaker website to appear more local and appeal to both the small producers and consumers.
- Small farmers are not marketing their products the way Florida MarketMaker is set up to assist them with sales and marketing.

Recommendations

After researching and analyzing results, the PIE Center has gathered a great deal of information concerning Florida MarketMaker on a broad basis as well as specifics about each section of the website. Below are specific recommendations

on how to increase the effectiveness of the site. The recommendations are grouped into two categories: Overall Recommendations and Layout Recommendations. By describing each suggestion in detail, it is anticipated that Florida MarketMaker will undergo some or all of the changes to experience a more effective, efficient website for consumers.

General Recommendations

- Further research should be conducted to determine which of the most common marketing techniques are the most effective in bringing in the most sales of local food.
- A marketing campaign should be developed to promote Florida MarketMaker among the public with emphasis on the fact that changes were made to the website.

Overall Recommendations for Florida MarketMaker

Overall recommendations for Florida MarketMaker consist of those dealing with the entire marketing concept as a whole, as well as the steps suggested to increase the effectiveness of the site.

- A clear, defined purpose for Florida MarketMaker should be established. Instead of trying to "wear too many hats," focus on one particular part of the industry or one service should be established.
- A specific target audience should be established and determined, or the website should be altered to be conducive to both producers and consumers of large and small operations.
- To avoid reinventing the wheel, Florida MarketMaker should offer something in demand by producers and consumers that is not already being offered by other websites.
- Creators, designers and operators of Florida MarketMaker should listen to the voices of participants who stated that they should look at successful websites such as LocalHarvest and EatWild for ideas and improvements.

Recommendations for Florida MarketMaker Design

Layout recommendations for Florida MarketMaker consist of those specifically associated with the visual presentation of the site itself such as font, wording and design. By adopting these layout changes, it is anticipated that the viewing experience of the Florida MarketMaker website will be more pleasurable for the consumer.

- First and foremost create a producer and consumer section of the Florida MarketMaker Website that segues each viewer to where they want to go in a simple and efficient manner. This would essentially divide the website into two parts, one for the producer and one for the consumer, as the information pertinent to each group differs along with the understanding of terms and the industry as a whole.
- Make clear the purpose of Florida MarketMaker on the website so viewers will be able to easily grasp what the site was created to do and how it functions as well as define the target audience. This could all be made available in an About Us page.
- Redesign the site to create a more presentable appearance and first opinion. Get rid of excess information creating clutter and make directions for getting registered clear, concise and easy to follow. Participants agreed unanimously that the website was cluttered and that too much information at once made them avoid the site altogether.

Florida MarketMaker

- Remove the Market Research page altogether or, if not, do not make it a prominent part of the website as participants did not see a value in the information provided by it in the form of statistics. Many participants thought the information could have been helpful prior to becoming a farmer, perhaps in the beginning stages of developing a farm. However, the market research information seems to have little to no value for the consumer.
- Remove the national side of the site as participants said they found no relevance for the information about national agriculture. Participants stated that when they go on a state site for the purpose of local agriculture, they only want to find local agriculture.
- The colors and pictures used currently are not representative of small farmers or agriculture in general. Consider using more earth tones and pictures that do not look so academic. Participants suggested using pictures and graphics that actually represent the state.
- In an effort to appear more local and small "farmer-esque," participants suggested the wording be changed to create clear and direct sentences. For example, participants suggested rewording “Find a Business” and “Register Your Business” to “Find a Farm” and “Register Your Farm.”
- Include a regularly updated calendar or upcoming events page that not only showcases large agricultural events such as annual meetings and tradeshows but also disperses information about individual farm sales, farm tours and farmer’s markets.
- Include a map for simple searching as LocalHarvest does at present.
- Include a search bar for information throughout the Florida MarketMaker site. This would contribute to easier navigation throughout the site.

Appendix A: Florida MarketMaker PowerPoint Presentation

Florida MarketMaker

- Florida MarketMaker is an online marketing tool for farmers, fisheries and businesses within the state of Florida. Florida MarketMaker allows producers throughout the state to register their business on the site for potential customers to find and purchase food and fiber products within their area.

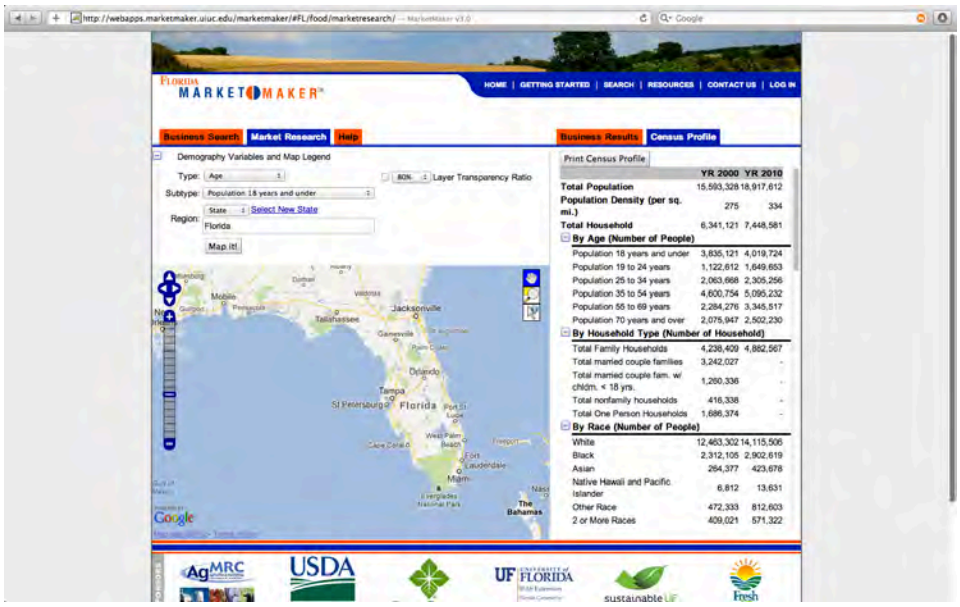
MarketMaker

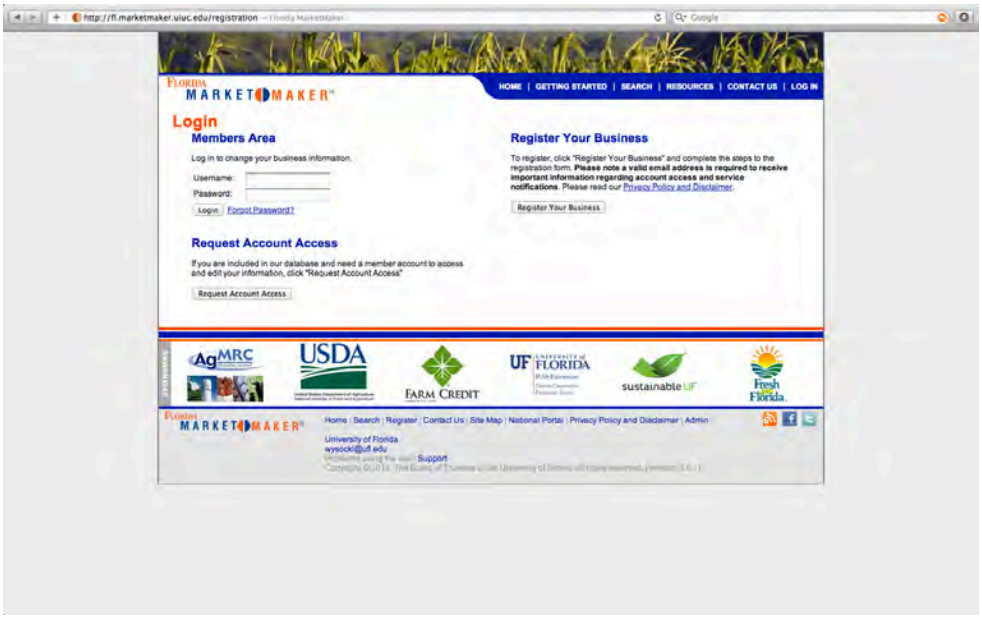
- MarketMaker is a national partnership of land grant institutions and State Departments of Agriculture dedicated to the development of a comprehensive interactive database of food industry marketing and business data.

Florida MarketMaker

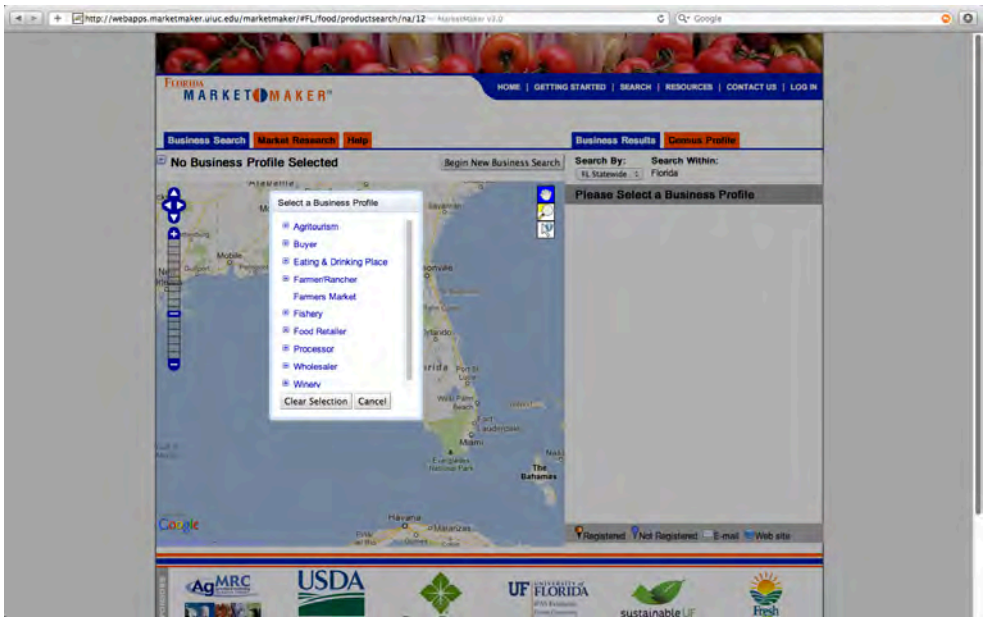
- Florida MarketMaker is an online marketing tool for farmers, fisheries and businesses within the state of Florida. Florida MarketMaker allows producers throughout the state to register their business on the site for potential customers to find and purchase food and fiber products within their area.

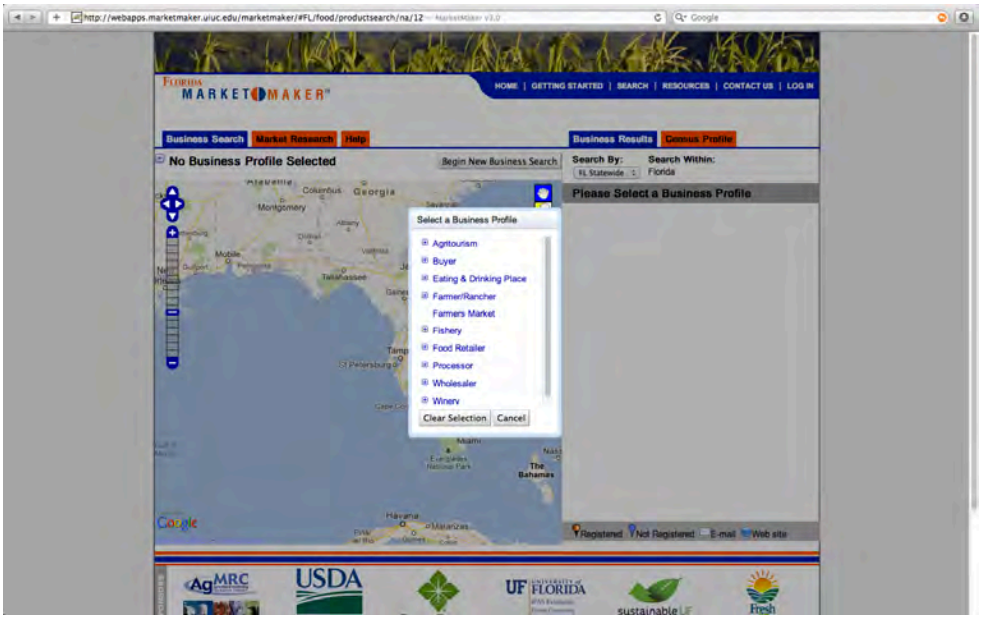
Florida MarketMaker





Florida MarketMaker





Appendix to Project (15): Miami-Dade County, Florida - Redland Raised – “Fresh from Florida Project”

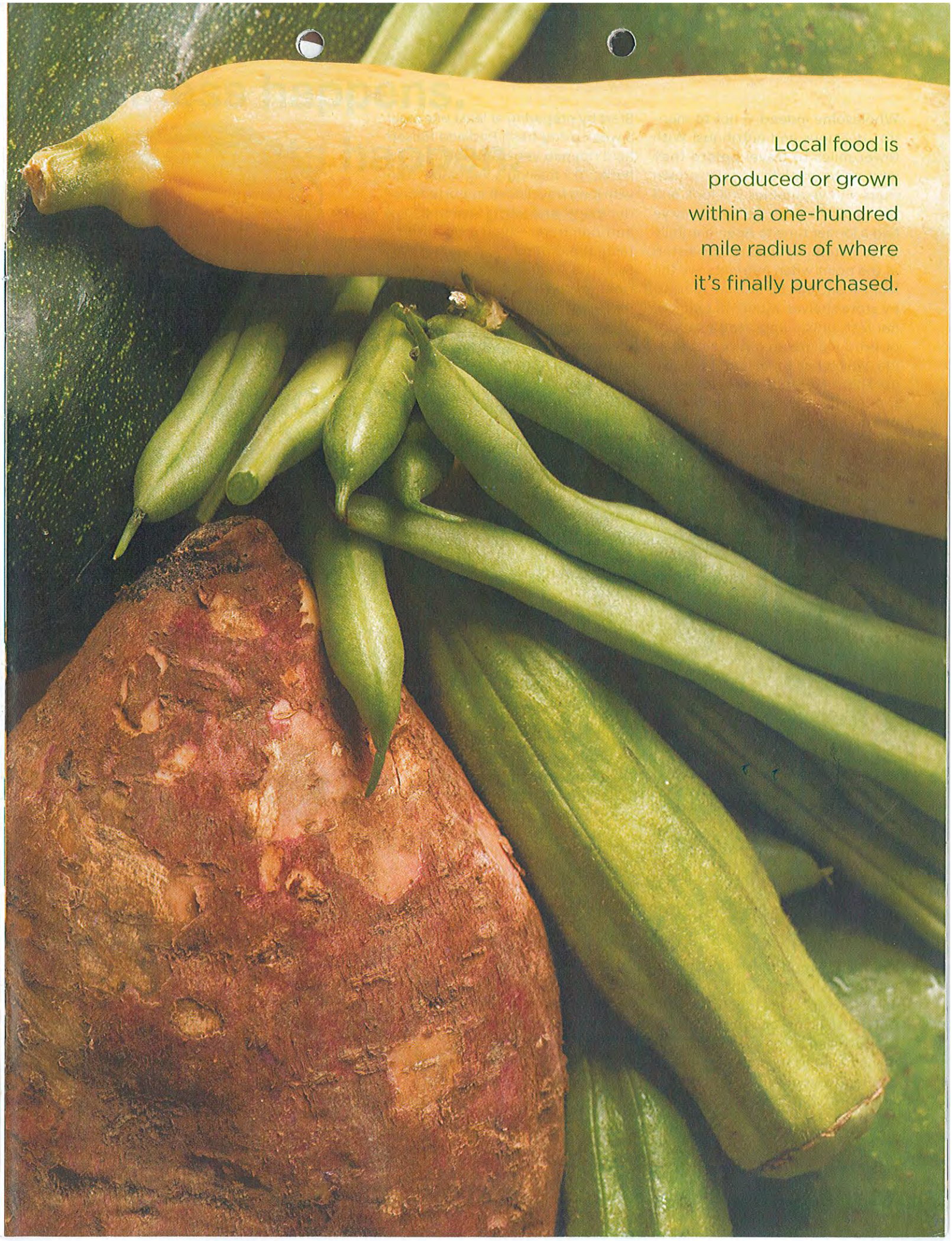
GOING LOCAL

Finding local produce is easier and more convenient than ever — just look for the Redland Raised brand at your neighborhood supermarket.

It's a given that eating fresh fruits and vegetables is important to maintaining a healthy lifestyle. Pick up any health or cuisine magazine, read any food blog or tune in to any cooking show and you're sure to hear a lot of terms being tossed around to describe ways to make healthy eating choices. There's vegetarian, dairy free, low sodium, organic, cage free, no trans fat, grass fed, hormone free and a dizzying array of others. While having choices is a good thing, it can sometimes also be overwhelming. You may find yourself in the supermarket aisles not knowing which might be the better option for you and your family.

However, one easy-to-remember term to keep in mind when purchasing food — specifically fresh fruits and vegetables — is the term "locally grown" or local food. Local food is produced or grown within a one-hundred mile radius of where it's finally purchased. We're fortunate to live in Miami-Dade County where going local is even closer than that hundred-mile benchmark. As one of the many advantages of living here, we're blessed with a rich agricultural area a mere twenty miles southwest of metropolitan Miami known as the Redland. This is where a variety of fresh produce is grown including zucchini, squash, mango, boniato, avocados, strawberries and green beans. And now, finding this local produce is easier and more convenient than ever — just look for the Redland Raised brand at your neighborhood supermarket.

Unveiled in 2009, the Redland Raised campaign was created by Miami-Dade County, in conjunction with the Florida Department of Agriculture and the Department of Consumer Services to promote our local produce and keep our agricultural industry thriving. As the County's Agricultural Manager Charles LaPradd points out, "For the local agricultural industry, the Redland Raised brand provides recognition that we actually grow product and that we have product to sell. A lot of people don't realize how extensive our farming is. We're second in the state and 18th in the country in terms of dollar value. Our agricultural industry, which actually employs over 20,000 people, generates an estimated $2.7 billion in our local economy. And this Redland Raised brand lets consumers know they're buying local. That it's straight from the field, it's fresh and it's wholesome."



Local food is produced or grown within a one-hundred mile radius of where it's finally purchased.

Wholesome indeed — not to mention delicious and nutritious! With fewer miles to travel before they land on your plate, locally grown fruits and vegetables will look and taste better, mainly because they've had a longer time to ripen naturally on the stem. Crops are harvested at the point when nutrients are the highest and can be trucked to nearby store shelves within 48 hours of harvest, unlike imported produce or produce grown outside of Florida, which has to instead be flown in. The difference boils down to produce that is picked within days of purchase versus produce that's picked early and then sits weeks in cold storage and transit losing its nutritional value as well as flavor along the way.

"...going local not only means healthier, better tasting fruits and vegetables, it's also better for our environment, which in the long run is healthier for us."

Nutrition is important, but nutrition without taste just doesn't cut it. Local restaurant chefs tout the superiority of seasonal and locally grown produce and some even build their menus around the local theme. So challenge yourself to become a "locavore." Eat local and seasonal. Start by preparing at least one meal a week using fresh Redland Raised field ripened vegetables, fruits and herbs. Try making a vegetable dish with long traveling or imported produce and one with local produce and compare — you'll be sure to taste the difference. If you've ever tasted a Redland heirloom vine-ripened tomato and delighted in its sweet tangy flavor, you know that flavor can only compare to a tomato you would grow yourself. When your family asks for more, make a point of letting them know it's grown right here, in Miami-Dade County. Help them foster a connection to the land through the food we eat. Take a day trip drive to the Redland and see if they can spot where your next vegetable dish may be growing. The local growing season for traditional produce runs from November through April, but you can purchase tropical produce through the summer months.

But going local not only means healthier, better tasting fruits and vegetables, it's also better for our environment, which in the long run is healthier for us. Essentially, keeping it local decreases emissions, saves fuel costs and reduces our carbon footprint. It also helps support our local farmers in the Redland, an area long affected by ever-expanding urban development.

As you can see, there are excellent reasons to seek out local produce. Local means fresher, healthier, better tasting food, it means supporting our local economy and an overall healthier environment. It's also great knowing exactly where your food comes from and feeling confident that you're eating wholesome, nutritious and delicious food. So be sure to ask for Redland Raised produce at your neighborhood supermarket and farmers' market.

Here's to a healthier you!

Appendix to Project (20): Florida Certified Organic Growers and Consumers, Inc. - Organic Systems Management Education Initiative for Florida Specialty Crop Producers

Turkey Hill Farm Workshop Preliminary Results Pre and Post Test 20-Jun-11

	Pre workshop % Right Answers	***Post workshop % Right Answers***	***% Change***
Question 1	48%	55%	***7% Positive***
Question 2	16%	77%	***61% Positive***
Question 3	53%	69%	***16% Positive***
Question 4	60%	68%	***8% Positive***
Question 5	62%	66%	***4% Positive***

19.2% Positive average change

Results from Follow Up Survey
SCBG Contract # 016862
June 2013

Background and Methods

FOG carried out a follow up survey targeting all participants from the 8 on-farm workshops conducted from June 2011 to June 2013. The objective was to measure the long term impact of these training events. The survey included only 6 questions that asked participants to indicate whether or not they had seen any benefit from the on-farm workshop, and how this had translated into their farming practices.

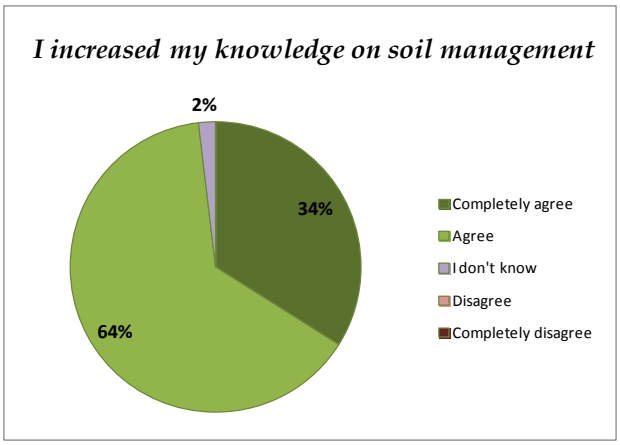
The survey was sent by email to all registered participants. Due that many participants attended the workshop with at least one more person, the number of email addresses collected were 250+. Workshop participants were asked to answer the survey either online, or by paper, and later scan, email or mail. A $300.00 gift certificate was raffled among respondents. The winner was selected by using a random number generator calculator. Attached is the survey questionnaire used.

Results

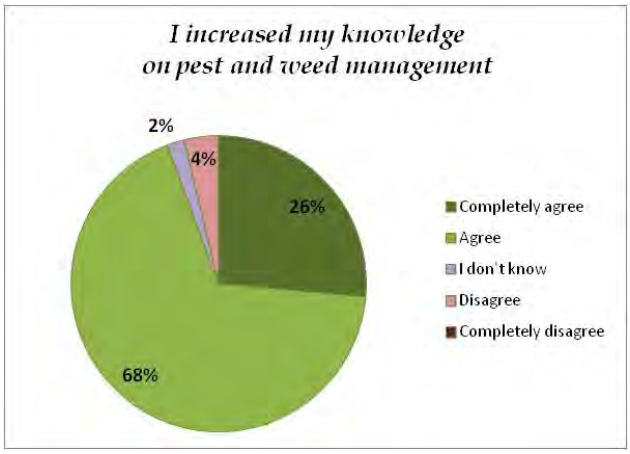
Fifty seven responses were collected in total; from which 42 responses were current farmers. The remainder responders belonged to prospective farmers or other agricultural professionals.

As seen in the survey questions, participants were asked to choose their response to the question based on their participation in the workshop. Specifically, the first section of each question included: ***"As a result of my participation on the on-farm workshop,...."*** The second section of each questions was different. Following is a brief discussion of the results, along with graphs. For the first five questions, the number of responses was 57, while for question No. 6 the number of responses was 42, as non farmers were excluded.

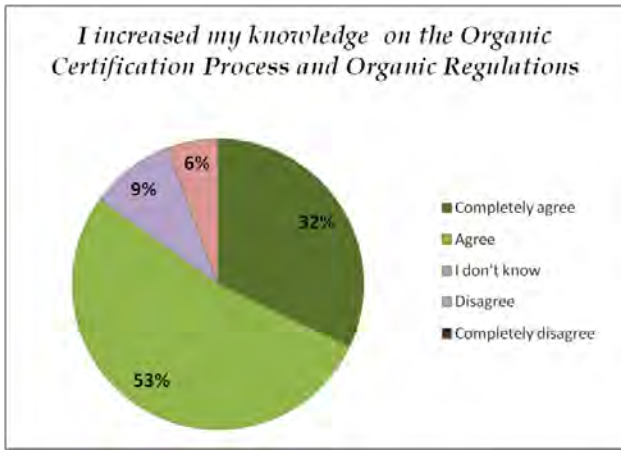
1. **Soil Management.** An overwhelming 98% agreed that as a result of the on-farm workshop they had increased their knowledge on soil management. Only 2% responded "I don't know."



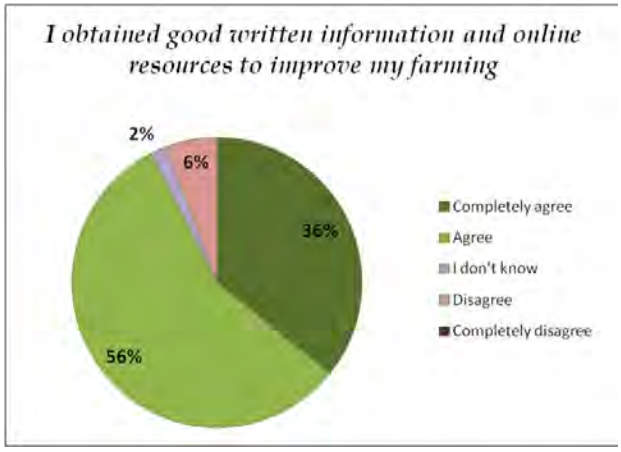
2. **Pest and Weed Management.** A combined 94% of respondents agreed that they had increased their knowledge on pest and weed management as a result of on the on-farm workshop. A 2% did not know and 4% disagreed.



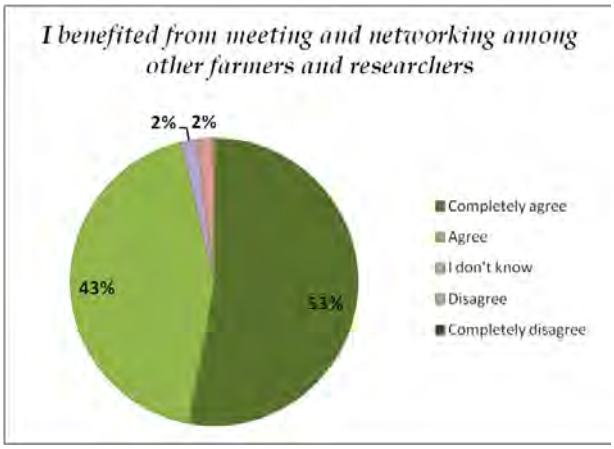
3. **Organic Certification Process and Organic Regulations**. A high 85% of respondents agreed that they had increased their knowledge on organic certification and regulations. A 9% indicated they did not know, and a 6% disagreed with the statement.



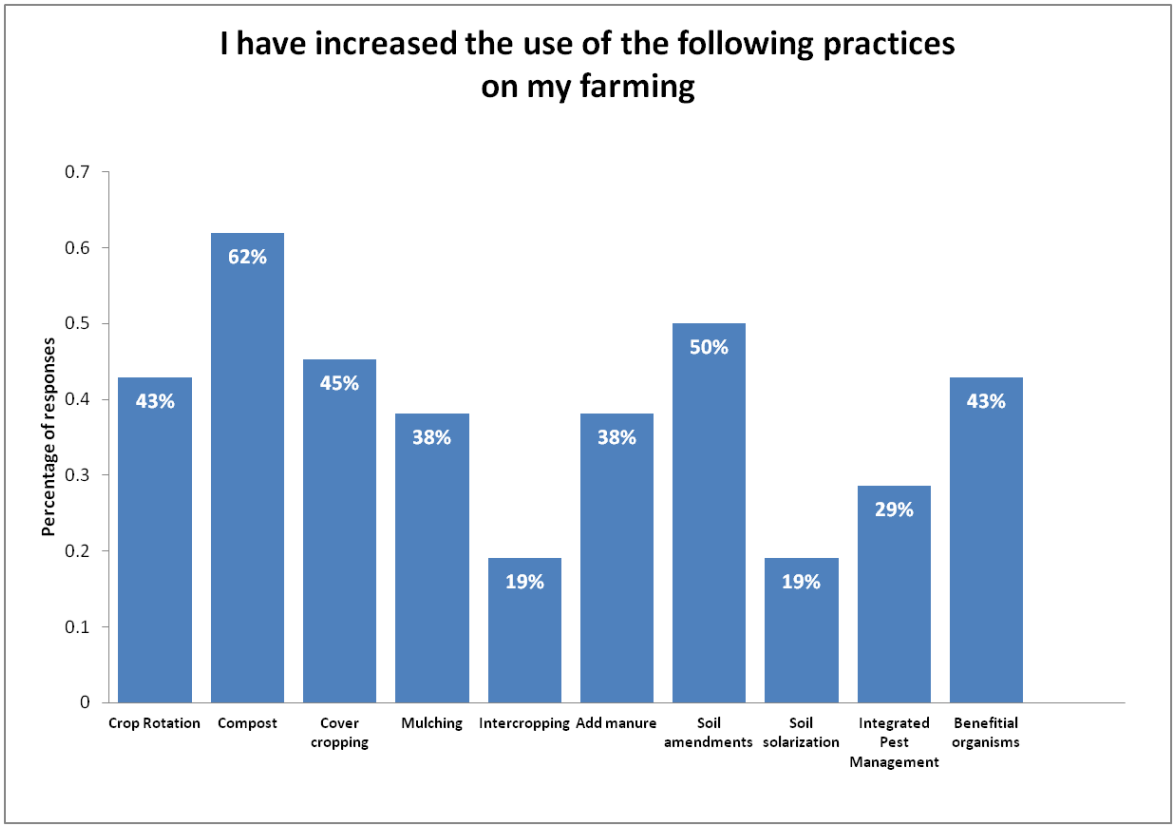
4. **Information and online resources.** A 92% of respondents agreed that the written information and online resources they had obtained at the on-farm workshops were good and will be useful to improve their farming. The remaining 8% either did not know or disagreed.



5. **Networking.** Ninety six percent of participants indicated that they had benefited from meeting and networking other farmers and researchers, as a result of the on-farm workshops. Only the remaining 4% disagreed or did not know.



6. **Farming Practices.** For this question, 15 responses were excluded as they were not current farmers. Therefore the results for this questions are based on 42 responses. Farmers were asked if as a result of their participation of the on-farm workshop, they had increased the use of any farming practice. They were given 10 different agricultural practices that were discussed at various degrees during the workshops. The results are encouraging. Sixty two percent of farmers indicated they had increased their use of compost as a result of the workshops. Between 38% and 50% of farmers indicated that they had increased their use of soil amendments, cover cropping, crop rotation, beneficial organisms, mulching and manure. A 29% indicated an increase in use of integrated pest management; while 19% of farmers indicated increases in use of intercropping and soil solarization practices.



Discussion

The great majority, a 93% average, of survey respondents agreed that as a result of the on-farm workshops they had acquired knowledge on soil management, pest management, organic certification and obtained benefits such as useful information, and networking. It is important to point out that on-farm workshops were not the same on each location, and not all of the topics were discussed in detail in each of them. For example, workshop No. 3 which took place on Oct 31 2011 at Worden Farm; touched on organic certification and soil management; but focused mostly on sustainable weed and pest management practices.

The high percentages of farmers that claim to have increased their use of sustainable agricultural practices as a result of the on-farm workshops is very encouraging. Again, not all on-farm workshops touched on all agricultural practices. For example workshop No. 5 which took place on Nov 5 2012 at Osceola Organic Farm was the only on-farm workshop that discussed soil solarization in detail; as they have practiced this technique for over a decade.

In summary, the survey results show that farmers believe that the on-farm workshops were useful, increased their knowledge on diverse topics, provided opportunities for networking and directly encouraged them to increase their use of sustainable agricultural practices.

Florida Certified Organic Growers & Consumers, Inc.
P.O. Box 12311 Gainesville, FL 32604
352-377-6355 phone, 352-377-8363 fax
jose@foginfo.org

Florida Organic Growers Survey

You have been contacted because our records show that you participated on a on-farm workshop organized by Florida Organic Growers (FOG) sometime from June 2011 to June 2013. FOG would appreciate your feedback by completing the following quick survey. We would like to improve our service to you and would appreciate your sincere input. It will only take a few minutes!

As an incentive for your participation FOG will **raffle a $300.00 Gift Certificate** for *Southern Exposure Seed Exchange* so that the winner can buy seeds, books or farm supplies. You can fill out the survey online at **this link**, or complete this form and send it our way.

Instructions: Use the following highlighted text to answer the following questions. Choose your answer by underlining or circling it.

As a result of my participation on the on-farm workshop,....

- **I increased my knowledge on soil management**

  Completely Disagree….....Disagree.....I don't know.....Agree.....Completely agree

- **I increased my knowledge on pest and weed management**

  Completely Disagree….....Disagree.....I don't know.....Agree.....Completely agree

- **I increased my knowledge on the organic certification process and the organic regulations**

  Completely Disagree….....Disagree.....I don't know.....Agree.....Completely agree

- **I obtained good written information and online resources to improve my farming**

  Completely Disagree….....Disagree.....I don't know.....Agree.....Completely agree

- **I benefited from meeting and networking among other farmers and researchers**

  Completely Disagree….....Disagree.....I don't know.....Agree.....Completely agree

- **I have increased the use of the following practices on my farming**:

Crop Rotation Cover Crops Compost Mulching Soil amendments Use beneficial organisms Integrated Pest Management Soil Solarization Intercropping Add manure **I'm not a farmer**

FOR GROWERS

FLORIDA FARMFINDER™

MAP

RESOURCES

FARMER FORUM

POLICY WORK

FOR GROWERS

Welcome to FOG's Growers' Resource Page!

Through support from a Specialty Crop Block Grant, FOG is pleased to provide a number of resources that we hope will provide practical tools and information that will help growers like you to be successful. The Growers Resource page was created to be a place of interaction among growers, researchers, extensionists, and other important stakeholders to advance organic and sustainable agriculture in Florida.

In this site, you will find organic input suppliers, organic consultants and relevant articles. You can post your announcements for farm land, produce and jobs. You can also read and learn from organic farmers and researchers and find out about upcoming events and much, much more!

We encourage you to use this site and hope you find it useful. We look forward to your input as we continue to improve it. The site is built to grow and offer up to date and practical information with you in mind!

~FOR GROWERS~

A RESOURCE FOR ORGANIC GROWERS

~FOR CONSUMERS~

A RESOURCE FOR ORGANIC CONSUMERS

RESOURCES

FOG is pleased to provide this reference library with hundreds of interesting articles, research reports, FOG publications and more.

If you are looking for specific information on organic and sustainable agriculture this is a good place to start. References include production, marketing, consumer information and more. Find the topic you are looking for by choosing among the different options you will find below. All references (except for FOG publications) will provide you with a brief description, the source and author of the reference, and the link that will take you to the full document.

Search Articles: Search

+ ORGANIC PRODUCTION
+ GRANTS & LOANS
+ FOOD POLICY
+ HEALTH & PESTICIDES
+ SOIL FERTILITY
+ MARKETING
+ BUSINESS
+ HOME & SCHOOL GARDENING
+ GMO'S
− IPM

- **Title:** Integrated Management of Bacterial Spot on Tomato in Florida
  Author: Tim Momol, Jeff Jones, Steve Olson, et al.
  Organization: EDIS, Electronic Data Information Source, IFAS, Institute of Food and Agricultural Science
  Submission Type: Article
  Publication Date: 11/2008
  Description: "Crop rotation should be used in an attempt to avoid carryover on volunteers and crop residue

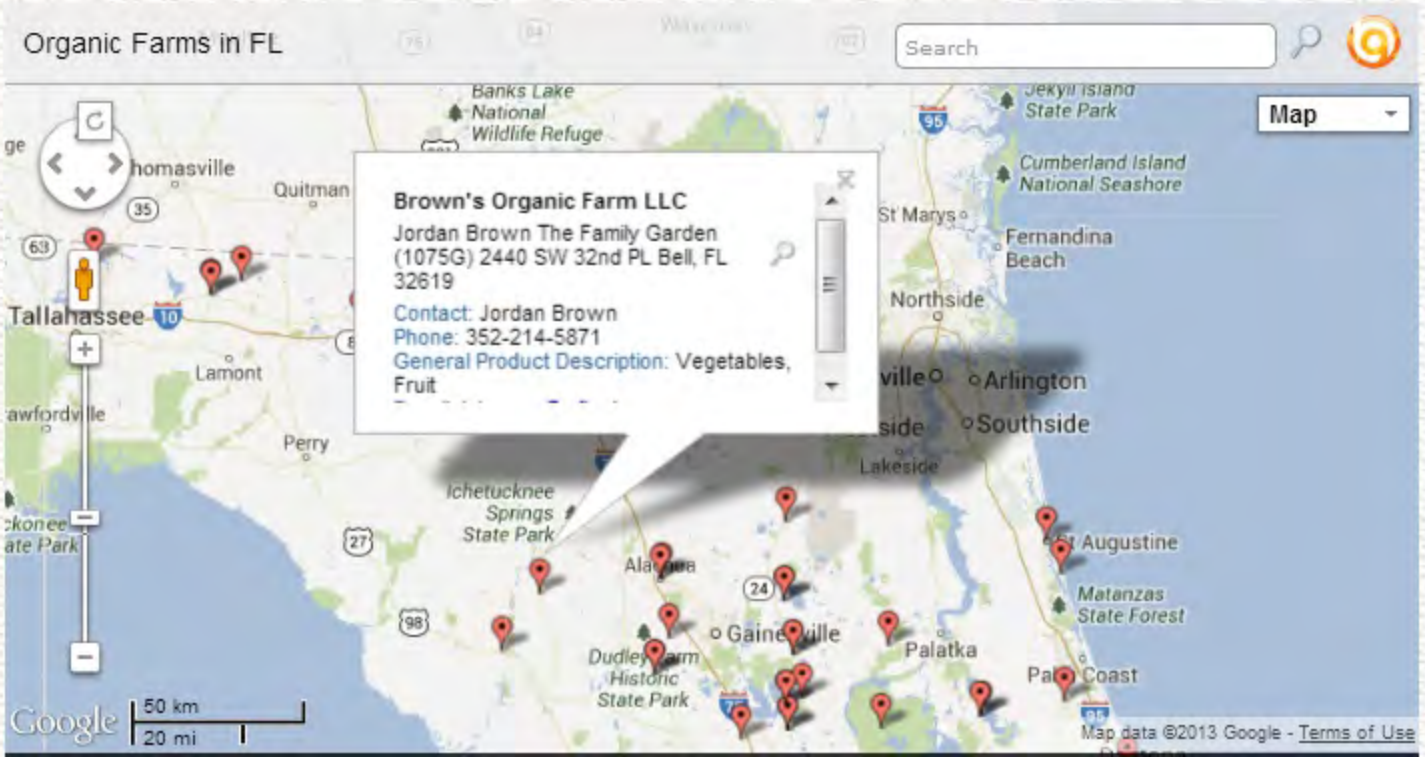
MAP

Find it!

FOG is pleased to provide this interactive map that will allow you to find organic farms and processing facilities, CSAs (Farms offering Community Supported Agriculture shares), farmers markets, organic input suppliers and organic consultants.

Just click or unclick the layer you are looking for and zoom in to your area to find resources. Click on the icons in your area and you will see contact and background information. This information is continually being updated.

If you would like to add your farm or business to the map, please email education@foginfo.org.



FOR GROWERS

FLORIDA FARMFINDER™

MAP

RESOURCES

FARMER FORUM

POLICY WORK

FLORIDA FARMFINDER™

Through a partnership with Conservation Trust for Florida, FOG is pleased to provide Florida FarmFinder™, a tool that allows you to post and/or search your farmland and jobs throughout the state of Florida. You will have to create an account in order to post your announcement.

Visit the Florida FarmFinder™.

~FOR GROWERS~

A RESOURCE FOR ORGANIC GROWERS

~FOR CONSUMERS~

A RESOURCE FOR ORGANIC CONSUMERS

P.O. Box 12311, Gainesville, FL 32604 • p: 352.377.6345 • e: education@foginfo.org

Design and Development by Frankel Media Group

FLORIDA FARMFINDER™

Florida FarmFinder™ is a program of **Florida Organic Growers** (FOG). This program was originally created by the **Conservation Trust for Florida** (CTF) in coordination with the University of Florida Institute of Food and Agricultural Sciences and the Department of Agronomy through grant support provided by the USDA Beginning Farmer and Rancher Development program.

FLORIDA ORGANIC GROWERS

CONSERVATION TRUST for FLORIDA

Why *Florida FarmFinder™?*

Florida has a rich agricultural tradition, but this tradition could be in danger—the majority of farmers are now over 55 years old. Within the next two decades, close to one-half of Florida's agricultural lands will change hands. The FarmFinder was created to match farmers and farmland owners with beginning farmers seeking land or guidance.

Learn more about the Florida FarmFinder's goals and services by visiting our About page.

Are you a Beginning Farmer?

Sign Up

Log In

Find A Farm

Are you a Farmland Owner or Established Farmer?

Sign Up

Log In

Find A Farmer

Who uses the Florida FarmFinder™?

Established Farmers and Farmland Owners who want to keep or put their land in production through sale, lease, partnering or other arrangements.

Beginning Farmers searching for suitable lands or other farming opportunities to meet their needs.

All topics

New topic

Looking for Organic Sunflower Seed
Updated 8 days ago by Bradley Brown — 1 post

The Farm Bill - why is it important to me?
Updated last month by Florida Certified Organic Growers and Consumers — 1 post

Position Available: University of North Florida Expert Gardener
Updated last month by Florida Certified Organic Growers and Consumers — 1 post

Nursery Business Opportunity
Updated last month by Gordon Mac Martin — 1 post

Can I grow my own organic vegetables at home?
Updated last month by Curtis Hochstetler — 2 posts

A Race to Save the Orange ... could altering its DNA be a solution?
Updated last month by Florida Certified Organic Growers and Consumers — 1 post

Sustainable Nutrient and Pest Management Workshop

Registration Form

Learn and share farming experiences with Florida specialty crop farmers, UF/IFAS research and extension personnel, and the Florida Organic Growers outreach team

Worden Farm Monday October 31, 8:30 a.m. – 2:00 p.m., 34900 Bermont Road, Punta Gorda, FL 33982

Free Admission, please mark if vegetarian meal required, or list any other special dietary needs:

Name:
Address:
City, state, zip:
Phone: Email

Farm name:
Acres: , Crops:
I'm farming currently: Yes ☐ No ☐
I plan to farm within 2 years: Yes ☐ No ☐

What you would like to gain from participating? Be as specific, and use additional space if needed:

Please indicate in the following survey how often you perform each practice. Check one box for each practice. Your responses are confidential. You may be contacted by Florida Organic Growers in the future to respond to a follow-up survey.

Practice	**Never/ very infrequently**	**Once every two years**	**Once per year**	**2 times per year**	**3 or more times per year**	**Always**
Grow a cover crop	☐	☐	☐	☐	☐	☐
Grow three (3) or more cash crops simultaneously (intercropping)	☐	☐	☐	☐	☐	☐
Rotate crops to avoid growing plants of the same family in the same field consistently	☐	☐	☐	☐	☐	☐
Apply animal manure to the soil	☐	☐	☐	☐	☐	☐
Apply compost or other amendments to the soil	☐	☐	☐	☐	☐	☐
Use deep tillage	☐	☐	☐	☐	☐	☐
Apply soluble nitrogen fertilizer (ex: ammonium nitrate, ammonium sulfate, urea)	☐	☐	☐	☐	☐	☐
Submit soil samples for nutrient analysis	☐	☐	☐	☐	☐	☐
Apply herbicide to control problem weeds	☐	☐	☐	☐	☐	☐
Apply pesticides (insecticides, fungicides, bactericides, herbicides) on a regularly scheduled basis	☐	☐	☐	☐	☐	☐

Plant non-cash crops specifically to enhance biological pest control	☐	☐	☐	☐	☐	☐
Monitor/identify beneficial organisms such as insects to help manage pest populations	☐	☐	☐	☐	☐	☐

Mail your completed registration form and survey to P.O. Box 12311, Gainesville, FL 32604, fax to 352.377.8363, call 352.377.6355 or e-mail jose@foginfo.org. For more information visit www.foginfo.org.

About the Host Farm:

Worden Farm is an 85-acre certified organic mixed vegetable in Southwest Florida. Farmers Chris and Eva Worden have been featured on national news programs including NBC Nightly News and PBS and have farmed together since 1998 while earning doctoral degrees in crop science and ecosystem management, respectively. Worden Farm has been certified organic since 2002 and currently has 55 acres of specialty crop production that are managed in accordance with organic standards, selling their huge array of specialty crops through a CSA with hundreds of members and at 6 farmers markets from St. Petersburg to Naples.

Florida Organic Growers (FOG) is a non-profit organization established in 1987 in Gainesville. FOG's Education and Outreach Program promotes organic agriculture and healthy and just food systems, informing producers, consumers, media, institutions and governments about the benefits of organic and sustainable agriculture.

For more information visit http://www.foginfo.org/scbgworkshops.php, call 352.377.6355 or email jose@foginfo.org.

Florida Certified Organic Growers & Consumers, Inc.
P.O. Box 12311 Gainesville, FL 32604
352-377-6345 phone, 352-377-8363 fax
education@foginfo.org
www.foginfo.org

Sustainable Nutrient and Pest Management Workshop
Oct. 31, 2011

Participant's Evaluation and Recommendations

For the following statements, please indicate how much you disagree or agree (circle one response).

1. **The workshop provided information that I will use in my farming.**

   Strongly disagree Disagree Neutral Agree Strongly agree

2. **The workshop increased my understanding of sustainable agriculture practices.**

   Strongly disagree Disagree Neutral Agree Strongly agree

3. **The workshop increased my understanding of USDA National Organic Program requirements.**

   Strongly disagree Disagree Neutral Agree Strongly agree

4. **The information was presented in a very understandable fashion.**

   Strongly disagree Disagree Neutral Agree Strongly agree

Please share your thoughts on the following.

5. **Please briefly explain two concepts you learned during the workshop.**

   _____
   _____
   _____
   _____
   _____
   _____
   _____

6. **Please tell us how we can improve the workshop.**

   _____
   _____
   _____
   _____
   _____
   _____
   _____

Thoughts about the On-Farm Workshop at Worden Farm
Punta Gorda, Florida; October 31, 2011

During a rainy day on Southwest Florida above 60 participants gathered to learn about sustainable nutrient and pest management. Farmers Eva and Chris Worden hosted this event that touched on many of the most important issues growers face day to day. A team from the University of Florida was invited to share with growers their insights into nutrient, pest, and weed management. Expert presenters included vegetable entomologist Dr. Hugh Smith from the University of Florida/IFAS Gulf Coast Research and Education Center, UF/IFAS vegetable specialist Dr. Monica Ozores-Hampton from the Southwest Florida Research and Education Center, and Dr. Carlene Chase, Associate Professor of the Horticultural Sciences Department at the University of Florida in Gainesville.

Participants were mostly farmers and prospective farmers, as well as service providers and gardeners. The workshop captivated the interest of many across the region, as participants from South East, Central, and North Central Florida were present. A small farm barn at the Worden Farm was the perfect place to protect participants from the rain and was the center stage for the various presentations.

Dr. Monica Ozores-Hampton introduced the ideas of working with a nutrient budget for organic agriculture. She explained that organic growers should get into the habit of learning how much nutrients the crop requires and what kind of natural sources can be used to provide those nutrients to the soil. The use of manure, cover crops, compost, other natural by-products and manufactured inputs should be taking into account as contributing nutrient sources. For this, their nutrient content should be calculated. Dr. Ozores-Hampton indicated that having a nutrient budget is very important as providing more or less than adequate nutrients to the plants are both detrimental to achieving healthy high quality crops. There is strong evidence that too much Nitrogen, for example, is conducive to higher rate of insect problems and excessive foliage.

Some recommendations were to regularly test soils at the same time every year. She recommended to do it in the summer right before planting. For many soil amendments such as compost, the release speed may be slow. This is important because not all the nutrients are likely to become available during the first year. Usually some of it will be available for the following years, but the reality in the sandy soils of South Florida is that residual Nitrogen is considered as zero. Marty Mesh, FOG's executive director, stressed the importance of compost as a soil amendment. Increasing soil organic matter is not a short time investment, it is a long term investment as it does not only provide nutrients but improves soil health in every aspect.

Dr. Hugh Smith introduced the idea of using landscape techniques to manage insect pests. He stressed the importance of getting to know the biology of the insect pests farmers struggle with. Knowing their life cycle, their way of moving and eating is crucial to identify what alternatives you may have. The use of strategies such as push-pull and biological control are important tools for all farmers but cannot be seen as silver bullets. They need to be part of a holistic view of the agroecosystem management. One question was raised about the use native species as trap crops. Dr. Smith indicated that native species could also be pest hosts, therefore farmers need to be careful by assuming that all native species are beneficial to your pest

management. This is also the case for production crops; understanding what crops in your mix are vulnerable to what insect is very relevant.

In terms of using beneficial organisms Dr. Smith stressed the importance of knowing how these organisms act. A good classification is Predators, Parasitoids and Pathogenic. Predators will literally eat insect pests, Parasitoids will place their eggs on the larvae of insect pests, and Pathogenic are organisms that will spread disease to insect pests, such as insect-pathogenic nematodes. Usually, he affirmed, when farmers use beneficial insects as if they were pesticides, they fail. He said that a better way to think about beneficial organisms is to treat them as pets. For example, providing habitat during crop and non crop seasons is crucial to their long term establishment and effectiveness.

Dr. Carlene Chase discussed the alternatives for sustainable weed management, focusing mostly on nutsdedge management. She passed around various specimens of nutsedge to help grower understand the differences between the various kinds of nutsedge. Finally she discussed the management options growers have. This includes using biodegradable synthetic mulches (Note: Not currently approved for organic growers), natural mulches and others. Dr. Robert Kluson led a small discussion on the opportunities for growers to access farm to school programs.

Finally the workshop included a marketing chat and a discussion on organic certification led by Eva and Chris Worden with assistance from FOG staff. Eva Worden shared with participants how Worden Farm has been able to develop strong presence at farmers markets and more than 300 Community Supported Agriculture (CSA) shares. Worden Farm commitment to producing high quality, diversified, and nutritious fresh food for consumers is recognized across Florida. For a small farm she recommended using farmers markets to test the waters, create a clientele and try different crops. According to her, establishing a CSA requires very strong commitment and responsibility as consumers have paid in advance and expect the best. Worden Farm has always strived for crop and genetic diversity, as well as innovation; they are not afraid to try new crops to pick their clients' interest and expand their diets.

The discussion about organic certification attempted to give a real portray of the process. According to Chris the process simply requires to be up to date with all records and paper work as the National Organic Program regulations mandates. FOG staff indicated that clear and honest communication with your certifier, good understanding of the organic regulations by the farmer, and being careful with inputs that have not been approved for organic production, may be keys to a successful certification process. In terms of costs, FOG staff pointed to the available Organic Cost-Share program that allows growers to get 75% of their certification costs reimbursed up to $750.00.

Finally when the rain ceased, and the shy sun came out to greet the group, Chris and Eva Worden led everybody for a good walk in some sections of the farm. Highlights from this aspect of the workshop were:

- The great use of intercropping and crop diversification to maximize the use of space.
- The use of rows of sunflowers to attract beneficials to the field.
- The use of cultivation and synthetic plastic mulch as the major strategies for weed control.

This way the workshop came to an end. Two great books were raffled among participants, and they received a resource folder that included many great articles and references related to the topics of discussion.

Worden Farm is an 85-acre certified organic mixed vegetable farm in Southwest Florida. Farmers Chris and Eva Worden have been featured on national news programs including NBC Nightly News and PBS and have farmed together since 1998 while earning doctoral degrees in crop science and ecosystem management, respectively. Worden Farm has been certified organic since 2002 and currently has 55 acres of specialty crop production that are managed in accordance with organic standards, selling their huge array of specialty crops through a CSA with hundreds of members and at 6 farmers markets from St. Petersburg to Naples.

The Farmer workshop was organized by Florida Organic Growers (FOG), a non-profit organization established in 1987 in Gainesville. FOG's Education and Outreach Program promotes organic agriculture and healthy and just food systems, informing producers, consumers, media, institutions and governments about the benefits of organic and sustainable agriculture. Upcoming workshops are in the process of being scheduled possibly for early 2012. Stay updated by receiving FOG's Email Newsletter. These workshops are supported by a Specialty Crop Block Grant program administer by the Florida Department of Agriculture and Consumer Services. For more information email jose@foginfo.org, call 352-377-6355, or visit FOG's website at http://foginfo.org/scbgworkshops.php

Summaries of Participants' interest based on Registration Forms
Nutrient and Pest Management Workshop
October 31, 2011

- Plant nutrition, different farming implements, ideas on germinating seeds
- To learn what plants draw beneficial insects
- I work at the everglades research farm and have done some small plot non research planting for the staff here to take home and eat. I try to keep chemical spraying to a minimum. I plan to start a small farm soon and believe organic would be my best starting point.
- Learn about pest management on organic farm and working with other farmers. Sharing information.
- Farmer (25 years). Was certified organic in New Hampshire and involved in starting NOFA NH. Sells specialty veggies, herbs, etc. to restaurants
- I am hoping to learn more about ways to deal with pest, weed & disease management. As a new farmer anything gained is much appreciated. The on-farm workshops are an excellent opportunity to see and learn best practices of more experienced farmers. I have attended several and find they have each been worthwhile.
- Fertilizer conservation, soil enhancement, pest control, production management
- Does urban farming selling at farmers market and small restaurants. I have a lengthy ag background and have a desire to learn more about the organic (or as close as practical) approach to Become more aware of what is involved in sustainable farming practices, with focus on economic cost and return. Also, developing markets to give viable return on investment.vegetable production.
- I own 100 acres in the Plant City area and currently operate a cow calf program. In my early years I farmed row crops, but I stopped after high school. I am interested in getting back into vegetables' on a small scale and want to gather as much info as possible.
- <1 acre vegetables and fruit trees; indicated plans to farm
- (14 acres veggies) All info on local and sustainable, espically folar diseases in tomatoes and southern green stink bug control.
- What applications have living mulches been shown to be benificial, Pest and disease diagnosis and treatments, preditory insects use including on farm insect propagation.
- We've been building soil and getting ready, but have lots of questions about irrigation, mechanization, how to meld permaculture ideas with good production
- We wish to convert our farm to a vegetable farm from a calf cow operation & wish to know as much as possible about soil prep. and nutrients
- Organic nutrient management methods, organic pest control methods and alternative mulches. I am an aspiring farmer and will be farming organically in the next 2 years, hopefully.
- We are fairly new to farming and are doing it organically. We would really like to learn as much as we can, especially about organic pest control and fertilization.
- Investigating starting a 1-acre farm
- Maintaining adequate phosphorus levels.

Other comments from extension agents in the region:

- Where to find sources for nutrients/materials

- About pest insects and weeds: keep it simple, what do they look like, how can I see it, what can I do.
- It's difficult to maintain adequate Nitrogen levels. It's also difficult trying to calculate the results from a soil test to organic amendments. Some amendments are not immediately available to the plant.
- Stink bug in tomato and other vegetables. Cow peas cover crop for example can be a host for stink bugs. Soil born diseases like sudden blight in pepper and cucumbers.
- Nutsedge, pigweed management.
- Whitefly- viruses in cucurbits management.

Florida Certified Organic Growers & Consumers, Inc.
P.O. Box 12311 Gainesville, FL 32604
352-377-6345 phone, 352-377-8363 fax
education@foginfo.org
www.foginfo.org

Sustainable Nutrient and Pest Management Workshop

October 31st 2011, 8:30 a.m. to 2:15 p.m.
Worden Farm; 34900 Bermont Road | Punta Gorda, FL 33982
Free refreshments and lunch provided.

8:30 a.m.	Sign-in and meet-and-greet, with refreshments provided
8:35 a.m.	Welcome to Worden Farm (Farmers Chris and Eva Worden, IFAS Extension, Florida Organic Growers)
8:45 a.m.	Introduction to Worden Farm by Eva and Chris Worden
9:10 a.m.	***Sustainable Nutrient Management*** by Dr. Monica Ozores-Hompton. Topics include sustaining soil fertility throughout crop maturation, increasing overall soil health, and phosphorus management.
10:10 a.m.	***Sustainable Pest Management*** by Dr. Hugh Smith Topics include habitat manipulation for promoting natural enemies, and other ecological management options for horticultural crops, such as push-pull strategies.
11:10 a.m.	Break
11:20 a.m.	***Sustainable Weed Management*** by Dr. Carlene Chase Topics include the use of cover crops as well as synthetic and living mulches.
12:20 p.m.	Working Lunch Dr. Robert Kluson (Sarasota County IFAS Extension) Marketing through Farm to School and other discussions and networking about opportunities for small farmers.
12:50 p.m.	Participants split into two groups. ***Group 1*** Organic Certification Chat with Florida Organic Growers and host farmer. ***Group 2*** Worden Farm tour with host farmer.
1:20 p.m.	***Group 1*** Worden Farm tour with host farmer. ***Group 2*** Organic Certification Chat with Florida Organic Growers and host farmer.
2:00 p.m.	Participants' Evaluation and Recommendations
2:10 p.m.	Book raffle! *Two useful books to be raffled among participants!*
2:15 p.m.	Workshop Adjournment! Thanks to collaborators and participants!!!

Free Sustainable Nutrient and Pest Management Workshop
October 31st in Southwest Florida.

Farmers Eva and Chris Worden will host a Farmer Workshop at Worden Farm in Punta Gorda on October 31st from 8:30 am to 2:00 pm. The workshop will provide practical information and advice about sustainable nutrient, pest, weed and disease management options for vegetable farmers seeking to learn and share knowledge about sustainable agricultural practices.

Expert presenters will include vegetable entomologist Dr. Hugh Smith from the University of Florida/IFAS Gulf Coast Research and Education Center, UF/IFAS vegetable specialist Dr. Monica Ozores-Hampton from the Southwest Florida Research and Education Center, and Dr. Carlene Chase, Associate Professor of the Horticultural Sciences Deparment at the University of Florida in Gainesville. Participant Farmers will benefit from the expertise of these speakers, and from the insights and experience of host farmers and the Education and Outreach team from Florida Organic Growers.

Dr. Hugh Smith will share insights on sustainable pest management. Some specific topics will include habitat manipulation for promoting natural enemies of insect pests, and ecological management options for horticultural crops, such as push-pull strategies. Dr. Monica Ozores-Hampton will lead a discussion on sustainable nutrient management, which will include phosphorus management as well as options to increase overall soil health. Dr. Carlene Chase will speak on sustainable weed management, including cover crops and synthetic and living mulch options for growers. Additionally, staff from Florida Organic Growers and host farmers Eva and Chris Worden will lead a brief discussion about organic certification that will clarify what is required to achieve and maintain organic certification.

Worden Farm is an 85-acre certified organic mixed vegetable farm in Southwest Florida. Farmers Chris and Eva Worden have been featured on national news programs including NBC Nightly News and PBS and have farmed together since 1998 while earning doctoral degrees in crop science and ecosystem management, respectively. Worden Farm has been certified organic since 2002 and currently has 55 acres of specialty crop production that are managed in accordance with organic standards, selling their huge array of specialty crops through a CSA with hundreds of members and at 6 farmers markets from St. Petersburg to Naples.

The Farmer workshop is organized by Florida Organic Growers(FOG), a non-profit organization established in 1987 in Gainesville. FOG's Education and Outreach Program promotes organic agriculture and healthy and just food systems, informing producers, consumers, media, institutions and governments about the benefits of organic and sustainable agriculture.

FLORIDA ORGANIC GROWERS

Mail your completed registration form to P.O. Box 12311, Gainesville, FL 32604, fax to 352.377.8363, call 352.377.6355 or e-mail jose@foginfo.org. For more information visit www.foginfo.org/scbgworkshops

Turkey Hill Farm, Tallahassee FL; June 2011
Sustainable Soil Management Workshop

The Family Garden Organic Farm, Bell FL; September 2011
Organic Production and Marketing Panel Workshop

Worden Farm, Punta Gorda, FL; October 2011
Sustainable Pest Management Workshop

Green Industries; April 2012
USDA Organic Certification Workshop

Bee Heaven Farm and LNB Groves; October 11, 2012
Organic Farming workshop

Swallowtail Farm, June 2013
Organic Farming workshop

Appendix to Project (22): University of Florida - Protective Structures for Crop Diversification, Improved Fruit Yield and Quality and Appropriate Water Management and Freeze Protection

Appendix 1
Why biofuel for greenhouses?
By Pratap C. Pullammanappallil

The recent spike in fossil fuel prices have resulted in the increased popularity of using biomass for fuel. Biomass is not only a cleaner alternative to fossil fuels, it is now becoming economically feasible for farmers to switch to biomass to heat their greenhouses. Wood biomass is considered to be greenhouse gas neutral when converted to heat efficiently with combustion (Chou et al., 2009). Wood makes up only 7% of global fuel sources, with an estimated 15% of energy used in developing nations and only 2% in developed nations (Mead, 2005). This cleaner energy is prompting governments to issue tax credits when biomass is used as a fossil fuel alternative, which increases the economic possibility. In 2006, Delta Research Corporation conducted a survey to investigate wood pellet and wood residue prices in Canada. The survey showed prices of both woody materials have been stable for the past 5 years, C$5.00 per GJ, and is predicted to remain steady for years. Natural gas prices were shown to fluctuate between C$5.00 to C$14.00 per GJ, averaging at C$8.00 per GJ (DRC, 2006). This study shows the uncertainty that fossil fuels bring. Another study done in Canada of a tomato greenhouse showed 28% of operating costs were going toward fuel for heating with natural gas (Chou et al., 2009). Converting to biomass boilers would reduce the operating costs drastically simply because of the consistent price of the biomass.

Current status

Greenhouses are used to maintain ideal environmental conditions for the plants that are grown inside of them; this includes temperature, humidity, and CO2 concentrations. Currently, many greenhouses are heated using steam or hot water radiation systems, which pump water through a network of pipes in the greenhouse Another system that is used involves space heaters that blow air over heating coils (ASHRAE Handbook). These systems are poor heat distributors, and create a large gradient of heat even within a smaller greenhouse. They also do not control the humidity. Geothermal heat pumps, or ground-source heat pumps, can provide heat, air conditioning, and hot water to the greenhouse. A form of this system is called the soil heating method and is more environmentally friendly, but requires extensive building and planning. This uses the floor of the greenhouse as a radiator that keeps the roots of the plants protected without having to heat large quantities of air (Hepbasli, 2011).

The method for heating that can be converted to a biomass system easily is the water-tube boiler system. This system can use natural gas, a gasifier, or a wood stove to heat water in the coils. Biomass boilers are larger in size and have a higher capital cost, this is why natural gas boilers are traditionally preferred (Hepbasli, 2011). A comparison was done of Natural gas, wood pellets, and wood residue, conclude the price per GJ as $8.25 per GJ, $5.57 per GJ, and $2.38 per GJ respectively. The low price of the biomass can only apply when the supply is secured, with no rapid increase in biomass demand. Wood pellets are more expensive than the woody residue because of the extra pretreatment steps for briquetting, and transportation. Wood residue is a very feasible fuel choice because of their availability and no briquette pre-processing (Chau, J. et al., 2009).

In addition to temperature and humidity, carbon dioxide has to be maintained, and pumped into an enclosed greenhouse. CO_2 concentration in an enclosed greenhouse has

to be kept between 1000 and 1500 ppmv for plant growth during photosynthetic periods. Combustion emissions from boilers could be used to sustain these levels (Chau, J. et al., 2009). The biomass boiler flue, if maintained properly, and if the ideal biomass was used, would produce a clean form of CO_2 that would be free of NO_x and SO_x associated with fossil fuel combustion.

Proposed research approach

There are many research options involving greenhouse heating using biomass as fuel. An enclosed greenhouse would allow for the most control of the environment with the smallest impact from ambient surroundings. A high tunnel system would have open sides and is only \$0.50 per ft^2 (hightunnels.org). Models need to be developed to determine the ideal combinations of heating systems. A system of steam tubes and heating fans may offer the most even distribution of heat but may require a percentage of fossil fuels to be used. Once the best heating system has been determined through simulation, a comparison of biomass types can be made. The choice for biomass may be determined by the greenhouse's location and what resources are available. A comparison of biomass pretreatment processes can be done as well to determine the most efficient fuel form.

Current treatment methods for frost prevention in blueberries

Greenhouses are used to control the climate immediately around plants to prevent harsh environmental impacts. In choosing a design that has optimized climate control, the most important parameter is the environmental temperature. The colder the temperature and the longer the duration of frozen air, the more heat has to be added to the interior of the greenhouse. In 2011, Alachua county recorded 520 hours of <45°F weather (agroclimate). For blueberries specifically, the plant needs to undergo a period of dormancy before the floral buds initiate growth in the spring. As the flowers begin to open, they become more susceptible to the slightest cold occurrences. When the flower buds have opened fully, slight exposure to temperatures of 25 °C or lower can kill the buds; extended periods of time near 28°C can also cause damage. In Florida, the months of February to April are the most problematic when freezing occurs because the flowers are beginning to open in and the fruit becomes the most vulnerable (Williamson, 2004).

Currently in Florida, diesel engines are used to pump water through overhead irrigation systems in the field. Water is pumped onto the plants to protect the fruits by encasing them in a layer of ice. When water at 0 °C becomes ice at 0°C, 337.7 kJ/kg is released into the environment. The fruit then stays at 0°C while the surrounding air may be cooler. The high sugar content of the fruit means they tend to freeze at temperatures lower than that of water. If the fruit remains encased in ice, it will not freeze but, if the ice shield becomes too thick or heavy, this could cause damage to the plant (Roy). This process requires accurate temperature, dew point, wind, and humidity predictions to calculate the appropriate water spray flow rate. This technique is currently the most versatile because it can be modified to fit many different combinations of atmospheric parameters.

Wind machines and helicopters are also used less frequently to protect the fruit but can only be used in calm, clear nights. The wind machines require a high cost to purchase and maintain, but the cost of running is relatively low ~ 8 gallons of gasoline / hour. Helicopters have a very high cost operation and are vulnerable to human error from the pilot. These choices can be used to prevent freezing, but the instillation of greenhouse structures would provide the most consistent protection.

Modeling Options for the determination of heating choices

Hot water pipes are currently a popular heating system because they offer convective heat transfer and energy radiation directly onto plant leaves. Though these are widely used, not much emphasis has been put on the location of these systems within the greenhouse. (Tadj)

Model Design Option I. Heated pipes predicting interior air and soil temperature (Du et al.)

The review of the following model from Du et al. shows a novel simulation of heat transfer, which follows the fundamentals of heat transfer and thermodynamics. This model represents an enclosed greenhouse that is being heated with hot water heat pipes during cold weather events. It predicts the average air temperature and soil temperature within the greenhouse. This model also corrects for very small variation in inputs by changing small sub-sections of the larger model. These sub-sections include, geometry of the greenhouse, heat transfer affects, and surrounding atmospheric parameters. This model predicts the air and soil temperatures as well as the heating requirement during cold weather.

Model:

Following the first law of thermodynamics, a basic energy balance can be written to account for much of the energy exchange. This general equation follows:

$$\rho_a c_a v_a \frac{\partial T_a}{\partial t} = \alpha_a S + Q_{\text{loss}} + Q_{s-a} + Q_{p-a} + Q_{\text{ven}} + Q_{\text{heat}} \quad (1)$$

Where Q_{loss} is the rate of heat lost from the greenhouse; $Q_{s\text{-}a}$ is the transfer rate from the soil to the air; $Q_{p\text{-}a}$ is the transfer rate from the plants to the air; Q_{ven} is the heat transfer rate due to ventilation; Q_{heat} is the transfer rate of the heating supply system; ρ_a, c_a, v_a, T_a, are the density of the air, specific heat, volume of air, and air temperature respectively. S is the solar radiation entering the greenhouse, and α_a is the absorption coefficient of solar radiation by air in the greenhouse. This general equation is a valid representation of any greenhouse-heating configuration; the Q_{heat} would change to represent different heating types.

The change in each of these greenhouse components can be represented by a transient one-dimensional heat conduction equation. For soil as an example:

$$\rho_s c_s \frac{\partial T_s}{\partial t} = \lambda_s \frac{\partial^2 T_s}{\partial Z^2} \tag{2}$$

Where T_s is the soil temperature, ρ_s, c_s, and λ_s are the density, specific heat, and thermal conductivity of the greenhouse soil. Through Fourier's law the air and soil can interact:

$$-\lambda_s \frac{\partial T_s}{\partial Z} = \frac{Q_a}{A_s} + \frac{\alpha_s S}{A_s} \tag{3}$$

Where A_s is the surface area of the soil. These transient heat equations were developed for each of the energy variables so they are each represented by the change in air and soil temperature. Each of the energy variables from equation (1) can be represented through conduction and convection equations and plugged back into the general heat equation. Du et al. take into consideration soil depth, characteristic length of plants, air velocity, the volumetric ventilation rate. This model takes care to mention even the smallest changes in energy.

This model was solved using both linear ordinary differential equations of the first method and the finite difference method. It was compared against an experimental greenhouse in Northern China with a floor area of 800m^2 the outside air varied between -12°C and -30°C and two heat-pipe systems with a total power of 56 kW were used to heat the greenhouse. The following graph shows the comparison of the simulation to the actual experimental results.

Figure (1) shows the air temperature:

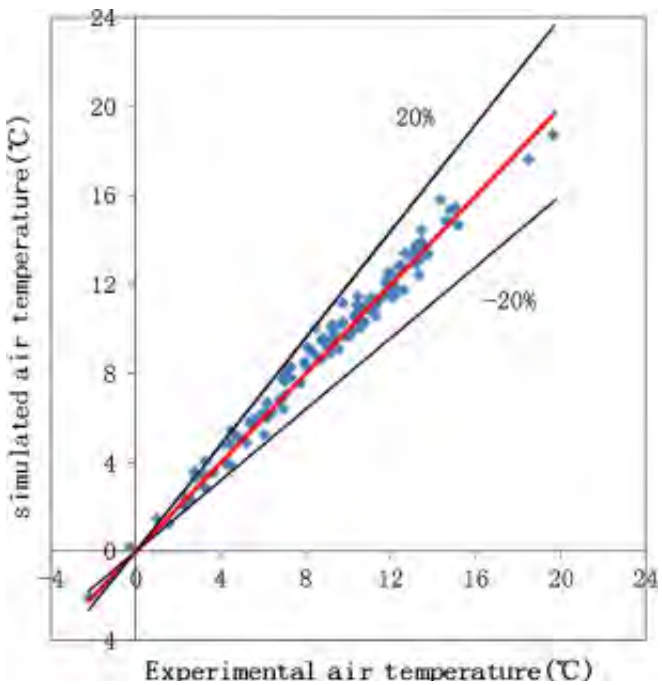


Figure (1). Comparison of simulated air temperature vs. experimental

Figure (2) shows the simulated soil temperature compared to the experimental soil temperature:

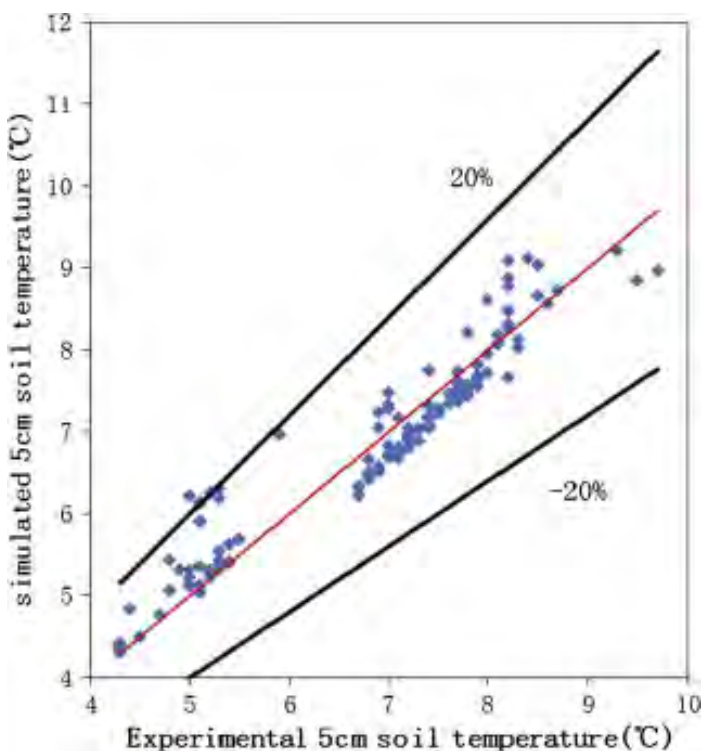


Figure (2). Comparison of simulated soil temperature vs. experimental soil temperature

These figures show the simulation was accurate for smaller temperatures, but the higher temperatures had +/-20% error. This model does give a fair prediction of air and soil temperature where the finite difference method is used to solve non-steady state soil conduction. This model would be very valuable in determining the energy needed to heat a greenhouse with heated pipes. This energy input could be compared with the energy inputs of other heating options.

Model Design Option II. Turbulent air flow prediction for fans and/or hot water pipes (Tadj et al.)

The model developed by Tadj et al. visually predicts air temperature gradients within a closed greenhouse system. The model can be used to show 'hot/cold' spots within a greenhouse heating design. The turbulent nature of warm air is used to predict the distribution of the air circulating in the greenhouse. This model also compares both heated fans and heated pipe systems, highlighting their advantages and disadvantages.

Model:

This option uses the combination of six governing mass and energy transport equations to develop a Computational Fluid Dynamics (CFD) model. This CFD model solves the Navier-Stokes equations for free convection.

$$\frac{\partial(U\Phi)}{\partial x} + \frac{\partial(V\Phi)}{\partial y} + \frac{\partial(W\Phi)}{\partial z} = \Gamma\nabla^2\Phi + S_{\Phi} \qquad (4)$$

Where U, V, and W are components of the velocity vector; Γ is the dimensionless transport quantity; Δ is the diffusion coefficient and S¢ is the source term. This method also requires an equation for continuity and conservation of momentum.

A Buoyancy model developed by Boussinesq is used to describe airflow. This model represents the natural convective flows of the air. This way the density variation is expressed through the density reference.

The turbulence of the air is modeled with an eddy-viscosity model based on the Rayleigh (Ra) number. The Ra is calculated using the length of the greenhouse and the temperature difference between the soil and the roof of the structure. The Reynolds number has been estimated to be a high value, so turbulent flow is represented in the greenhouse.

The energy equation used to estimate the interior of a greenhouse is the general incompressible transport convection-diffusion equations. This equation offers relationships between effective and turbulent conductive and enthalpy.

Radiation is represented using the Rosseland approximation, which introduces a diffusion term, which is temperature dependent.

The plants inside the greenhouse are modeled using a porous medium approach. This accounts for the heat and mass transfer between leaves and air within each plant. This model uses a sensible and latent heat exchange balance, which is dependent on characteristics of this plant matrix.

Basic boundary conditions were applied to the 3D model, including; greenhouse measurements, temperatures, air velocity, plant characteristics, and greenhouse cover material characteristics. The following figures were generated using the model to compare heating efficiencies of pipes and fans. Figure (3) represents a vertical cross-section of air velocity, heating with pipes only, and highlights any stagnant air zones.

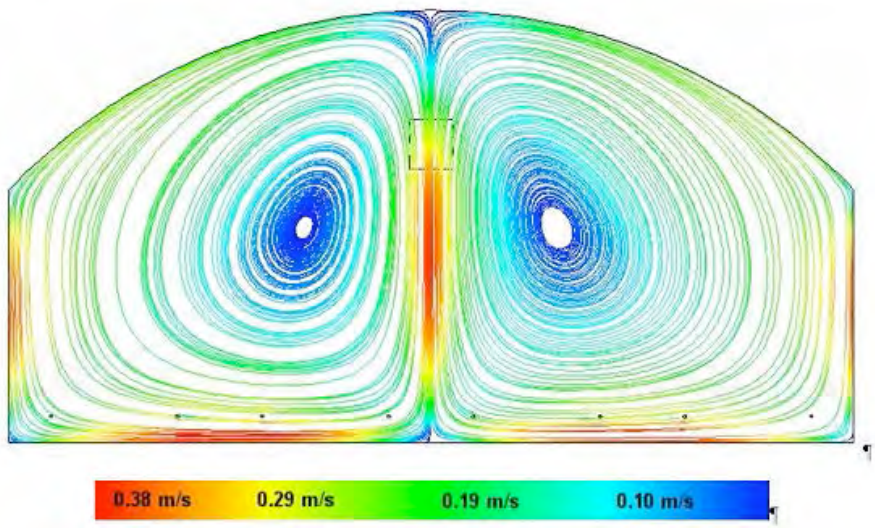


Figure 3. Cross-sectional area of air velocity, heated pipes only

Figure (4) shows a cross-sectional area of air temperature when using only the heated pipes. This shows that the temperature of the air is largely dependent on airflow patterns with the most gradient at near the roof of the structure.

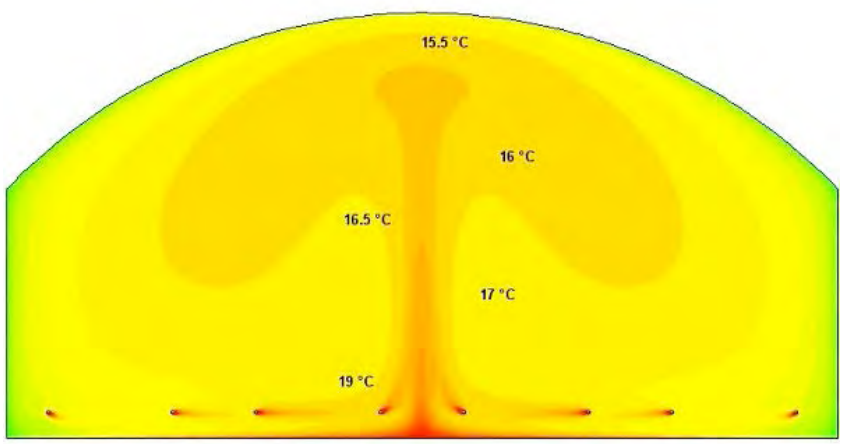


Figure 4. Cross-sectional area of air temperature, heated pipes only

Figure (5) shows a horizontal cross-section of airflow when using one hot air fan. This clearly shows that the air is stagnant near the opposite wall from the fan.

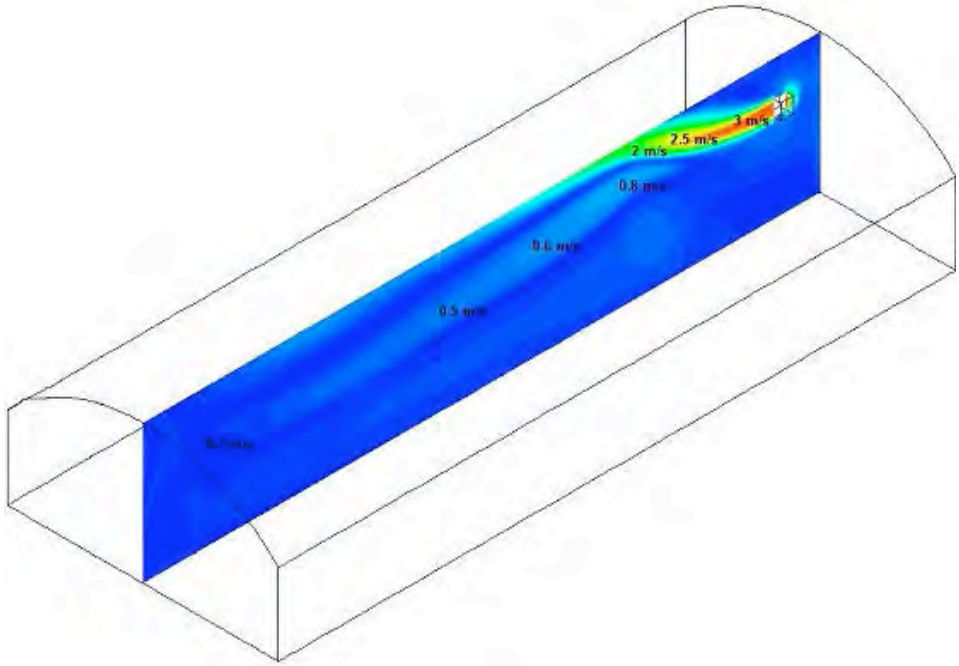


Figure 5. Horizontal cross-section of air flow, fan only

Figure (6) shows the air temperature gradient from the warm fan. This shows warm air accumulates near the top of the greenhouse, while the cool air is pocketed near the floor. There is not much vertical mixing of warm air in this scenario and this may not be the best method if you are concerned with very cold winter temperatures.

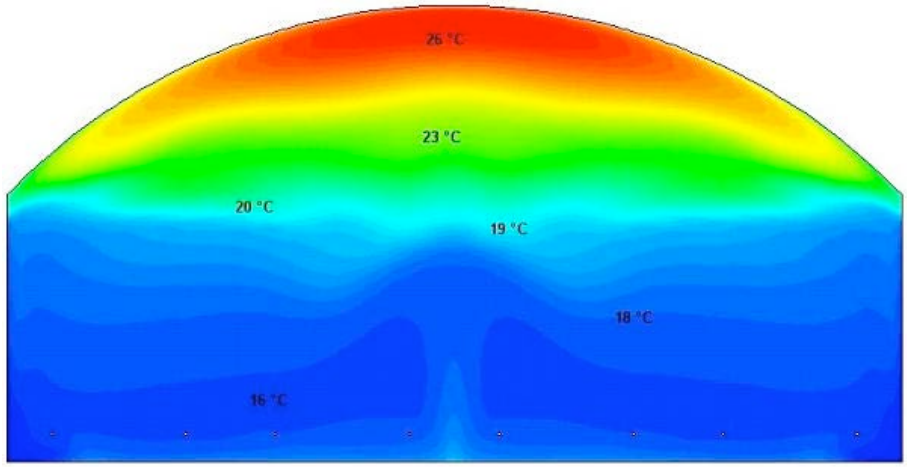


Figure 6. Cross-sectional area of air temperature, fan only

Figure (7) offers a view of heating pipes and fans used together in one greenhouse.

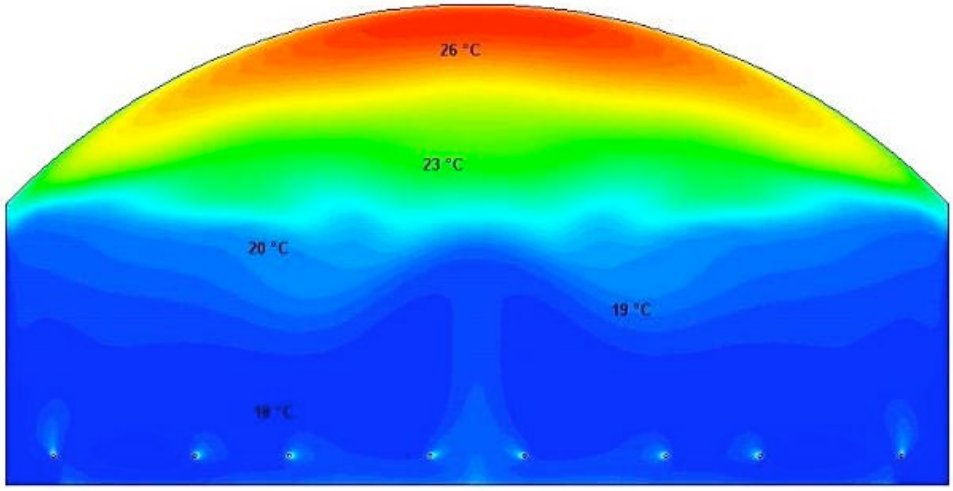


Figure 7. Cross-sectional area of temperature fans and heating pipes

The mixed system had the highest energy consumption in the study, with 70 W/m2 while the heating pipes only required 59 W/m2 and the fans required 57 W/m2. This model offers a very accurate representation of airflow within a greenhouse. The exterior air is going to be the main deciding factor in choosing heating systems. This system shows that the fans offer the least amount of air movement but also requires the least amount of energy to power it.

Model Recommendations

The modeling approach that may offer the most useful information is the Computational Fluid Dynamics (CFD) model developed by Tadj et al. This model offers the clearest representation of the air temperature and flow within a greenhouse. This model uses the thermodynamic properties of air to determine an accurate representation of the greenhouse. This method can be used to determine the best heating option for Florida's blueberry crops. Tadj et al. also discussed the efficiency of heating with pipes vs. heating with fans and finds that the fans are the most economical while the pipes offer the most even distribution of heat. For Florida, the fans might be adequate for the mild winters.

Future work

The CFD model will provide clear information on the amount of heat that needs to be added into the greenhouse. Once this value has been determined, based on climate information, a heating method can be developed. Parameters for the proposed greenhouses need to be determined, and those values plugged into the CFD model to accurately determine the heat input. Within this heating method comparison, feedstocks, gasifier types and sizes can be discussed. Once the heating requirement is determined accurately, the gasifier and feedstock can be determined. Models have also been developed to determine the efficiency of the gasifier systems. These can be used to ensure the correct choices have been made.

Bibliography

A.F. Miguel, A.M. Silva. “Modelling of transport phenomena near greenhouse screens.” Acta Hortic 456 (1998):371–374

ASHRAE Handbook: applications volume. American Society of Heating, Refrigerating, and Air-Conditioning Engineers. Atlanta, CA. 1974, chapter 22.

Chau, J., T. Sowlati, S. Sokhansanj, F. Preto, S. Melin, X. Bi, "Economic Sensitivity of Wood Biomass Utilization for Greenhouse Heating Application." Applied Energy 86.5 (2009): 616-621. Web. Jan. 2012.

Chau, J., T. Sowlati, S. Sokhansanj, F. Preto, S. Merlin, and X. Bi. "Techno-economic Analysis of Wood Biomass Boilers for the Greenhouse Industry." Applied Energy 86.3 (2009): 364-371. Web. Jan. 2012.

Chou, S. K., K. J. Chua, J. C. Ho, and C. L. Ooi. "On the Study of an Energy-efficient Greenhouse for Heating, Cooling and Dehumidification Applications." Applied Energy 77.4 (2004): 355-373. Web. Jan. 2012.

De La Plaza, S., R. M. Benavente, J. L. García, L. M. Navas, L Luns, J. M. Duran, and N. Retamal. "Modelling and Optimal Design of an Electric Substrate Heating System for Greenhouse Crops." *Journal of Agricultural Engineering Research* 73.2 (1999): 131-139. Web.

Dion, Louis-Martin, Mark Lefsrud, and Valerie Orsat. "Review of CO2 Recovery Methods from the Exhaust Gas of Biomass Heating Systems for Safe Enrichment in Greenhouses." *Biomass and Bioenergy* 35.8 (2011): 3422-3432. Web.

DRC. Survey of greenhouses within GVRD/FVRD converted to biomass for heating. Delta, BC: Delta Research Corporation; 2006.

Du, Jun, Pradeep Bansal, and Bo Huang. "Simulation Model of a Greenhouse with a Heat-pipe Heating System." Applied Energy 93(2012): 268-276.

EIA. International energy outlook 2007. Report DOE/EIA-0484(2007). Washington (DC): Energy Information Administration; 2007.

Hepbasli, Arif. "A Comparative Investigation of Various Greenhouse Heating Options Using Exergy Analysis Method." Applied Energy 88.12 (2011): 4411-4423. Web. Jan. 2012.

"High Tunnels Vs. Field Grown Production Practices." *High Tunnel FAQ*. N.p., Apr. 2005. Web. <Hightunnels.org>.

Issa, Roy J. "NUMERICAL HEAT TRANSFER MODEL FOR FROST PROTECTION OF CITRUS FRUITS BY WATER FROM a SPRAYING SYSTEM." *Thermal Science* 2011 online first(2006): N. pag.

Kurpaska, S.. "Optimization of Greenhouse Substrate Heating." *Journal of Agricultural Engineering Research* 76.2 (2000): 129-139. Web.

Kurpaska, S., Z. Ślipek, B. Bożek, and J. Fraczek. "Simulation of Heat and Moisture Transfer in the Greenhouse Substrate due to a Heating System by Buried Pipes." *Biosystems Engineering* 90.1 (2005): 63-74. Web.

Li, Shuhai, Daniel H. Willits, Craig L. Browdy, Michael B. Timmons, and THomas M. Losordo. "Thermal Modeling of Greenhouse Aquaculture Raceway Systems." *Aquacultral Engineering* 41.1 (2009): 1-13. Web.

MacFarlane, David W. "Potential Availability of Urban Wood Biomass in Michigan: Implications for Energy Production, Carbon Sequestration and Sustainable Forest Management in the U.S.A." Biomass and Bioenergy 33.4 (2009): 628-634. Web. Jan. 2012.

Mead, D. J. "Forests for Energy and the Role of Planted Trees." Critical Reviews in Plant Sciences 24.5-6 (2005): 407-421. Web. Jan. 2012.

Mohammadi, Ali, and Mahmoud Omid. "Economical Analysis and Relation Between Energy Inputs and Yield of Greenhouse Cucumber Production in Iran." Applied Energy 87.1 (2010): 191-196. Web. Jan. 2012.

Tadj, N, T Bartzanas, D Fidaros, B Draoui, and C Kittas. "Influence of Heating Systems on Greenhouse Microclimate Distribution." Transactions of ASABE 53.1 (2010): 225-238.

Williamson, J. G., P. M. Lyrene, and J. W. Olmstead. "Protecting Blueberries from Freezes in Florida." IFAS Extension (2004): N. pag. Web.

Zhu, S., J Deltour, and S. Wang. "Modeling the Thermal Characteristics of Greenhouse Pond Systems." *Aquacultral Engineering* 18.3 (1998): 201-217. Web.

Fig. 1. Recently-transplanted strawberry in high tables filled with pine bark, Alachua County. Credits: BM Santos.

Fig. 2. Summer ventilation of high tunnels planted with blueberry, Alachua County. Credits: BM Santos.

Fig. 3. Determinate tomato growing in pine bark inside high tunnels, Hillsborough County. Credits: BM Santos.

Fig. 4. Strawberry plants in bags filled with coconut coir and pine bark in a nitrogen rate study, Hillsborough County. Credits: BM Santos.

Fig. 5. Specialty cucumbers planted inside a greenhouse using bags filled with coconut coir, Polk County. Credits: BM Santos.

Fig. 6. High tunnel in a pepper grower field in Hernando County. Credits: B.M. Santos.

Appendix to Project (23): University of Florida - A Safe Harvest: Reduction of Tomato Susceptibility to Contamination with Salmonella through Cultivar Selection, Optimized Fertilization Regime and Education

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

Model Information	
Data Set	TOMATO.FERT
Response Variable	LOG_OUTIN
Response Distribution	Gaussian
Link Function	Identity
Variance Function	Default
Variance Matrix	Not blocked
Estimation Technique	Restricted Maximum Likelihood
Degrees of Freedom Method	Kenward-Roger
Fixed Effects SE Adjustment	Kenward-Roger

Class Level Information

Class	*Levels*	*Values*
Plot	54	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54
MAT	3	II IM MM
Cultivar	2	SE SF
Nitrogen	3	N1 N2 N3
Potassium	3	K1 K2 K3
Strain	2	O T
HARVEST	4	A B C D

Number of Observations Read	2835
Number of Observations Used	2835

Dimensions	
G-side Cov. Parameters	3
R-side Cov. Parameters	1
Columns in X	576
Columns in Z	58
Subjects (Blocks in V)	1
Max Obs per Subject	2835

Optimization Information	
Optimization Technique	Dual Quasi-Newton
Parameters in Optimization	3
Lower Boundaries	3
Upper Boundaries	0
Fixed Effects	Profiled

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

Optimization Information	
Residual Variance	Profiled
Starting From	Data

Iteration History

Iteration	*Restarts*	*Evaluations*	*Objective Function*	*Change*	*Max Gradient*
0	*0*	4	7743.4655631	.	43.38407
1	*0*	3	7743.4617941	0.00376902	40.87668
2	*0*	3	7743.4607286	0.00106551	33.84923
3	*0*	3	7743.4590833	0.00164535	33.56974
4	*0*	4	7743.4542143	0.00486899	1.679085
5	*0*	2	7743.4541988	0.00001546	0.17948

Convergence criterion (GCONV=1E-8) satisfied.

Fit Statistics	
-2 Res Log Likelihood	7743.45
AIC (smaller is better)	7751.45
AICC (smaller is better)	7751.47
BIC (smaller is better)	7743.45
CAIC (smaller is better)	7747.45
HQIC (smaller is better)	7743.45
Generalized Chi-Square	2248.83
Gener. Chi-Square / DF	0.85

Covariance Parameter Estimates

Cov Parm	*Estimate*	*Standard Error*
Block	0.000692	0.002644
*Block*Nitrogen*	0.000433	0.003152
Plot	0.01462	0.008006
Residual	0.8451	0.02333

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

Type III Tests of Fixed Effects

Effect	*Num DF*	*Den DF*	*F Value*	*Pr > F*
Nitrogen	2	1	0.03	0.9672
Potassium	2	152	0.61	0.5438
*Nitrogen*Potassium*	4	35.98	1.03	0.4028
Cultivar	1	188	0.62	0.4321
*Cultivar*Nitrogen*	2	37.1	0.57	0.5727
*Cultivar*Potassium*	2	37.35	0.72	0.4956
*Cultiv*Nitrog*Potass*	4	33.32	0.57	0.6849
Strain	1	2642	0.60	0.4386
*Nitrogen*Strain*	2	2633	0.41	0.6632
*Potassium*Strain*	2	2632	0.01	0.9947
*Nitrog*Potass*Strain*	4	2631	1.49	0.2013
*Cultivar*Strain*	1	2632	0.01	0.9040
*Cultiv*Nitrog*Strain*	2	2633	1.29	0.2745
*Cultiv*Potass*Strain*	2	2633	2.43	0.0885
HARVEST	3	2657	351.80	<.0001
*Nitrogen*HARVEST*	6	2657	0.37	0.8983
*Potassium*HARVEST*	6	2656	2.38	0.0268
*Nitrog*Potass*HARVES*	12	2654	1.84	0.0366
*Cultivar*HARVEST*	3	2656	0.40	0.7535
*Cultiv*Nitrog*HARVES*	6	2655	2.50	0.0205
*Cultiv*Potass*HARVES*	6	2654	0.15	0.9883
*Strain*HARVEST*	3	2640	9.03	<.0001
*Nitrog*Strain*HARVES*	6	2639	1.32	0.2459
*Potass*Strain*HARVES*	6	2639	1.93	0.0718
*Cultiv*Strain*HARVES*	3	2637	1.36	0.2522
MAT	2	2654	96.13	<.0001
*MAT*Nitrogen*	4	2657	1.24	0.2905
*MAT*Potassium*	4	2657	0.57	0.6872
*MAT*Nitroge*Potassiu*	8	2657	1.12	0.3495
*MAT*Cultivar*	2	2659	0.26	0.7685
*MAT*Cultiva*Nitrogen*	4	2657	1.86	0.1139
*MAT*Cultiva*Potassiu*	4	2658	1.36	0.2452
*MAT*Strain*	2	2645	0.12	0.8859
*MAT*Nitrogen*Strain*	4	2643	1.27	0.2785
*MAT*Potassium*Strain*	4	2642	0.68	0.6043
*MAT*Cultivar*Strain*	2	2642	0.07	0.9335

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

Type III Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
MAT*HARVEST	6	2656	10.41	<.0001
MAT*Nitrogen*HARVEST	12	2656	2.10	0.0141
MAT*Potassiu*HARVEST	12	2656	0.68	0.7726
MAT*Cultivar*HARVEST	6	2657	4.33	0.0002
MAT*Strain*HARVEST	6	2646	1.13	0.3399

*F Test for Potassium*HARVEST Least Squares Means Slice*

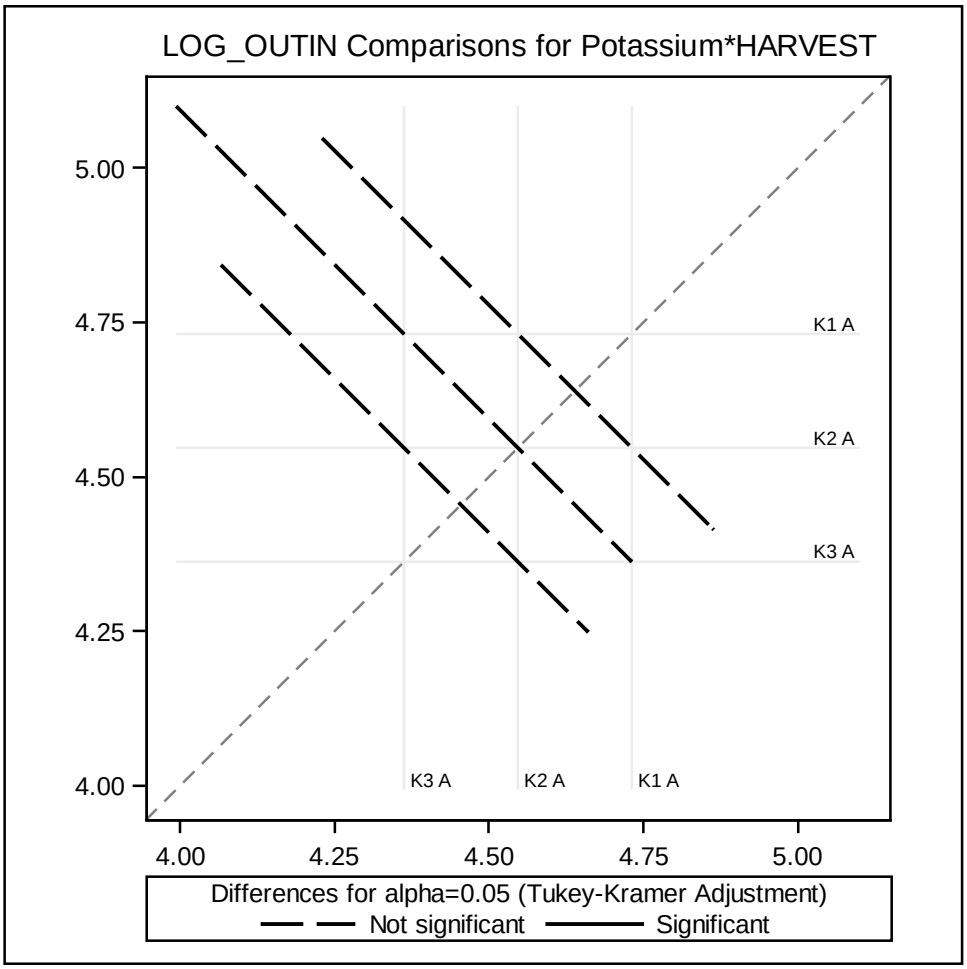
Slice	Num DF	Den DF	F Value	Pr > F
HARVEST A	2	2283	0.69	0.5038

*Simple Differences of Potassium*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	Potassium	Potassium	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
HARVEST A	K1	K2	0.1845	0.2708	2315	0.68	0.4958	0.7745
HARVEST A	K1	K3	0.3682	0.3150	2460	1.17	0.2427	0.4721
HARVEST A	K2	K3	0.1837	0.2537	2177	0.72	0.4691	0.7492

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



*Tukey-Kramer Grouping for Potassium*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*Potassium*	*Estimate*	
HARVEST A	K1	4.7307	A
HARVEST A			A
HARVEST A	K2	4.5462	A
HARVEST A			A
HARVEST A	K3	4.3626	A

*F Test for Potassium*HARVEST Least Squares Means Slice*

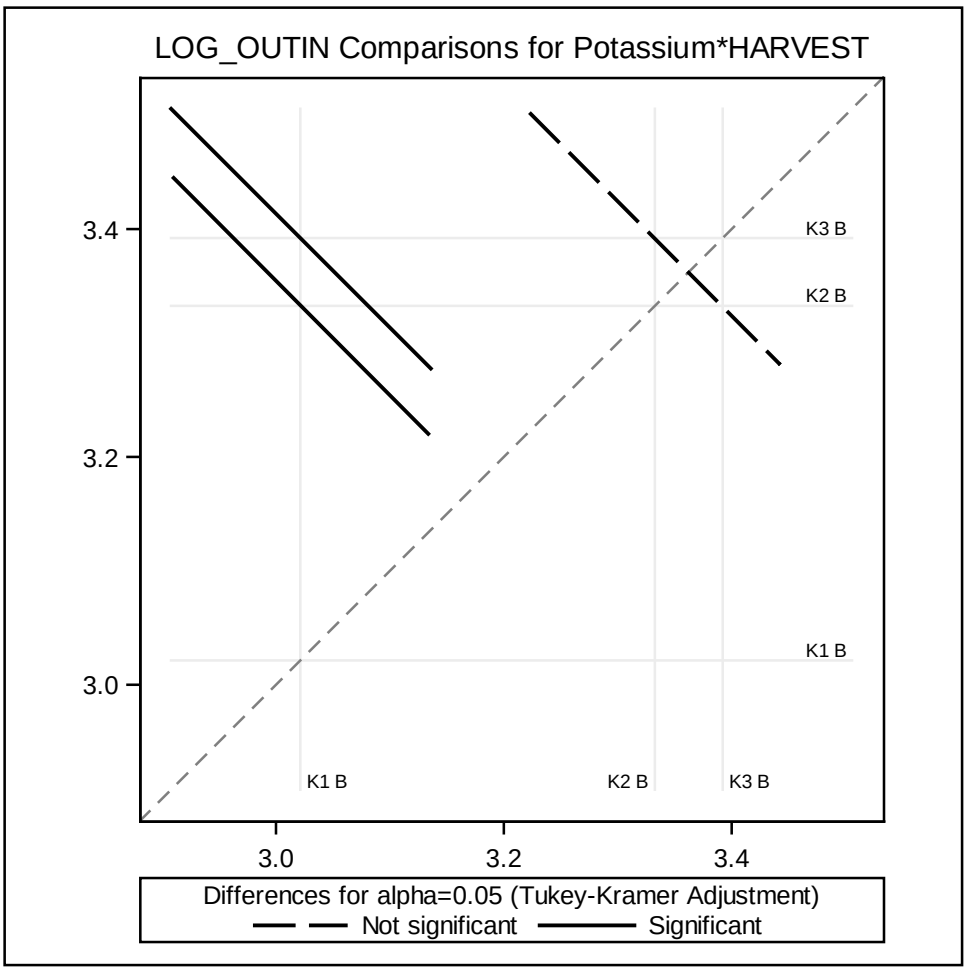
Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST B	2	210.2	8.13	0.0004

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Simple Differences of Potassium*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*Potassium*	*Potassium*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST B	K1	K2	-0.3112	0.09656	217.2	-3.22	0.0015	0.0037
HARVEST B	K1	K3	-0.3702	0.09823	226.4	-3.77	0.0002	0.0005
HARVEST B	K2	K3	-0.05896	0.09420	191.5	-0.63	0.5321	0.8059



*Tukey-Kramer Grouping for Potassium*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*Potassium*	*Estimate*	
HARVEST B	K3	3.3919	A
HARVEST B			A
HARVEST B	K2	3.3329	A
HARVEST B			
HARVEST B	K1	3.0217	B

Statistical Analysis: 06/05/2013

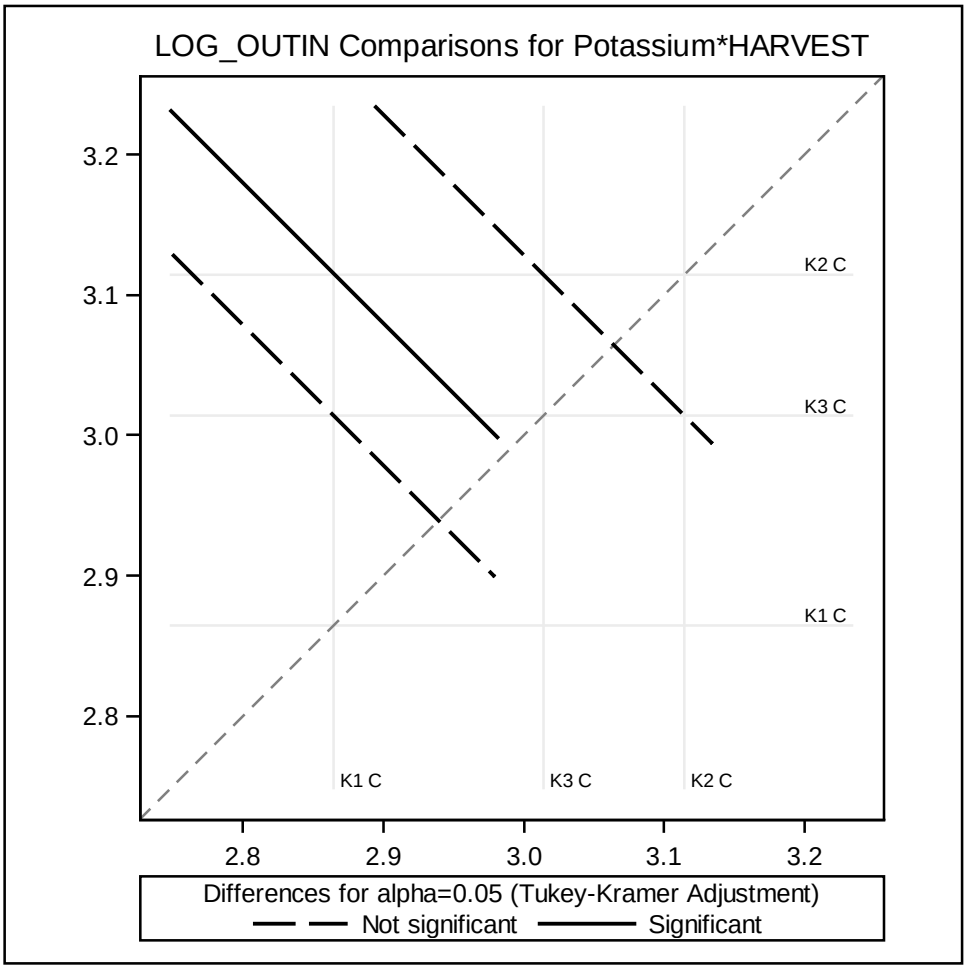
The GLIMMIX Procedure

*F Test for Potassium*HARVEST Least Squares Means Slice*

Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST C	2	227.1	3.20	0.0426

*Simple Differences of Potassium*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*Potassium*	*Potassium*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST C	K1	K2	-0.2495	0.09992	227	-2.50	0.0132	0.0336
HARVEST C	K1	K3	-0.1490	0.09796	209.3	-1.52	0.1298	0.2812
HARVEST C	K2	K3	0.1006	0.1024	250.7	0.98	0.3272	0.5885



Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Tukey-Kramer Grouping for Potassium*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*Potassium*	*Estimate*		
HARVEST C	K2	3.1146		A
HARVEST C				A
HARVEST C	K3	3.0141	B	A
HARVEST C			B	
HARVEST C	K1	2.8651	B	

*F Test for Potassium*HARVEST Least Squares Means Slice*

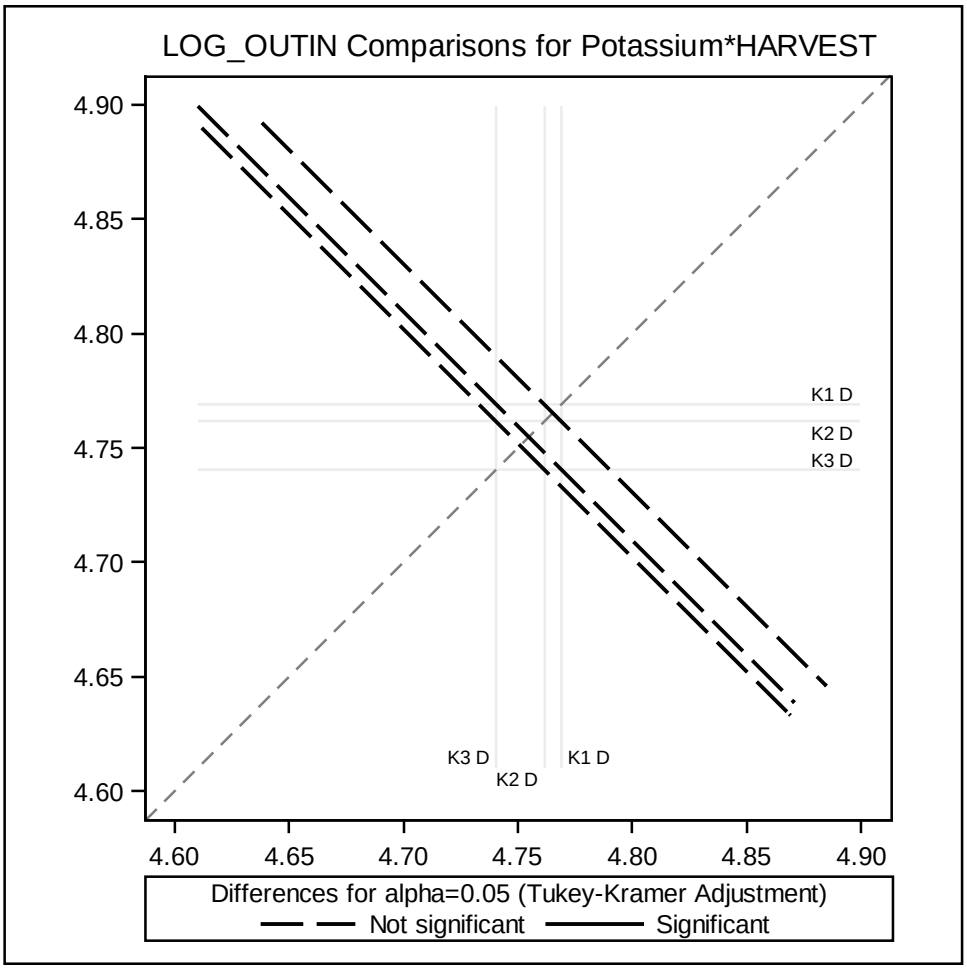
Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST D	2	305.1	0.04	0.9653

*Simple Differences of Potassium*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*Potassium*	*Potassium*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST D	K1	K2	0.007497	0.1051	272.4	0.07	0.9432	0.9972
HARVEST D	K1	K3	0.02868	0.1111	338.8	0.26	0.7964	0.9639
HARVEST D	K2	K3	0.02118	0.1097	315.3	0.19	0.8469	0.9796

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



*Tukey-Kramer Grouping for Potassium*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*Potassium*	*Estimate*	
HARVEST D	K1	4.7691	A
HARVEST D			A
HARVEST D	K2	4.7616	A
HARVEST D			A
HARVEST D	K3	4.7404	A

*F Test for Nitrog*Potass*HARVES Least Squares Means Slice*

Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST A	8	392.7	0.53	0.8307

Statistical Analysis: 06/05/2013

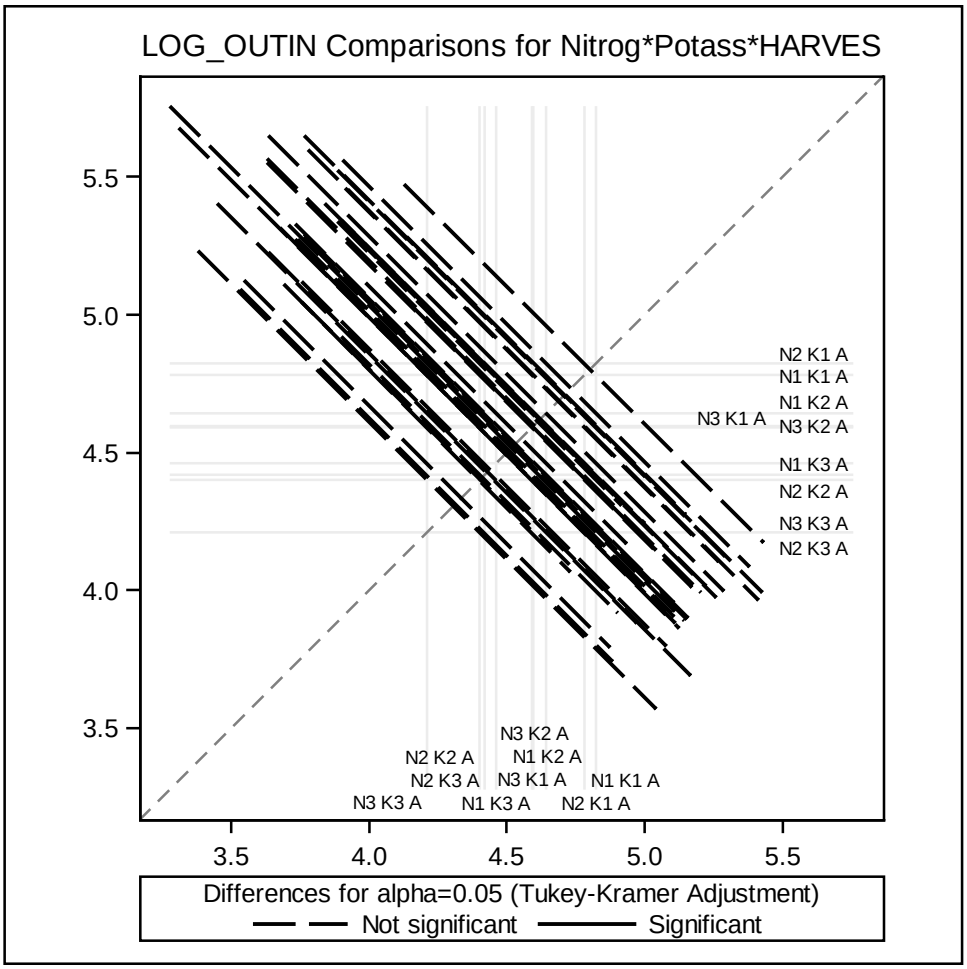
The GLIMMIX Procedure

*Simple Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	Nitrogen	Potassium	Nitrogen	Potassium	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
HARVEST A	N1	K1	N1	K2	0.1368	0.3255	1561	0.42	0.6744	1.0000
HARVEST A	N1	K1	N1	K3	0.3198	0.3629	1807	0.88	0.3783	0.9939
HARVEST A	N1	K1	N2	K1	-0.04387	0.4199	98.43	-0.10	0.9170	1.0000
HARVEST A	N1	K1	N2	K2	0.3790	0.4971	213	0.76	0.4466	0.9978
HARVEST A	N1	K1	N2	K3	0.3609	0.5077	256.4	0.71	0.4778	0.9987
HARVEST A	N1	K1	N3	K1	0.1901	0.4372	100.8	0.43	0.6647	1.0000
HARVEST A	N1	K1	N3	K2	0.1838	0.5270	284.1	0.35	0.7276	1.0000
HARVEST A	N1	K1	N3	K3	0.5699	0.5798	398.1	0.98	0.3262	0.9874
HARVEST A	N1	K2	N1	K3	0.1831	0.3056	1345	0.60	0.5492	0.9996
HARVEST A	N1	K2	N2	K1	-0.1806	0.4756	200.2	-0.38	0.7045	1.0000
HARVEST A	N1	K2	N2	K2	0.2423	0.3994	84.68	0.61	0.5457	0.9996
HARVEST A	N1	K2	N2	K3	0.2241	0.4436	157.6	0.51	0.6141	0.9999
HARVEST A	N1	K2	N3	K1	0.05329	0.4326	109.2	0.12	0.9022	1.0000
HARVEST A	N1	K2	N3	K2	0.04701	0.4040	94.4	0.12	0.9076	1.0000
HARVEST A	N1	K2	N3	K3	0.4331	0.4911	223.5	0.88	0.3787	0.9939
HARVEST A	N1	K3	N2	K1	-0.3637	0.5325	290.4	-0.68	0.4951	0.9990
HARVEST A	N1	K3	N2	K2	0.05921	0.4954	208.4	0.12	0.9050	1.0000
HARVEST A	N1	K3	N2	K3	0.04108	0.4267	115	0.10	0.9235	1.0000
HARVEST A	N1	K3	N3	K1	-0.1298	0.4478	125.1	-0.29	0.7724	1.0000
HARVEST A	N1	K3	N3	K2	-0.1361	0.4498	153.6	-0.30	0.7627	1.0000
HARVEST A	N1	K3	N3	K3	0.2501	0.4291	115.4	0.58	0.5611	0.9997
HARVEST A	N2	K1	N2	K2	0.4229	0.3325	1603	1.27	0.2036	0.9395
HARVEST A	N2	K1	N2	K3	0.4048	0.3754	1880	1.08	0.2811	0.9773
HARVEST A	N2	K1	N3	K1	0.2339	0.4530	132	0.52	0.6064	0.9999
HARVEST A	N2	K1	N3	K2	0.2276	0.5346	336.7	0.43	0.6705	1.0000
HARVEST A	N2	K1	N3	K3	0.6138	0.6022	486.8	1.02	0.3086	0.9841
HARVEST A	N2	K2	N2	K3	-0.01813	0.3231	1481	-0.06	0.9553	1.0000
HARVEST A	N2	K2	N3	K1	-0.1890	0.4684	159.8	-0.40	0.6871	1.0000
HARVEST A	N2	K2	N3	K2	-0.1953	0.4343	138.7	-0.45	0.6537	1.0000
HARVEST A	N2	K2	N3	K3	0.1909	0.5356	316.1	0.36	0.7218	1.0000
HARVEST A	N2	K3	N3	K1	-0.1709	0.4421	137.4	-0.39	0.6997	1.0000
HARVEST A	N2	K3	N3	K2	-0.1771	0.4366	161.8	-0.41	0.6855	1.0000
HARVEST A	N2	K3	N3	K3	0.2090	0.4355	142.5	0.48	0.6321	0.9999
HARVEST A	N3	K1	N3	K2	-0.00628	0.2900	1149	-0.02	0.9827	1.0000
HARVEST A	N3	K1	N3	K3	0.3799	0.3364	1581	1.13	0.2590	0.9699
HARVEST A	N3	K2	N3	K3	0.3861	0.2919	1190	1.32	0.1862	0.9248

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



*Tukey-Kramer Grouping for Nitrog*Potass*HARVES Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*Nitrogen*	*Potassium*	*Estimate*	
HARVEST A	N2	K1	4.8233	A
HARVEST A				A
HARVEST A	N1	K1	4.7794	A
HARVEST A				A
HARVEST A	N1	K2	4.6427	A
HARVEST A				A
HARVEST A	N3	K2	4.5957	A
HARVEST A				A
HARVEST A	N3	K1	4.5894	A
HARVEST A				A
HARVEST A	N1	K3	4.4596	A
HARVEST A				A
HARVEST A	N2	K3	4.4185	A
HARVEST A				A
HARVEST A	N2	K2	4.4004	A

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Tukey-Kramer Grouping for Nitrog*Potass*HARVES Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*Nitrogen*	*Potassium*	*Estimate*	
HARVEST A				A
HARVEST A	N3	K3	4.2095	A

*F Test for Nitrog*Potass*HARVES Least Squares Means Slice*

Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST B	8	4.307	2.34	0.2030

*Simple Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

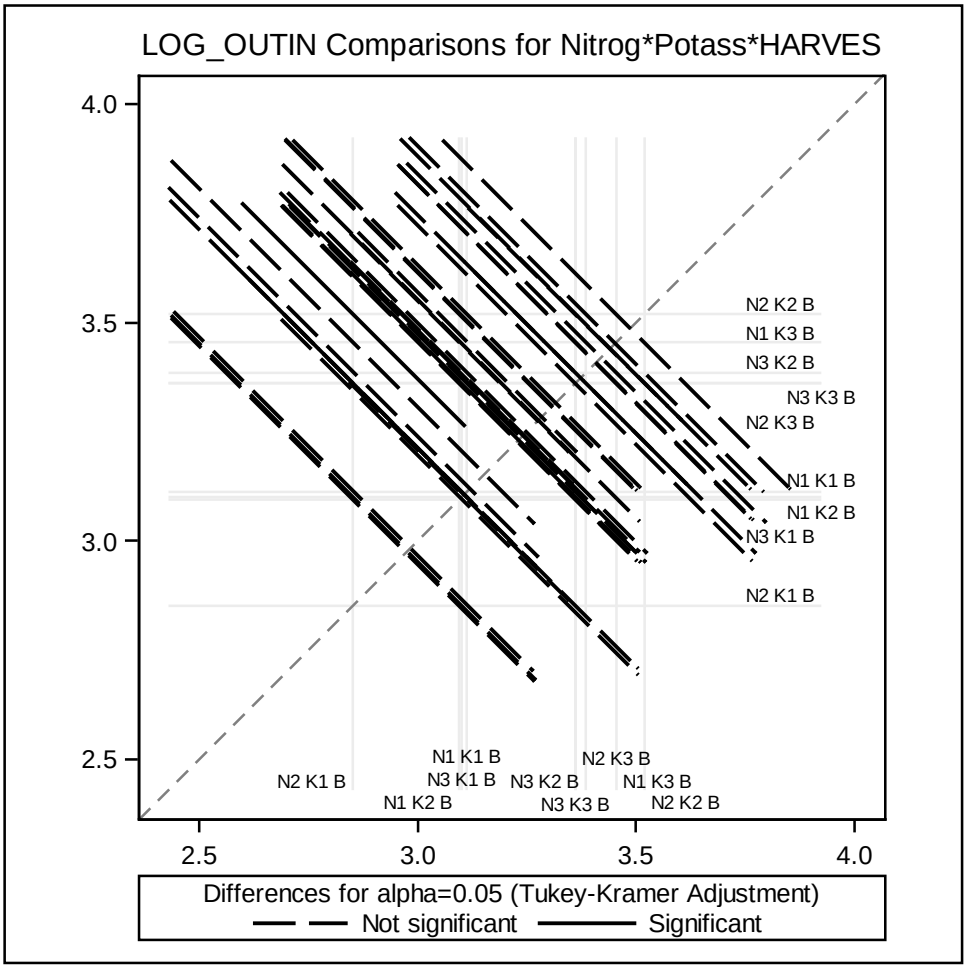
Slice	*Nitrogen*	*Potassium*	*Nitrogen*	*Potassium*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST B	N1	K1	N1	K2	0.01822	0.1620	197.5	0.11	0.9106	1.0000
HARVEST B	N1	K1	N1	K3	-0.3414	0.1620	197.1	-2.11	0.0364	0.4686
HARVEST B	N1	K1	N2	K1	0.2611	0.2654	5.363	0.98	0.3674	0.9874
HARVEST B	N1	K1	N2	K2	-0.4052	0.2568	4.813	-1.58	0.1776	0.8169
HARVEST B	N1	K1	N2	K3	-0.2467	0.2617	5.475	-0.94	0.3857	0.9905
HARVEST B	N1	K1	N3	K1	0.01364	0.2618	4.961	0.05	0.9605	1.0000
HARVEST B	N1	K1	N3	K2	-0.2719	0.2658	5.274	-1.02	0.3510	0.9838
HARVEST B	N1	K1	N3	K3	-0.2477	0.2635	5.592	-0.94	0.3860	0.9906
HARVEST B	N1	K2	N1	K3	-0.3597	0.1614	186.2	-2.23	0.0270	0.3872
HARVEST B	N1	K2	N2	K1	0.2429	0.2678	5.602	0.91	0.4017	0.9926
HARVEST B	N1	K2	N2	K2	-0.4235	0.2568	4.628	-1.65	0.1647	0.7773
HARVEST B	N1	K2	N2	K3	-0.2649	0.2615	5.225	-1.01	0.3557	0.9848
HARVEST B	N1	K2	N3	K1	-0.00458	0.2629	5.104	-0.02	0.9868	1.0000
HARVEST B	N1	K2	N3	K2	-0.2901	0.2652	5.098	-1.09	0.3229	0.9752
HARVEST B	N1	K2	N3	K3	-0.2659	0.2627	5.367	-1.01	0.3548	0.9848
HARVEST B	N1	K3	N2	K1	0.6026	0.2677	5.446	2.25	0.0699	0.3730
HARVEST B	N1	K3	N2	K2	-0.06380	0.2572	4.566	-0.25	0.8149	1.0000
HARVEST B	N1	K3	N2	K3	0.09479	0.2601	4.832	0.36	0.7309	1.0000
HARVEST B	N1	K3	N3	K1	0.3551	0.2634	4.953	1.35	0.2359	0.9165
HARVEST B	N1	K3	N3	K2	0.06953	0.2653	4.889	0.26	0.8039	1.0000
HARVEST B	N1	K3	N3	K3	0.09373	0.2621	5.019	0.36	0.7352	1.0000
HARVEST B	N2	K1	N2	K2	-0.6663	0.1652	200.3	-4.03	<.0001	0.0019
HARVEST B	N2	K1	N2	K3	-0.5078	0.1689	219.3	-3.01	0.0030	0.0664
HARVEST B	N2	K1	N3	K1	-0.2475	0.2691	5.281	-0.92	0.3979	0.9919
HARVEST B	N2	K1	N3	K2	-0.5330	0.2727	5.376	-1.95	0.1040	0.5755

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Simple Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*Nitrogen*	*Potassium*	*Nitrogen*	*Potassium*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST B	N2	K1	N3	K3	-0.5088	0.2702	5.776	-1.88	0.1106	0.6257
HARVEST B	N2	K2	N2	K3	0.1586	0.1571	165.6	1.01	0.3141	0.9851
HARVEST B	N2	K2	N3	K1	0.4189	0.2594	4.602	1.61	0.1723	0.7969
HARVEST B	N2	K2	N3	K2	0.1333	0.2612	4.405	0.51	0.6342	0.9999
HARVEST B	N2	K2	N3	K3	0.1575	0.2588	4.766	0.61	0.5705	0.9996
HARVEST B	N2	K3	N3	K1	0.2603	0.2638	5.128	0.99	0.3681	0.9871
HARVEST B	N2	K3	N3	K2	-0.02526	0.2662	5.019	-0.09	0.9281	1.0000
HARVEST B	N2	K3	N3	K3	-0.00106	0.2621	5.103	-0.00	0.9969	1.0000
HARVEST B	N3	K1	N3	K2	-0.2855	0.1647	197	-1.73	0.0846	0.7258
HARVEST B	N3	K1	N3	K3	-0.2613	0.1639	193	-1.59	0.1125	0.8082
HARVEST B	N3	K2	N3	K3	0.02420	0.1640	194.8	0.15	0.8828	1.0000



Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Tukey-Kramer Grouping for Nitrog*Potass*HARVES Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*Nitrogen*	*Potassium*	*Estimate*		
HARVEST B	N2	K2	3.5185		A
HARVEST B					A
HARVEST B	N1	K3	3.4547	B	A
HARVEST B				B	A
HARVEST B	N3	K2	3.3852	B	A
HARVEST B				B	A
HARVEST B	N3	K3	3.3610	B	A
HARVEST B				B	A
HARVEST B	N2	K3	3.3599	B	A
HARVEST B				B	A
HARVEST B	N1	K1	3.1133	B	A
HARVEST B				B	A
HARVEST B	N3	K1	3.0996	B	A
HARVEST B				B	A
HARVEST B	N1	K2	3.0951	B	A
HARVEST B				B	
HARVEST B	N2	K1	2.8522	B	

*F Test for Nitrog*Potass*HARVES Least Squares Means Slice*

Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST C	8	5.278	1.10	0.4782

*Simple Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*Nitrogen*	*Potassium*	*Nitrogen*	*Potassium*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST C	N1	K1	N1	K2	-0.2901	0.1720	223.8	-1.69	0.0930	0.7546
HARVEST C	N1	K1	N1	K3	-0.1181	0.1528	150.1	-0.77	0.4410	0.9976
HARVEST C	N1	K1	N2	K1	-0.07453	0.2615	4.484	-0.29	0.7883	1.0000
HARVEST C	N1	K1	N2	K2	-0.5265	0.2563	5.218	-2.05	0.0928	0.5053
HARVEST C	N1	K1	N2	K3	-0.2836	0.2591	5.214	-1.09	0.3217	0.9751
HARVEST C	N1	K1	N3	K1	-0.1571	0.2664	5.028	-0.59	0.5808	0.9997
HARVEST C	N1	K1	N3	K2	-0.1637	0.2616	4.487	-0.63	0.5620	0.9995
HARVEST C	N1	K1	N3	K3	-0.2770	0.2681	6.747	-1.03	0.3372	0.9827
HARVEST C	N1	K2	N1	K3	0.1721	0.1679	204.3	1.02	0.3066	0.9836
HARVEST C	N1	K2	N2	K1	0.2156	0.2713	6.926	0.79	0.4532	0.9970

Statistical Analysis: 06/05/2013

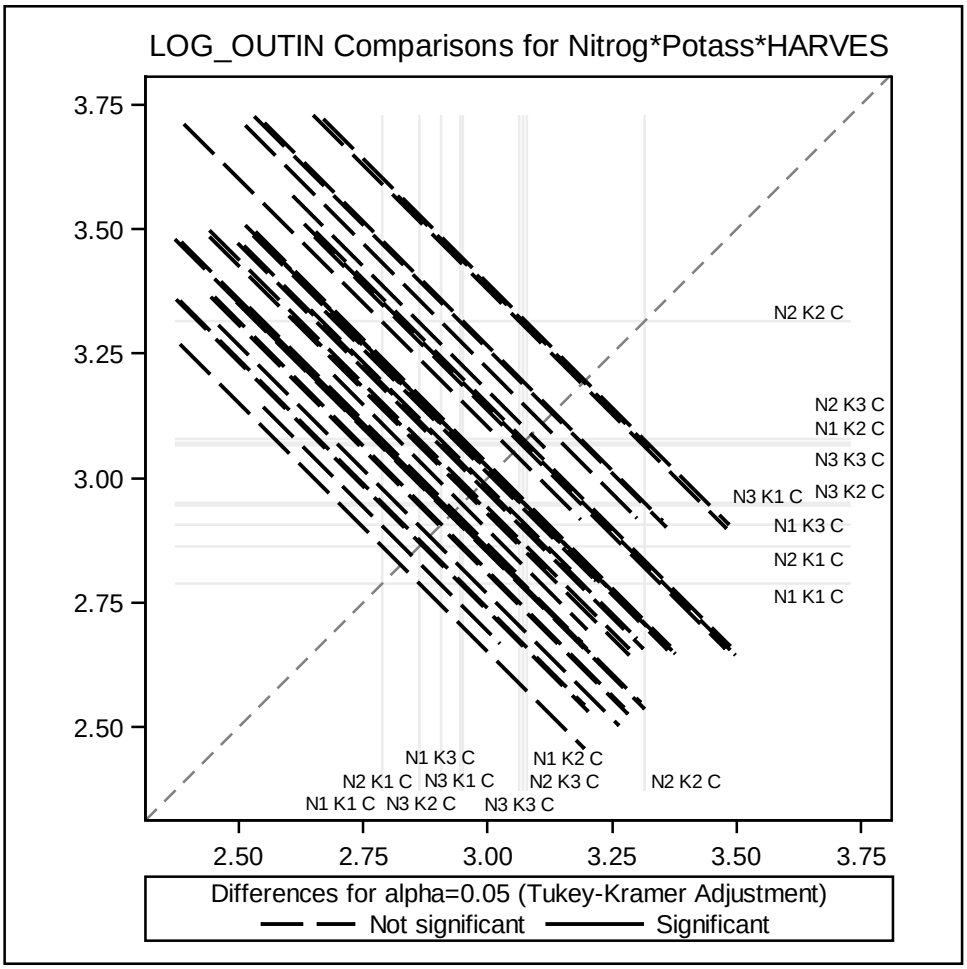
The GLIMMIX Procedure

*Simple Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	Nitrogen	Potassium	Nitrogen	Potassium	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
HARVEST C	N1	K2	N2	K2	-0.2364	0.2625	7.153	-0.90	0.3971	0.9930
HARVEST C	N1	K2	N2	K3	0.006513	0.2685	7.838	0.02	0.9813	1.0000
HARVEST C	N1	K2	N3	K1	0.1330	0.2776	7.887	0.48	0.6449	0.9999
HARVEST C	N1	K2	N3	K2	0.1265	0.2684	6.242	0.47	0.6535	0.9999
HARVEST C	N1	K2	N3	K3	0.01317	0.2794	10.32	0.05	0.9633	1.0000
HARVEST C	N1	K3	N2	K1	0.04354	0.2590	4.389	0.17	0.8740	1.0000
HARVEST C	N1	K3	N2	K2	-0.4084	0.2536	5.097	-1.61	0.1672	0.7995
HARVEST C	N1	K3	N2	K3	-0.1655	0.2543	4.688	-0.65	0.5456	0.9993
HARVEST C	N1	K3	N3	K1	-0.03908	0.2639	4.969	-0.15	0.8881	1.0000
HARVEST C	N1	K3	N3	K2	-0.04560	0.2586	4.343	-0.18	0.8680	1.0000
HARVEST C	N1	K3	N3	K3	-0.1589	0.2622	5.987	-0.61	0.5668	0.9996
HARVEST C	N2	K1	N2	K2	-0.4520	0.1632	187.6	-2.77	0.0062	0.1253
HARVEST C	N2	K1	N2	K3	-0.2091	0.1645	191.4	-1.27	0.2054	0.9398
HARVEST C	N2	K1	N3	K1	-0.08262	0.2696	4.986	-0.31	0.7716	1.0000
HARVEST C	N2	K1	N3	K2	-0.08913	0.2652	4.765	-0.34	0.7511	1.0000
HARVEST C	N2	K1	N3	K3	-0.2024	0.2715	6.993	-0.75	0.4802	0.9981
HARVEST C	N2	K2	N2	K3	0.2429	0.1631	189.5	1.49	0.1381	0.8608
HARVEST C	N2	K2	N3	K1	0.3693	0.2663	6.218	1.39	0.2131	0.9030
HARVEST C	N2	K2	N3	K2	0.3628	0.2579	5.204	1.41	0.2164	0.8956
HARVEST C	N2	K2	N3	K3	0.2495	0.2669	8.39	0.93	0.3760	0.9910
HARVEST C	N2	K3	N3	K1	0.1265	0.2688	5.84	0.47	0.6551	0.9999
HARVEST C	N2	K3	N3	K2	0.1199	0.2631	5.359	0.46	0.6664	1.0000
HARVEST C	N2	K3	N3	K3	0.006656	0.2665	7.153	0.02	0.9808	1.0000
HARVEST C	N3	K1	N3	K2	-0.00652	0.1645	182.1	-0.04	0.9684	1.0000
HARVEST C	N3	K1	N3	K3	-0.1198	0.1750	221.2	-0.68	0.4942	0.9990
HARVEST C	N3	K2	N3	K3	-0.1133	0.1722	226.8	-0.66	0.5113	0.9992

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



*Tukey-Kramer Grouping for Nitrog*Potass*HARVES Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*Nitrogen*	*Potassium*	*Estimate*	
HARVEST C	N2	K2	3.3143	A
HARVEST C				A
HARVEST C	N1	K2	3.0780	A
HARVEST C				A
HARVEST C	N2	K3	3.0715	A
HARVEST C				A
HARVEST C	N3	K3	3.0648	A
HARVEST C				A
HARVEST C	N3	K2	2.9515	A
HARVEST C				A
HARVEST C	N3	K1	2.9450	A
HARVEST C				A
HARVEST C	N1	K3	2.9059	A
HARVEST C				A
HARVEST C	N2	K1	2.8624	A

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Tukey-Kramer Grouping for Nitrog*Potass*HARVES Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*Nitrogen*	*Potassium*	*Estimate*	
HARVEST C				A
HARVEST C	N1	K1	2.7878	A

*F Test for Nitrog*Potass*HARVES Least Squares Means Slice*

Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST D	8	8.551	0.89	0.5599

*Simple Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

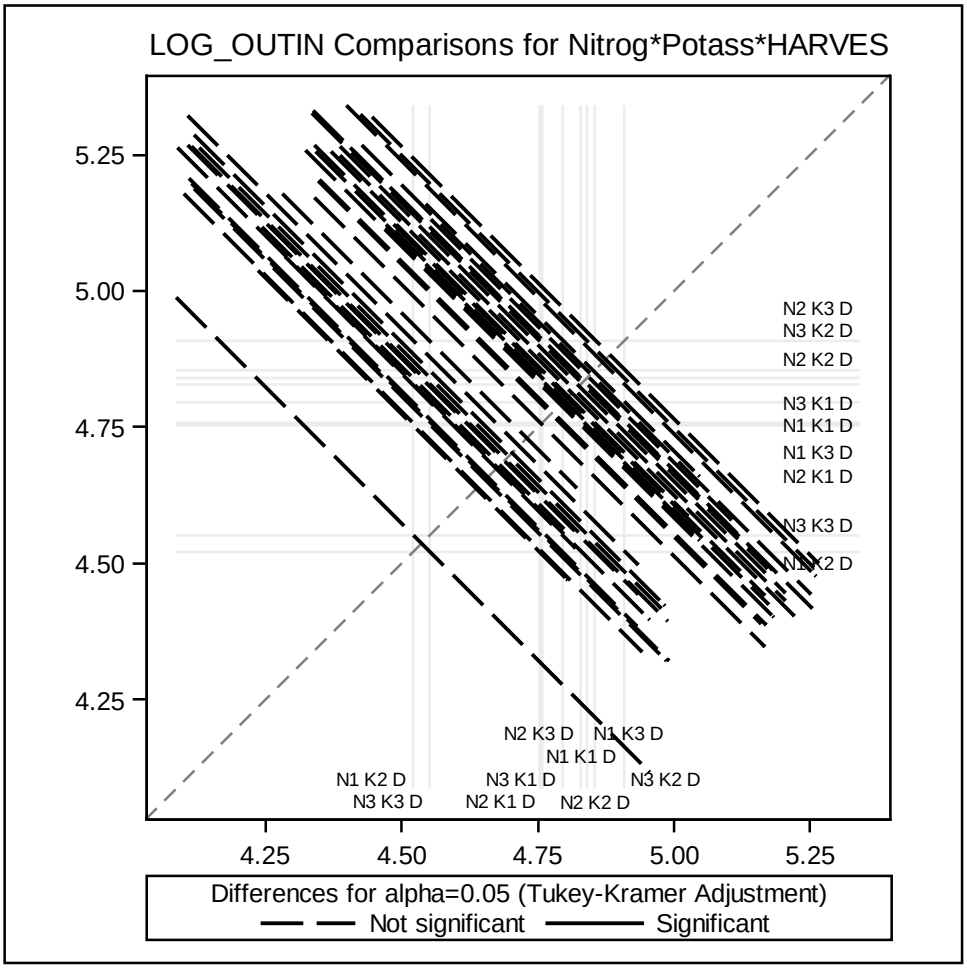
Slice	*Nitrogen*	*Potassium*	*Nitrogen*	*Potassium*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST D	N1	K1	N1	K2	0.2324	0.1831	262.8	1.27	0.2055	0.9402
HARVEST D	N1	K1	N1	K3	-0.08651	0.1819	275.7	-0.48	0.6348	0.9999
HARVEST D	N1	K1	N2	K1	-0.00522	0.2661	10.21	-0.02	0.9847	1.0000
HARVEST D	N1	K1	N2	K2	-0.1017	0.2663	8.549	-0.38	0.7118	1.0000
HARVEST D	N1	K1	N2	K3	-0.07617	0.2768	10.34	-0.28	0.7886	1.0000
HARVEST D	N1	K1	N3	K1	-0.04201	0.2617	7.584	-0.16	0.8767	1.0000
HARVEST D	N1	K1	N3	K2	-0.1554	0.2692	9.754	-0.58	0.5768	0.9997
HARVEST D	N1	K1	N3	K3	0.2015	0.2793	11.65	0.72	0.4849	0.9985
HARVEST D	N1	K2	N1	K3	-0.3189	0.1784	242.5	-1.79	0.0752	0.6909
HARVEST D	N1	K2	N2	K1	-0.2376	0.2709	9.181	-0.88	0.4028	0.9941
HARVEST D	N1	K2	N2	K2	-0.3341	0.2659	6.566	-1.26	0.2518	0.9435
HARVEST D	N1	K2	N2	K3	-0.3086	0.2794	8.781	-1.10	0.2987	0.9737
HARVEST D	N1	K2	N3	K1	-0.2744	0.2653	6.637	-1.03	0.3372	0.9826
HARVEST D	N1	K2	N3	K2	-0.3878	0.2659	6.918	-1.46	0.1886	0.8746
HARVEST D	N1	K2	N3	K3	-0.03091	0.2805	9.639	-0.11	0.9145	1.0000
HARVEST D	N1	K3	N2	K1	0.08129	0.2682	8.712	0.30	0.7689	1.0000
HARVEST D	N1	K3	N2	K2	-0.01523	0.2656	6.684	-0.06	0.9560	1.0000
HARVEST D	N1	K3	N2	K3	0.01034	0.2731	7.483	0.04	0.9708	1.0000
HARVEST D	N1	K3	N3	K1	0.04450	0.2638	6.465	0.17	0.8712	1.0000
HARVEST D	N1	K3	N3	K2	-0.06889	0.2675	7.443	-0.26	0.8038	1.0000
HARVEST D	N1	K3	N3	K3	0.2880	0.2731	7.9	1.05	0.3227	0.9803
HARVEST D	N2	K1	N2	K2	-0.09652	0.1726	231.8	-0.56	0.5765	0.9998
HARVEST D	N2	K1	N2	K3	-0.07095	0.1851	297.4	-0.38	0.7017	1.0000
HARVEST D	N2	K1	N3	K1	-0.03679	0.2641	6.671	-0.14	0.8933	1.0000
HARVEST D	N2	K1	N3	K2	-0.1502	0.2716	8.695	-0.55	0.5942	0.9998

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Simple Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*Nitrogen*	*Potassium*	*Nitrogen*	*Potassium*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST D	N2	K1	N3	K3	0.2067	0.2825	10.1	0.73	0.4809	0.9983
HARVEST D	N2	K2	N2	K3	0.02557	0.1781	264.6	0.14	0.8860	1.0000
HARVEST D	N2	K2	N3	K1	0.05973	0.2639	5.355	0.23	0.8293	1.0000
HARVEST D	N2	K2	N3	K2	-0.05366	0.2644	5.65	-0.20	0.8463	1.0000
HARVEST D	N2	K2	N3	K3	0.3032	0.2785	7.477	1.09	0.3101	0.9759
HARVEST D	N2	K3	N3	K1	0.03416	0.2745	6.767	0.12	0.9046	1.0000
HARVEST D	N2	K3	N3	K2	-0.07923	0.2783	7.847	-0.28	0.7833	1.0000
HARVEST D	N2	K3	N3	K3	0.2777	0.2814	7.321	0.99	0.3553	0.9871
HARVEST D	N3	K1	N3	K2	-0.1134	0.1613	182.1	-0.70	0.4831	0.9988
HARVEST D	N3	K1	N3	K3	0.2435	0.1723	230.3	1.41	0.1588	0.8929
HARVEST D	N3	K2	N3	K3	0.3569	0.1743	238	2.05	0.0417	0.5099



Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Tukey-Kramer Grouping for Nitrog*Potass*HARVES Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	Nitrogen	Potassium	Estimate	
HARVEST D	N3	K2	4.9087	A
HARVEST D				A
HARVEST D	N2	K2	4.8551	A
HARVEST D				A
HARVEST D	N1	K3	4.8398	A
HARVEST D				A
HARVEST D	N2	K3	4.8295	A
HARVEST D				A
HARVEST D	N3	K1	4.7953	A
HARVEST D				A
HARVEST D	N2	K1	4.7585	A
HARVEST D				A
HARVEST D	N1	K1	4.7533	A
HARVEST D				A
HARVEST D	N3	K3	4.5518	A
HARVEST D				A
HARVEST D	N1	K2	4.5209	A

*F Test for Nitrog*Potass*HARVES Least Squares Means Slice*

Slice	Num DF	Den DF	F Value	Pr > F
HARVEST A	8	392.7	0.53	0.8307

*Simple Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	Nitrogen	Potassium	Nitrogen	Potassium	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
HARVEST A	N1	K1	N1	K2	0.1368	0.3255	1561	0.42	0.6744	1.0000
HARVEST A	N1	K1	N1	K3	0.3198	0.3629	1807	0.88	0.3783	0.9939
HARVEST A	N1	K1	N2	K1	-0.04387	0.4199	98.43	-0.10	0.9170	1.0000
HARVEST A	N1	K1	N2	K2	0.3790	0.4971	213	0.76	0.4466	0.9978
HARVEST A	N1	K1	N2	K3	0.3609	0.5077	256.4	0.71	0.4778	0.9987
HARVEST A	N1	K1	N3	K1	0.1901	0.4372	100.8	0.43	0.6647	1.0000
HARVEST A	N1	K1	N3	K2	0.1838	0.5270	284.1	0.35	0.7276	1.0000
HARVEST A	N1	K1	N3	K3	0.5699	0.5798	398.1	0.98	0.3262	0.9874
HARVEST A	N1	K2	N1	K3	0.1831	0.3056	1345	0.60	0.5492	0.9996
HARVEST A	N1	K2	N2	K1	-0.1806	0.4756	200.2	-0.38	0.7045	1.0000

Statistical Analysis: 06/05/2013

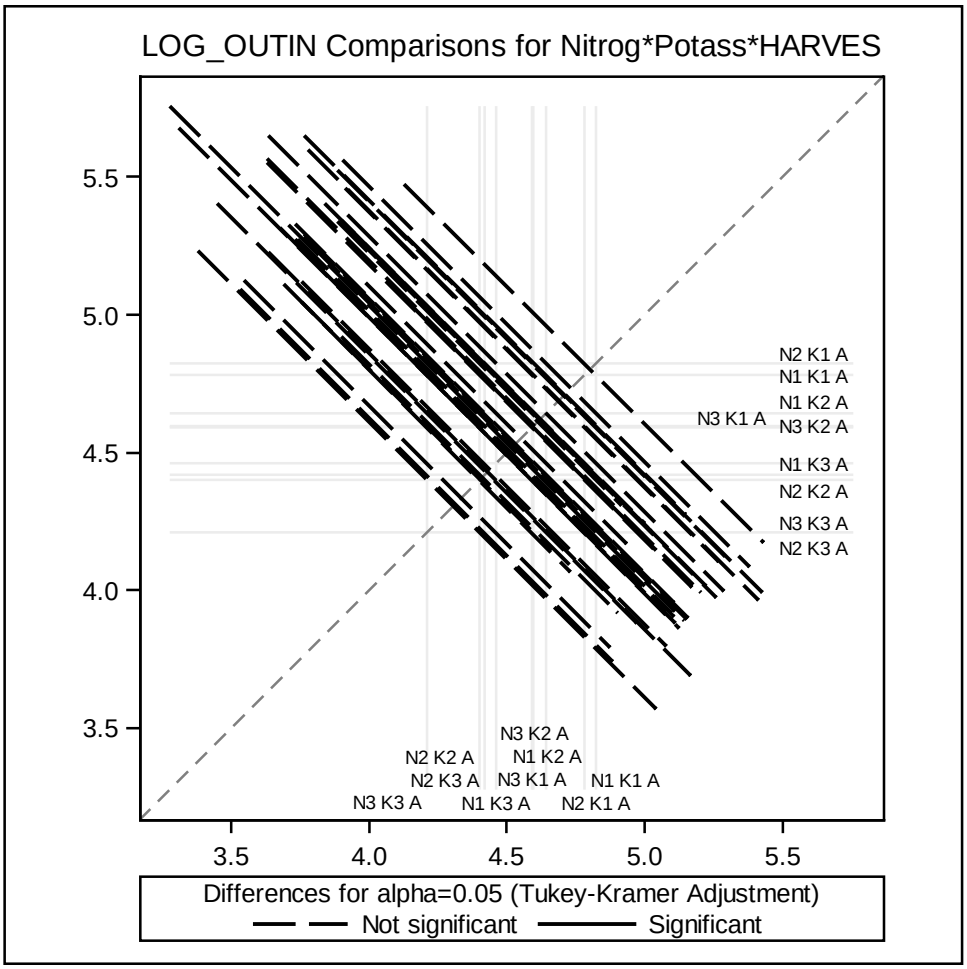
The GLIMMIX Procedure

*Simple Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	Nitrogen	Potassium	Nitrogen	Potassium	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
HARVEST A	N1	K2	N2	K2	0.2423	0.3994	84.68	0.61	0.5457	0.9996
HARVEST A	N1	K2	N2	K3	0.2241	0.4436	157.6	0.51	0.6141	0.9999
HARVEST A	N1	K2	N3	K1	0.05329	0.4326	109.2	0.12	0.9022	1.0000
HARVEST A	N1	K2	N3	K2	0.04701	0.4040	94.4	0.12	0.9076	1.0000
HARVEST A	N1	K2	N3	K3	0.4331	0.4911	223.5	0.88	0.3787	0.9939
HARVEST A	N1	K3	N2	K1	-0.3637	0.5325	290.4	-0.68	0.4951	0.9990
HARVEST A	N1	K3	N2	K2	0.05921	0.4954	208.4	0.12	0.9050	1.0000
HARVEST A	N1	K3	N2	K3	0.04108	0.4267	115	0.10	0.9235	1.0000
HARVEST A	N1	K3	N3	K1	-0.1298	0.4478	125.1	-0.29	0.7724	1.0000
HARVEST A	N1	K3	N3	K2	-0.1361	0.4498	153.6	-0.30	0.7627	1.0000
HARVEST A	N1	K3	N3	K3	0.2501	0.4291	115.4	0.58	0.5611	0.9997
HARVEST A	N2	K1	N2	K2	0.4229	0.3325	1603	1.27	0.2036	0.9395
HARVEST A	N2	K1	N2	K3	0.4048	0.3754	1880	1.08	0.2811	0.9773
HARVEST A	N2	K1	N3	K1	0.2339	0.4530	132	0.52	0.6064	0.9999
HARVEST A	N2	K1	N3	K2	0.2276	0.5346	336.7	0.43	0.6705	1.0000
HARVEST A	N2	K1	N3	K3	0.6138	0.6022	486.8	1.02	0.3086	0.9841
HARVEST A	N2	K2	N2	K3	-0.01813	0.3231	1481	-0.06	0.9553	1.0000
HARVEST A	N2	K2	N3	K1	-0.1890	0.4684	159.8	-0.40	0.6871	1.0000
HARVEST A	N2	K2	N3	K2	-0.1953	0.4343	138.7	-0.45	0.6537	1.0000
HARVEST A	N2	K2	N3	K3	0.1909	0.5356	316.1	0.36	0.7218	1.0000
HARVEST A	N2	K3	N3	K1	-0.1709	0.4421	137.4	-0.39	0.6997	1.0000
HARVEST A	N2	K3	N3	K2	-0.1771	0.4366	161.8	-0.41	0.6855	1.0000
HARVEST A	N2	K3	N3	K3	0.2090	0.4355	142.5	0.48	0.6321	0.9999
HARVEST A	N3	K1	N3	K2	-0.00628	0.2900	1149	-0.02	0.9827	1.0000
HARVEST A	N3	K1	N3	K3	0.3799	0.3364	1581	1.13	0.2590	0.9699
HARVEST A	N3	K2	N3	K3	0.3861	0.2919	1190	1.32	0.1862	0.9248

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



*Tukey-Kramer Grouping for Nitrog*Potass*HARVES Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*Nitrogen*	*Potassium*	*Estimate*	
HARVEST A	N2	K1	4.8233	A
HARVEST A				A
HARVEST A	N1	K1	4.7794	A
HARVEST A				A
HARVEST A	N1	K2	4.6427	A
HARVEST A				A
HARVEST A	N3	K2	4.5957	A
HARVEST A				A
HARVEST A	N3	K1	4.5894	A
HARVEST A				A
HARVEST A	N1	K3	4.4596	A
HARVEST A				A
HARVEST A	N2	K3	4.4185	A
HARVEST A				A
HARVEST A	N2	K2	4.4004	A

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Tukey-Kramer Grouping for Nitrog*Potass*HARVES Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*Nitrogen*	*Potassium*	*Estimate*	
HARVEST A				A
HARVEST A	N3	K3	4.2095	A

*F Test for Nitrog*Potass*HARVES Least Squares Means Slice*

Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST B	8	4.307	2.34	0.2030

*Simple Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

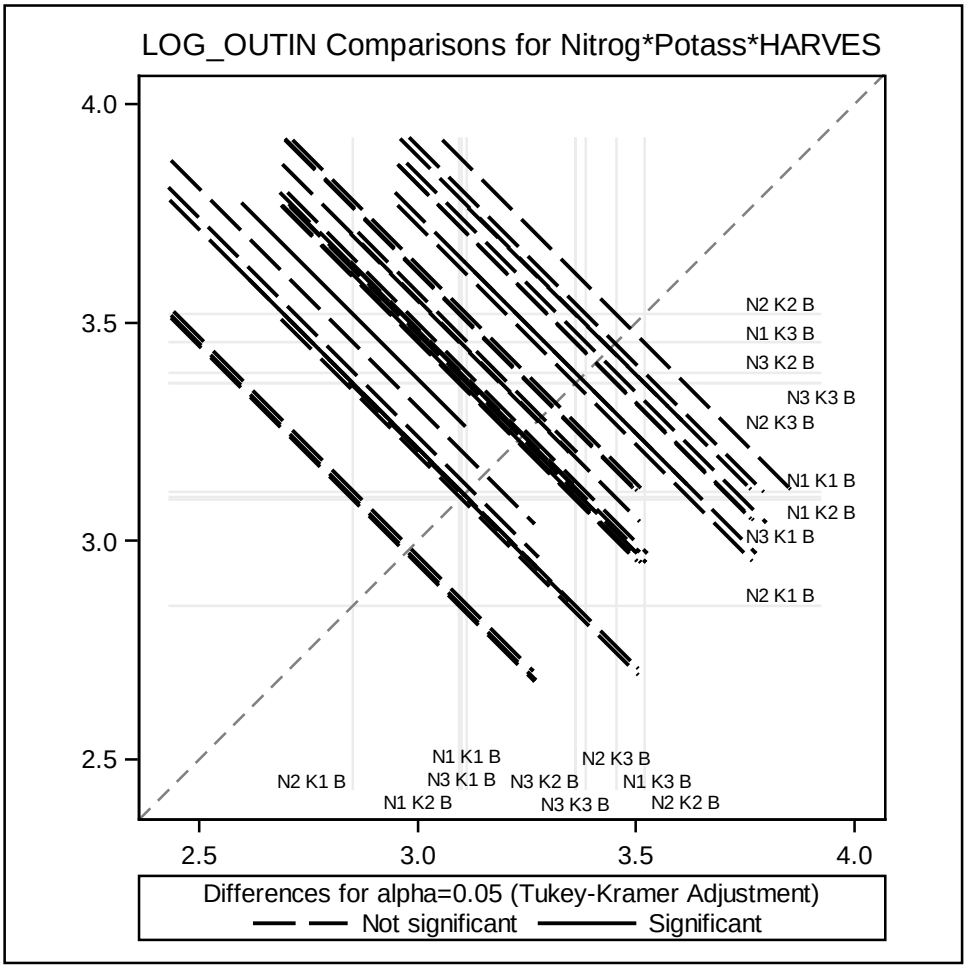
Slice	*Nitrogen*	*Potassium*	*Nitrogen*	*Potassium*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST B	N1	K1	N1	K2	0.01822	0.1620	197.5	0.11	0.9106	1.0000
HARVEST B	N1	K1	N1	K3	-0.3414	0.1620	197.1	-2.11	0.0364	0.4686
HARVEST B	N1	K1	N2	K1	0.2611	0.2654	5.363	0.98	0.3674	0.9874
HARVEST B	N1	K1	N2	K2	-0.4052	0.2568	4.813	-1.58	0.1776	0.8169
HARVEST B	N1	K1	N2	K3	-0.2467	0.2617	5.475	-0.94	0.3857	0.9905
HARVEST B	N1	K1	N3	K1	0.01364	0.2618	4.961	0.05	0.9605	1.0000
HARVEST B	N1	K1	N3	K2	-0.2719	0.2658	5.274	-1.02	0.3510	0.9838
HARVEST B	N1	K1	N3	K3	-0.2477	0.2635	5.592	-0.94	0.3860	0.9906
HARVEST B	N1	K2	N1	K3	-0.3597	0.1614	186.2	-2.23	0.0270	0.3872
HARVEST B	N1	K2	N2	K1	0.2429	0.2678	5.602	0.91	0.4017	0.9926
HARVEST B	N1	K2	N2	K2	-0.4235	0.2568	4.628	-1.65	0.1647	0.7773
HARVEST B	N1	K2	N2	K3	-0.2649	0.2615	5.225	-1.01	0.3557	0.9848
HARVEST B	N1	K2	N3	K1	-0.00458	0.2629	5.104	-0.02	0.9868	1.0000
HARVEST B	N1	K2	N3	K2	-0.2901	0.2652	5.098	-1.09	0.3229	0.9752
HARVEST B	N1	K2	N3	K3	-0.2659	0.2627	5.367	-1.01	0.3548	0.9848
HARVEST B	N1	K3	N2	K1	0.6026	0.2677	5.446	2.25	0.0699	0.3730
HARVEST B	N1	K3	N2	K2	-0.06380	0.2572	4.566	-0.25	0.8149	1.0000
HARVEST B	N1	K3	N2	K3	0.09479	0.2601	4.832	0.36	0.7309	1.0000
HARVEST B	N1	K3	N3	K1	0.3551	0.2634	4.953	1.35	0.2359	0.9165
HARVEST B	N1	K3	N3	K2	0.06953	0.2653	4.889	0.26	0.8039	1.0000
HARVEST B	N1	K3	N3	K3	0.09373	0.2621	5.019	0.36	0.7352	1.0000
HARVEST B	N2	K1	N2	K2	-0.6663	0.1652	200.3	-4.03	<.0001	0.0019
HARVEST B	N2	K1	N2	K3	-0.5078	0.1689	219.3	-3.01	0.0030	0.0664
HARVEST B	N2	K1	N3	K1	-0.2475	0.2691	5.281	-0.92	0.3979	0.9919
HARVEST B	N2	K1	N3	K2	-0.5330	0.2727	5.376	-1.95	0.1040	0.5755

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Simple Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*Nitrogen*	*Potassium*	*Nitrogen*	*Potassium*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST B	N2	K1	N3	K3	-0.5088	0.2702	5.776	-1.88	0.1106	0.6257
HARVEST B	N2	K2	N2	K3	0.1586	0.1571	165.6	1.01	0.3141	0.9851
HARVEST B	N2	K2	N3	K1	0.4189	0.2594	4.602	1.61	0.1723	0.7969
HARVEST B	N2	K2	N3	K2	0.1333	0.2612	4.405	0.51	0.6342	0.9999
HARVEST B	N2	K2	N3	K3	0.1575	0.2588	4.766	0.61	0.5705	0.9996
HARVEST B	N2	K3	N3	K1	0.2603	0.2638	5.128	0.99	0.3681	0.9871
HARVEST B	N2	K3	N3	K2	-0.02526	0.2662	5.019	-0.09	0.9281	1.0000
HARVEST B	N2	K3	N3	K3	-0.00106	0.2621	5.103	-0.00	0.9969	1.0000
HARVEST B	N3	K1	N3	K2	-0.2855	0.1647	197	-1.73	0.0846	0.7258
HARVEST B	N3	K1	N3	K3	-0.2613	0.1639	193	-1.59	0.1125	0.8082
HARVEST B	N3	K2	N3	K3	0.02420	0.1640	194.8	0.15	0.8828	1.0000



Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Tukey-Kramer Grouping for Nitrog*Potass*HARVES Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*Nitrogen*	*Potassium*	*Estimate*		
HARVEST B	N2	K2	3.5185		A
HARVEST B					A
HARVEST B	N1	K3	3.4547	B	A
HARVEST B				B	A
HARVEST B	N3	K2	3.3852	B	A
HARVEST B				B	A
HARVEST B	N3	K3	3.3610	B	A
HARVEST B				B	A
HARVEST B	N2	K3	3.3599	B	A
HARVEST B				B	A
HARVEST B	N1	K1	3.1133	B	A
HARVEST B				B	A
HARVEST B	N3	K1	3.0996	B	A
HARVEST B				B	A
HARVEST B	N1	K2	3.0951	B	A
HARVEST B				B	
HARVEST B	N2	K1	2.8522	B	

*F Test for Nitrog*Potass*HARVES Least Squares Means Slice*

Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST C	8	5.278	1.10	0.4782

*Simple Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*Nitrogen*	*Potassium*	*Nitrogen*	*Potassium*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST C	N1	K1	N1	K2	-0.2901	0.1720	223.8	-1.69	0.0930	0.7546
HARVEST C	N1	K1	N1	K3	-0.1181	0.1528	150.1	-0.77	0.4410	0.9976
HARVEST C	N1	K1	N2	K1	-0.07453	0.2615	4.484	-0.29	0.7883	1.0000
HARVEST C	N1	K1	N2	K2	-0.5265	0.2563	5.218	-2.05	0.0928	0.5053
HARVEST C	N1	K1	N2	K3	-0.2836	0.2591	5.214	-1.09	0.3217	0.9751
HARVEST C	N1	K1	N3	K1	-0.1571	0.2664	5.028	-0.59	0.5808	0.9997
HARVEST C	N1	K1	N3	K2	-0.1637	0.2616	4.487	-0.63	0.5620	0.9995
HARVEST C	N1	K1	N3	K3	-0.2770	0.2681	6.747	-1.03	0.3372	0.9827
HARVEST C	N1	K2	N1	K3	0.1721	0.1679	204.3	1.02	0.3066	0.9836
HARVEST C	N1	K2	N2	K1	0.2156	0.2713	6.926	0.79	0.4532	0.9970

Statistical Analysis: 06/05/2013

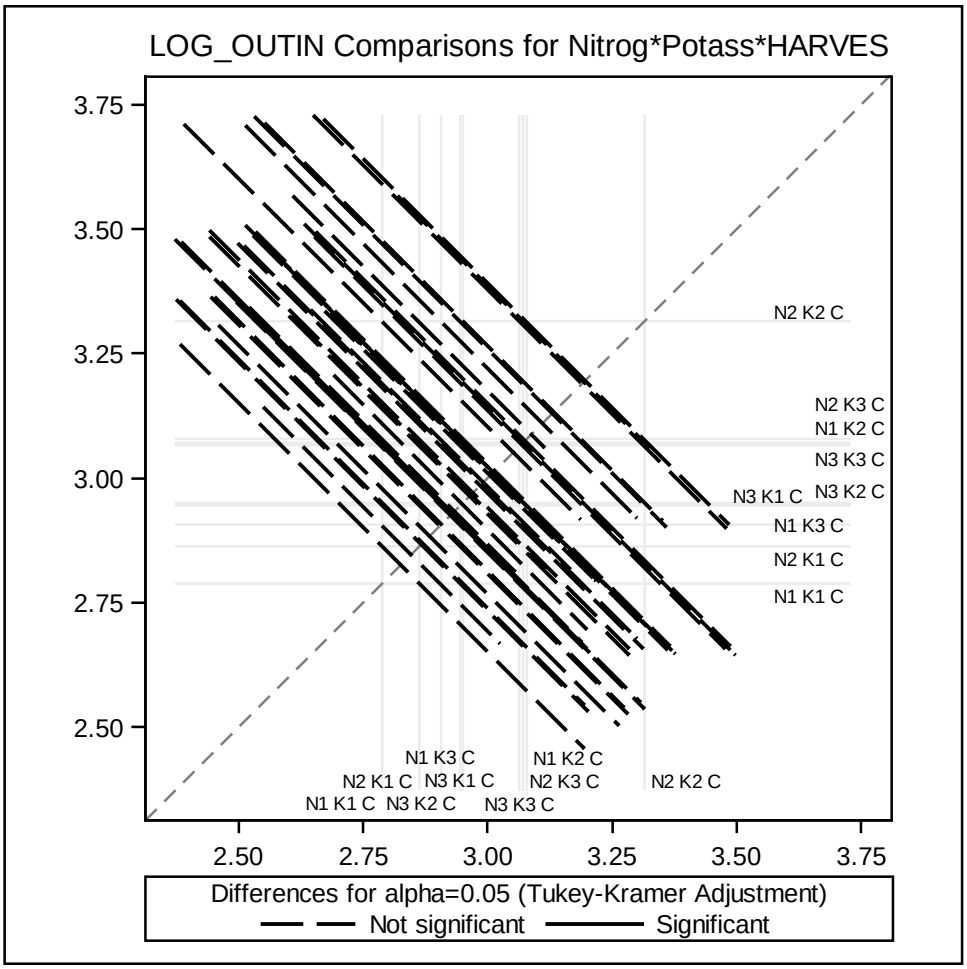
The GLIMMIX Procedure

*Simple Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	Nitrogen	Potassium	Nitrogen	Potassium	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
HARVEST C	N1	K2	N2	K2	-0.2364	0.2625	7.153	-0.90	0.3971	0.9930
HARVEST C	N1	K2	N2	K3	0.006513	0.2685	7.838	0.02	0.9813	1.0000
HARVEST C	N1	K2	N3	K1	0.1330	0.2776	7.887	0.48	0.6449	0.9999
HARVEST C	N1	K2	N3	K2	0.1265	0.2684	6.242	0.47	0.6535	0.9999
HARVEST C	N1	K2	N3	K3	0.01317	0.2794	10.32	0.05	0.9633	1.0000
HARVEST C	N1	K3	N2	K1	0.04354	0.2590	4.389	0.17	0.8740	1.0000
HARVEST C	N1	K3	N2	K2	-0.4084	0.2536	5.097	-1.61	0.1672	0.7995
HARVEST C	N1	K3	N2	K3	-0.1655	0.2543	4.688	-0.65	0.5456	0.9993
HARVEST C	N1	K3	N3	K1	-0.03908	0.2639	4.969	-0.15	0.8881	1.0000
HARVEST C	N1	K3	N3	K2	-0.04560	0.2586	4.343	-0.18	0.8680	1.0000
HARVEST C	N1	K3	N3	K3	-0.1589	0.2622	5.987	-0.61	0.5668	0.9996
HARVEST C	N2	K1	N2	K2	-0.4520	0.1632	187.6	-2.77	0.0062	0.1253
HARVEST C	N2	K1	N2	K3	-0.2091	0.1645	191.4	-1.27	0.2054	0.9398
HARVEST C	N2	K1	N3	K1	-0.08262	0.2696	4.986	-0.31	0.7716	1.0000
HARVEST C	N2	K1	N3	K2	-0.08913	0.2652	4.765	-0.34	0.7511	1.0000
HARVEST C	N2	K1	N3	K3	-0.2024	0.2715	6.993	-0.75	0.4802	0.9981
HARVEST C	N2	K2	N2	K3	0.2429	0.1631	189.5	1.49	0.1381	0.8608
HARVEST C	N2	K2	N3	K1	0.3693	0.2663	6.218	1.39	0.2131	0.9030
HARVEST C	N2	K2	N3	K2	0.3628	0.2579	5.204	1.41	0.2164	0.8956
HARVEST C	N2	K2	N3	K3	0.2495	0.2669	8.39	0.93	0.3760	0.9910
HARVEST C	N2	K3	N3	K1	0.1265	0.2688	5.84	0.47	0.6551	0.9999
HARVEST C	N2	K3	N3	K2	0.1199	0.2631	5.359	0.46	0.6664	1.0000
HARVEST C	N2	K3	N3	K3	0.006656	0.2665	7.153	0.02	0.9808	1.0000
HARVEST C	N3	K1	N3	K2	-0.00652	0.1645	182.1	-0.04	0.9684	1.0000
HARVEST C	N3	K1	N3	K3	-0.1198	0.1750	221.2	-0.68	0.4942	0.9990
HARVEST C	N3	K2	N3	K3	-0.1133	0.1722	226.8	-0.66	0.5113	0.9992

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



*Tukey-Kramer Grouping for Nitrog*Potass*HARVES Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*Nitrogen*	*Potassium*	*Estimate*	
HARVEST C	N2	K2	3.3143	A
HARVEST C				A
HARVEST C	N1	K2	3.0780	A
HARVEST C				A
HARVEST C	N2	K3	3.0715	A
HARVEST C				A
HARVEST C	N3	K3	3.0648	A
HARVEST C				A
HARVEST C	N3	K2	2.9515	A
HARVEST C				A
HARVEST C	N3	K1	2.9450	A
HARVEST C				A
HARVEST C	N1	K3	2.9059	A
HARVEST C				A
HARVEST C	N2	K1	2.8624	A

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Tukey-Kramer Grouping for Nitrog*Potass*HARVES Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*Nitrogen*	*Potassium*	*Estimate*	
HARVEST C				A
HARVEST C	N1	K1	2.7878	A

*F Test for Nitrog*Potass*HARVES Least Squares Means Slice*

Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST D	8	8.551	0.89	0.5599

*Simple Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

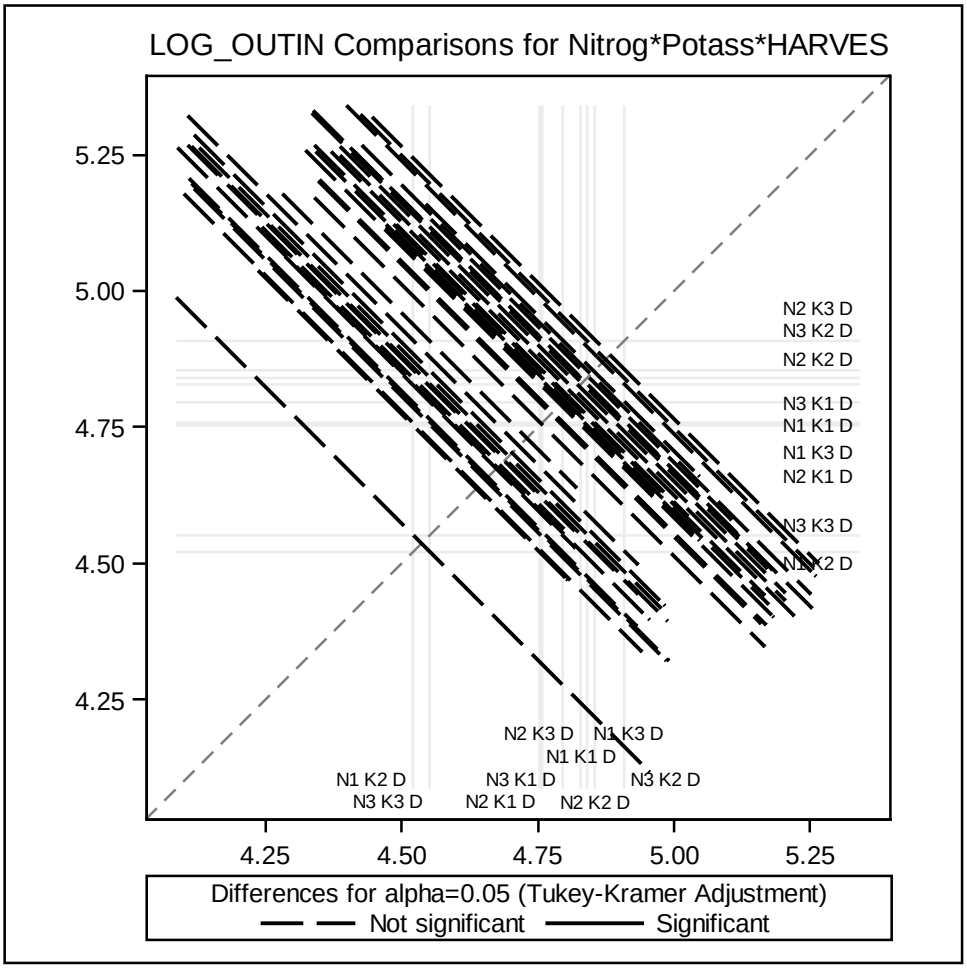
Slice	*Nitrogen*	*Potassium*	*Nitrogen*	*Potassium*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST D	N1	K1	N1	K2	0.2324	0.1831	262.8	1.27	0.2055	0.9402
HARVEST D	N1	K1	N1	K3	-0.08651	0.1819	275.7	-0.48	0.6348	0.9999
HARVEST D	N1	K1	N2	K1	-0.00522	0.2661	10.21	-0.02	0.9847	1.0000
HARVEST D	N1	K1	N2	K2	-0.1017	0.2663	8.549	-0.38	0.7118	1.0000
HARVEST D	N1	K1	N2	K3	-0.07617	0.2768	10.34	-0.28	0.7886	1.0000
HARVEST D	N1	K1	N3	K1	-0.04201	0.2617	7.584	-0.16	0.8767	1.0000
HARVEST D	N1	K1	N3	K2	-0.1554	0.2692	9.754	-0.58	0.5768	0.9997
HARVEST D	N1	K1	N3	K3	0.2015	0.2793	11.65	0.72	0.4849	0.9985
HARVEST D	N1	K2	N1	K3	-0.3189	0.1784	242.5	-1.79	0.0752	0.6909
HARVEST D	N1	K2	N2	K1	-0.2376	0.2709	9.181	-0.88	0.4028	0.9941
HARVEST D	N1	K2	N2	K2	-0.3341	0.2659	6.566	-1.26	0.2518	0.9435
HARVEST D	N1	K2	N2	K3	-0.3086	0.2794	8.781	-1.10	0.2987	0.9737
HARVEST D	N1	K2	N3	K1	-0.2744	0.2653	6.637	-1.03	0.3372	0.9826
HARVEST D	N1	K2	N3	K2	-0.3878	0.2659	6.918	-1.46	0.1886	0.8746
HARVEST D	N1	K2	N3	K3	-0.03091	0.2805	9.639	-0.11	0.9145	1.0000
HARVEST D	N1	K3	N2	K1	0.08129	0.2682	8.712	0.30	0.7689	1.0000
HARVEST D	N1	K3	N2	K2	-0.01523	0.2656	6.684	-0.06	0.9560	1.0000
HARVEST D	N1	K3	N2	K3	0.01034	0.2731	7.483	0.04	0.9708	1.0000
HARVEST D	N1	K3	N3	K1	0.04450	0.2638	6.465	0.17	0.8712	1.0000
HARVEST D	N1	K3	N3	K2	-0.06889	0.2675	7.443	-0.26	0.8038	1.0000
HARVEST D	N1	K3	N3	K3	0.2880	0.2731	7.9	1.05	0.3227	0.9803
HARVEST D	N2	K1	N2	K2	-0.09652	0.1726	231.8	-0.56	0.5765	0.9998
HARVEST D	N2	K1	N2	K3	-0.07095	0.1851	297.4	-0.38	0.7017	1.0000
HARVEST D	N2	K1	N3	K1	-0.03679	0.2641	6.671	-0.14	0.8933	1.0000
HARVEST D	N2	K1	N3	K2	-0.1502	0.2716	8.695	-0.55	0.5942	0.9998

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Simple Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*Nitrogen*	*Potassium*	*Nitrogen*	*Potassium*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST D	N2	K1	N3	K3	0.2067	0.2825	10.1	0.73	0.4809	0.9983
HARVEST D	N2	K2	N2	K3	0.02557	0.1781	264.6	0.14	0.8860	1.0000
HARVEST D	N2	K2	N3	K1	0.05973	0.2639	5.355	0.23	0.8293	1.0000
HARVEST D	N2	K2	N3	K2	-0.05366	0.2644	5.65	-0.20	0.8463	1.0000
HARVEST D	N2	K2	N3	K3	0.3032	0.2785	7.477	1.09	0.3101	0.9759
HARVEST D	N2	K3	N3	K1	0.03416	0.2745	6.767	0.12	0.9046	1.0000
HARVEST D	N2	K3	N3	K2	-0.07923	0.2783	7.847	-0.28	0.7833	1.0000
HARVEST D	N2	K3	N3	K3	0.2777	0.2814	7.321	0.99	0.3553	0.9871
HARVEST D	N3	K1	N3	K2	-0.1134	0.1613	182.1	-0.70	0.4831	0.9988
HARVEST D	N3	K1	N3	K3	0.2435	0.1723	230.3	1.41	0.1588	0.8929
HARVEST D	N3	K2	N3	K3	0.3569	0.1743	238	2.05	0.0417	0.5099



Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Tukey-Kramer Grouping for Nitrog*Potass*HARVES Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*Nitrogen*	*Potassium*	*Estimate*	
HARVEST D	N3	K2	4.9087	A
HARVEST D				A
HARVEST D	N2	K2	4.8551	A
HARVEST D				A
HARVEST D	N1	K3	4.8398	A
HARVEST D				A
HARVEST D	N2	K3	4.8295	A
HARVEST D				A
HARVEST D	N3	K1	4.7953	A
HARVEST D				A
HARVEST D	N2	K1	4.7585	A
HARVEST D				A
HARVEST D	N1	K1	4.7533	A
HARVEST D				A
HARVEST D	N3	K3	4.5518	A
HARVEST D				A
HARVEST D	N1	K2	4.5209	A

*F Test for Strain*HARVEST Least Squares Means Slice*

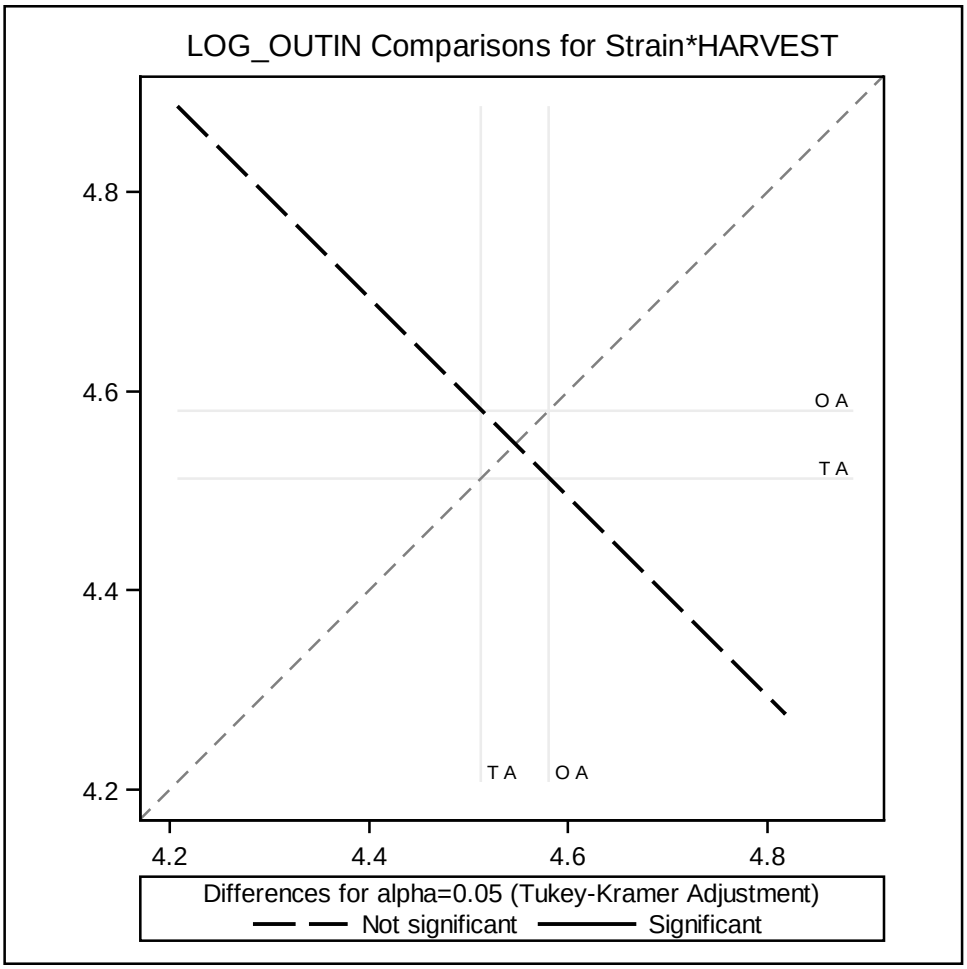
Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST A	1	2640	0.05	0.8268

*Simple Differences of Strain*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*Strain*	*Strain*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST A	O	T	0.06811	0.3113	2640	0.22	0.8268	0.8268

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



*Tukey-Kramer Grouping for Strain*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*Strain*	*Estimate*	
HARVEST A	O	4.5806	A
HARVEST A			A
HARVEST A	T	4.5125	A

*F Test for Strain*HARVEST Least Squares Means Slice*

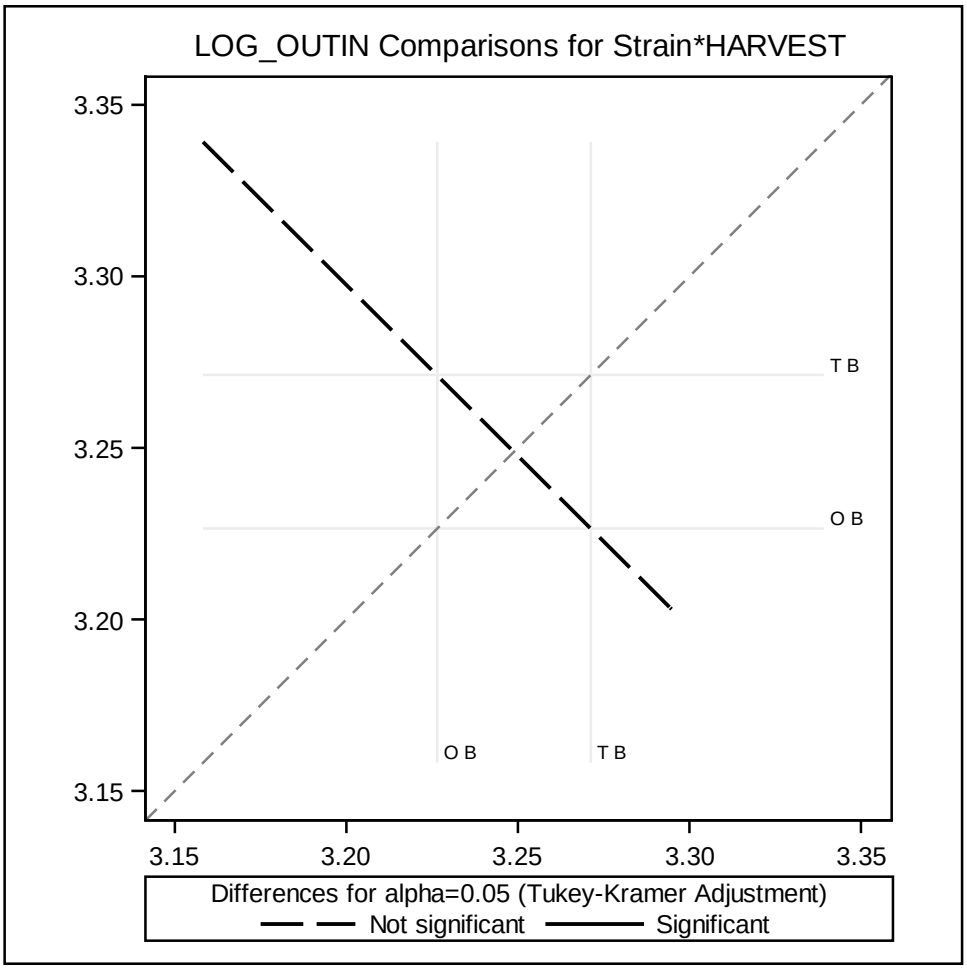
Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST B	1	2634	0.41	0.5216

*Simple Differences of Strain*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*Strain*	*Strain*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST B	O	T	-0.04456	0.06952	2634	-0.64	0.5216	0.5216

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



*Tukey-Kramer Grouping for Strain*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*Strain*	*Estimate*	
HARVEST B	T	3.2711	A
HARVEST B			A
HARVEST B	O	3.2266	A

*F Test for Strain*HARVEST Least Squares Means Slice*

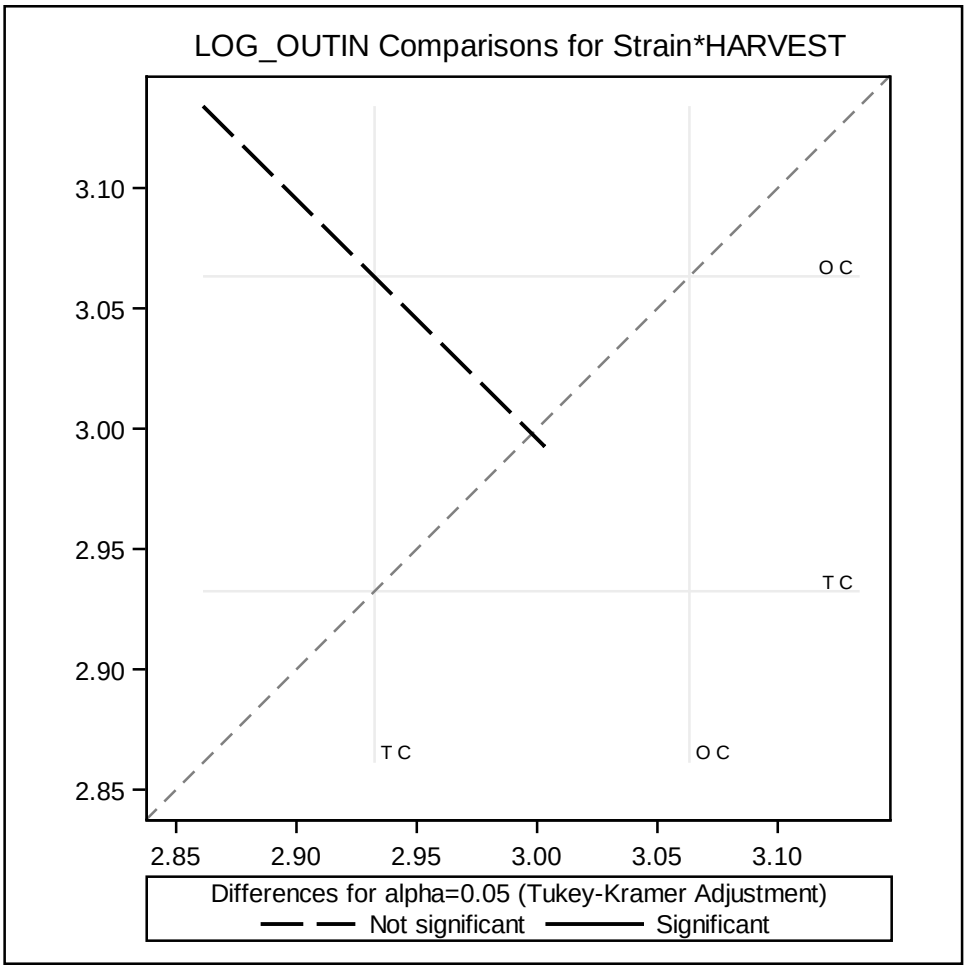
Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST C	1	2635	3.29	0.0699

*Simple Differences of Strain*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*Strain*	*Strain*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST C	O	T	0.1311	0.07230	2635	1.81	0.0699	0.0699

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



*Tukey-Kramer Grouping for Strain*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*Strain*	*Estimate*	
HARVEST C	O	3.0635	A
HARVEST C			A
HARVEST C	T	2.9324	A

*F Test for Strain*HARVEST Least Squares Means Slice*

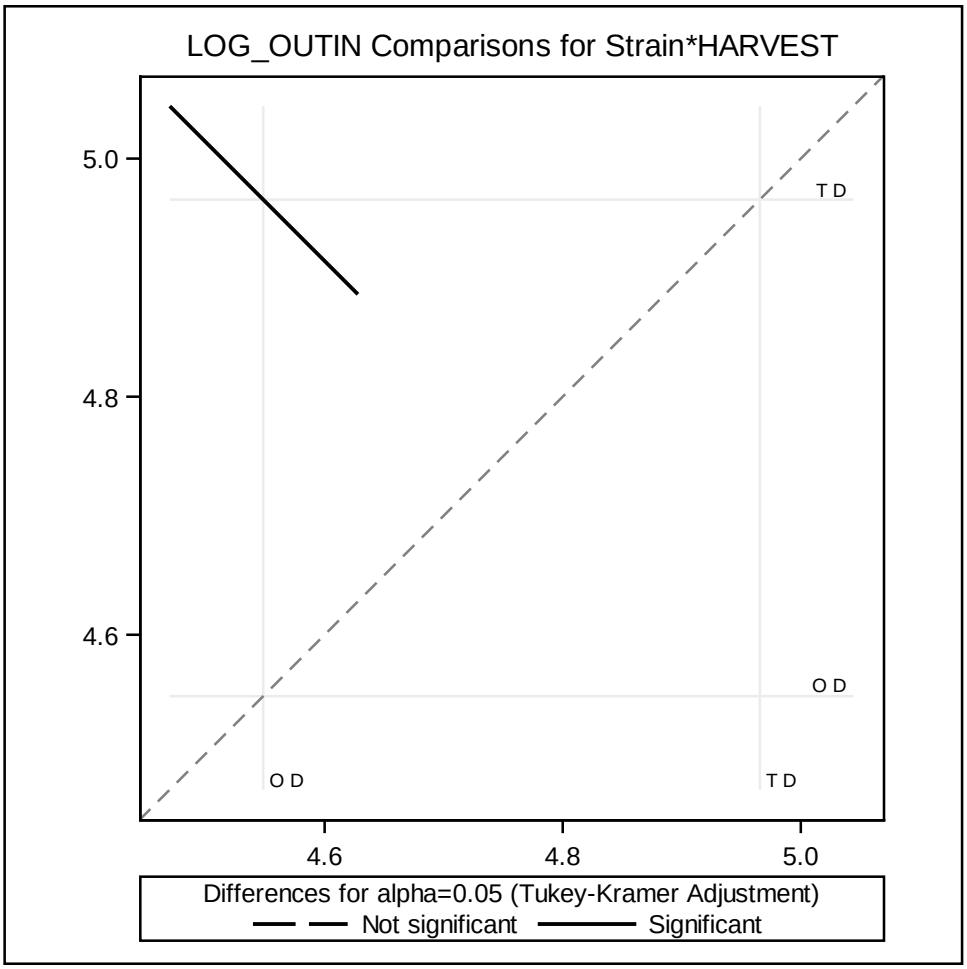
Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST D	1	2646	26.73	<.0001

*Simple Differences of Strain*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*Strain*	*Strain*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST D	O	T	-0.4163	0.08052	2646	-5.17	<.0001	<.0001

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



*Tukey-Kramer Grouping for Strain*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*Strain*	*Estimate*	
HARVEST D	T	4.9652	A
HARVEST D			
HARVEST D	O	4.5489	B

*F Test for MAT*HARVEST Least Squares Means Slice*

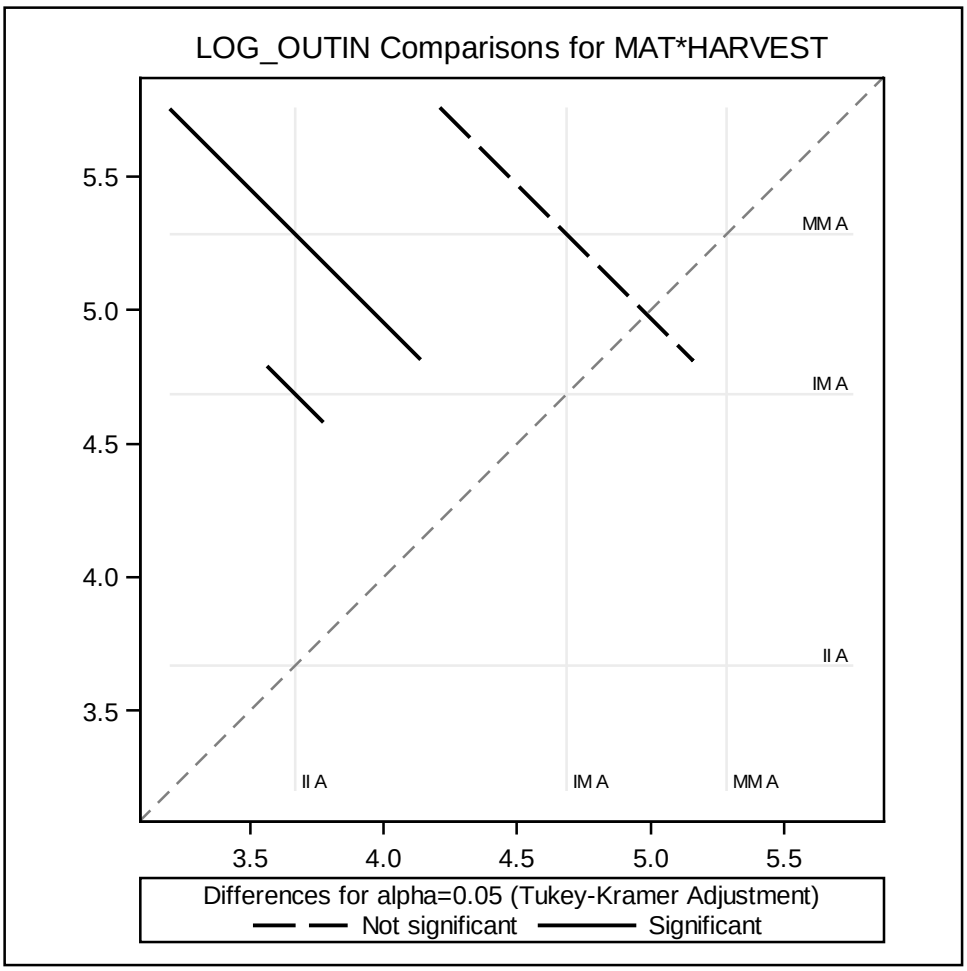
Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST A	2	2650	69.07	<.0001

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Simple Differences of MAT*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*MAT*	*_MAT*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST A	II	IM	-1.0159	0.08960	2651	-11.34	<.0001	<.0001
HARVEST A	II	MM	-1.6159	0.4011	2650	-4.03	<.0001	0.0002
HARVEST A	IM	MM	-0.6000	0.4037	2649	-1.49	0.1373	0.2977



*Tukey-Kramer Grouping for MAT*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*MAT*	*Estimate*	
HARVEST A	MM	5.2851	A
HARVEST A			A
HARVEST A	IM	4.6852	A
HARVEST A			
HARVEST A	II	3.6692	B

Statistical Analysis: 06/05/2013

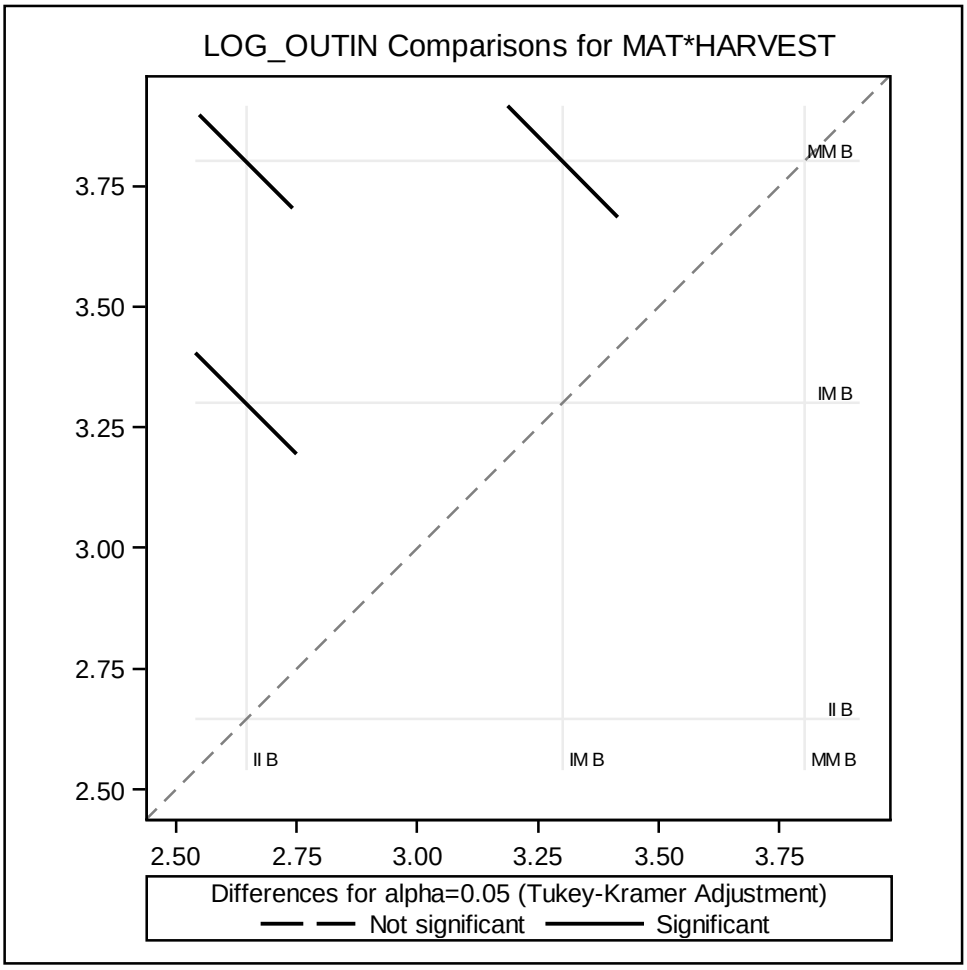
The GLIMMIX Procedure

*F Test for MAT*HARVEST Least Squares Means Slice*

Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST B	2	2659	101.71	<.0001

*Simple Differences of MAT*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*MAT*	*_MAT*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST B	II	IM	-0.6555	0.08913	2661	-7.35	<.0001	<.0001
HARVEST B	II	MM	-1.1561	0.08246	2659	-14.02	<.0001	<.0001
HARVEST B	IM	MM	-0.5006	0.09801	2657	-5.11	<.0001	<.0001



Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Tukey-Kramer Grouping for MAT*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*MAT*	*Estimate*	
HARVEST B	MM	3.8010	A
HARVEST B			
HARVEST B	IM	3.3005	B
HARVEST B			
HARVEST B	II	2.6450	C

*F Test for MAT*HARVEST Least Squares Means Slice*

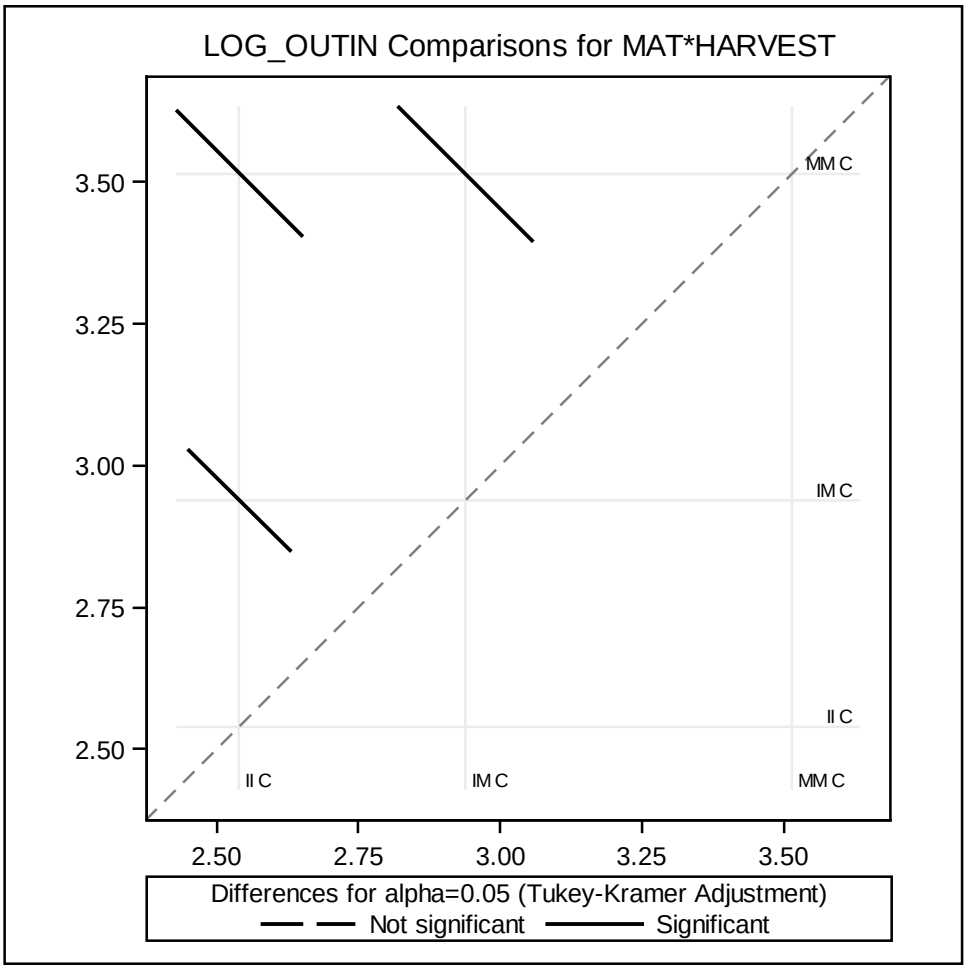
Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST C	2	2657	54.29	<.0001

*Simple Differences of MAT*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*MAT*	*_MAT*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST C	II	IM	-0.3990	0.07750	2657	-5.15	<.0001	<.0001
HARVEST C	II	MM	-0.9749	0.09532	2658	-10.23	<.0001	<.0001
HARVEST C	IM	MM	-0.5760	0.1019	2656	-5.65	<.0001	<.0001

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



*Tukey-Kramer Grouping for MAT*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*MAT*	*Estimate*	
HARVEST C	MM	3.5149	A
HARVEST C			
HARVEST C	IM	2.9389	B
HARVEST C			
HARVEST C	II	2.5399	C

*F Test for MAT*HARVEST Least Squares Means Slice*

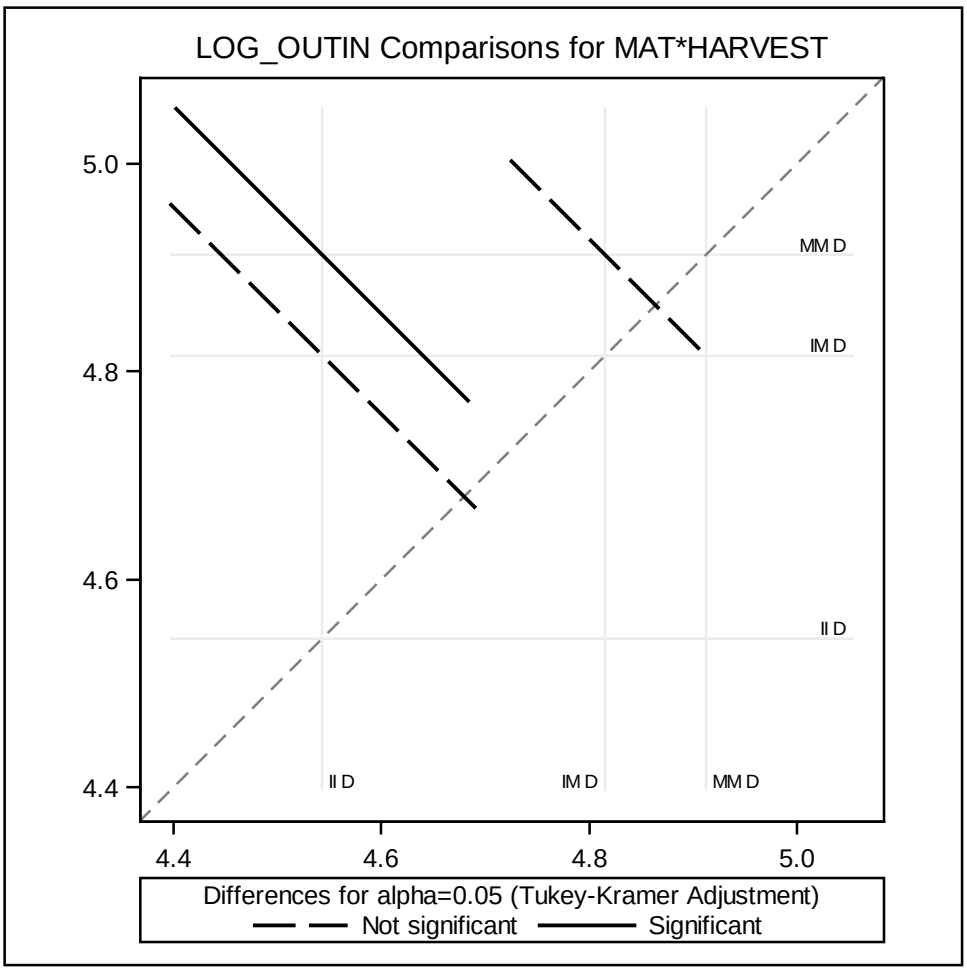
Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST D	2	2655	4.77	0.0086

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Simple Differences of MAT*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*MAT*	*_MAT*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST D	II	IM	-0.2720	0.1253	2651	-2.17	0.0301	0.0765
HARVEST D	II	MM	-0.3692	0.1209	2653	-3.05	0.0023	0.0064
HARVEST D	IM	MM	-0.09716	0.07809	2657	-1.24	0.2135	0.4272



*Tukey-Kramer Grouping for MAT*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*MAT*	*Estimate*		
HARVEST D	MM	4.9125		A
HARVEST D				A
HARVEST D	IM	4.8153	B	A
HARVEST D			B	
HARVEST D	II	4.5433	B	

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*F Test for MAT*Nitrogen*HARVEST Least Squares Means Slice*

Slice	Num DF	Den DF	F Value	Pr > F
HARVEST A	8	9.902	14.68	0.0001

*Simple Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

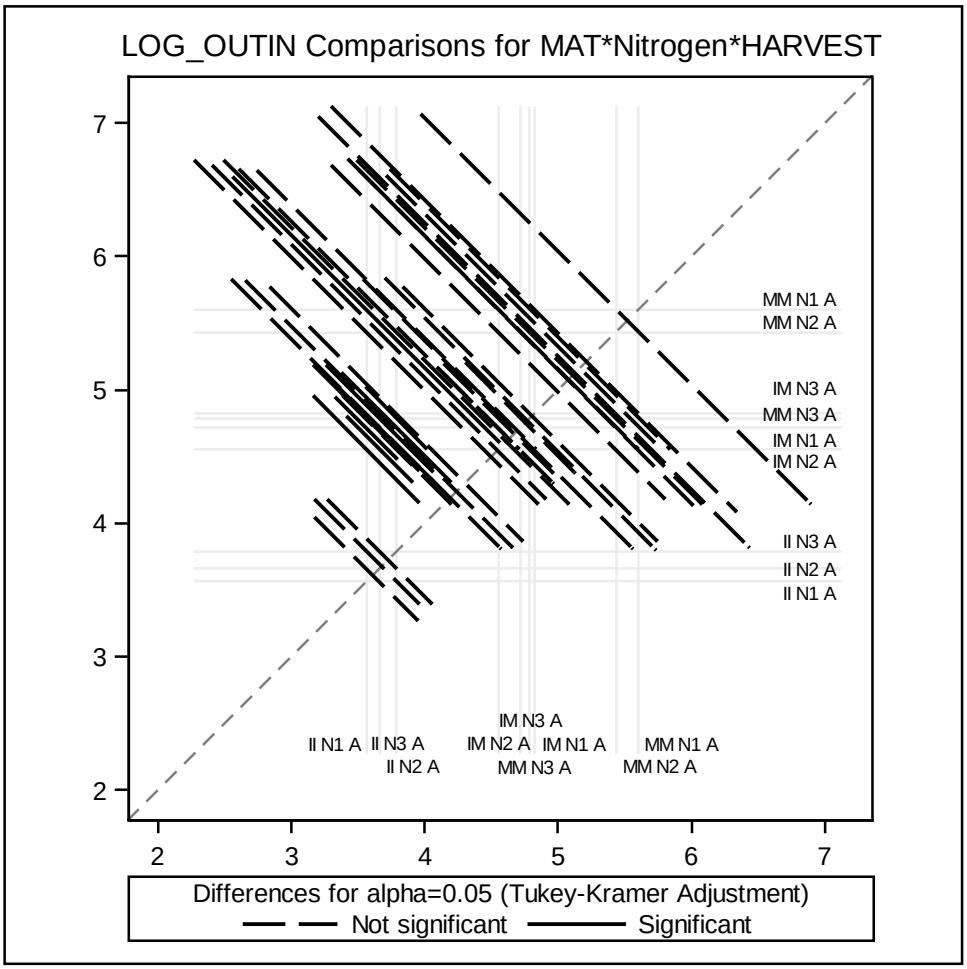
Slice	MAT	Nitrogen	_MAT	Nitrogen	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
HARVEST A	II	N1	II	N2	-0.09711	0.2506	3.651	-0.39	0.7199	1.0000
HARVEST A	II	N1	II	N3	-0.2253	0.2532	3.083	-0.89	0.4375	0.9935
HARVEST A	II	N1	IM	N1	-1.1545	0.1513	2656	-7.63	<.0001	<.0001
HARVEST A	II	N1	IM	N2	-0.9895	0.2588	5.179	-3.82	0.0115	0.0043
HARVEST A	II	N1	IM	N3	-1.2262	0.2580	4.498	-4.75	0.0067	<.0001
HARVEST A	II	N1	MM	N1	-2.0420	0.6438	2658	-3.17	0.0015	0.0408
HARVEST A	II	N1	MM	N2	-1.8703	0.8330	1236	-2.25	0.0249	0.3765
HARVEST A	II	N1	MM	N3	-1.2578	0.6512	561.2	-1.93	0.0539	0.5918
HARVEST A	II	N2	II	N3	-0.1282	0.2545	3.423	-0.50	0.6451	0.9999
HARVEST A	II	N2	IM	N1	-1.0573	0.2620	4.47	-4.04	0.0125	0.0018
HARVEST A	II	N2	IM	N2	-0.8924	0.1598	2643	-5.59	<.0001	<.0001
HARVEST A	II	N2	IM	N3	-1.1291	0.2590	4.798	-4.36	0.0080	0.0005
HARVEST A	II	N2	MM	N1	-1.9448	0.6761	790.8	-2.88	0.0041	0.0948
HARVEST A	II	N2	MM	N2	-1.7732	0.8058	2650	-2.20	0.0278	0.4054
HARVEST A	II	N2	MM	N3	-1.1607	0.6472	697.2	-1.79	0.0733	0.6867
HARVEST A	II	N3	IM	N1	-0.9291	0.2645	3.782	-3.51	0.0270	0.0134
HARVEST A	II	N3	IM	N2	-0.7642	0.2623	4.751	-2.91	0.0354	0.0860
HARVEST A	II	N3	IM	N3	-1.0009	0.1502	2652	-6.66	<.0001	<.0001
HARVEST A	II	N3	MM	N1	-1.8166	0.6745	793.2	-2.69	0.0072	0.1506
HARVEST A	II	N3	MM	N2	-1.6450	0.8328	1228	-1.98	0.0485	0.5609
HARVEST A	II	N3	MM	N3	-1.0324	0.6135	2647	-1.68	0.0925	0.7572
HARVEST A	IM	N1	IM	N2	0.1650	0.2684	5.795	0.61	0.5622	0.9995
HARVEST A	IM	N1	IM	N3	-0.07173	0.2681	5.104	-0.27	0.7996	1.0000
HARVEST A	IM	N1	MM	N1	-0.8875	0.6477	2659	-1.37	0.1707	0.9090
HARVEST A	IM	N1	MM	N2	-0.7159	0.8363	1180	-0.86	0.3922	0.9950
HARVEST A	IM	N1	MM	N3	-0.1033	0.6574	531.2	-0.16	0.8752	1.0000
HARVEST A	IM	N2	IM	N3	-0.2367	0.2667	6.436	-0.89	0.4068	0.9936
HARVEST A	IM	N2	MM	N1	-1.0525	0.6783	809.6	-1.55	0.1211	0.8307
HARVEST A	IM	N2	MM	N2	-0.8808	0.8085	2649	-1.09	0.2761	0.9758
HARVEST A	IM	N2	MM	N3	-0.2683	0.6516	719.7	-0.41	0.6807	1.0000
HARVEST A	IM	N3	MM	N1	-0.8158	0.6773	851.4	-1.20	0.2287	0.9557

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Simple Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*MAT*	*Nitrogen*	*_MAT*	*Nitrogen*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST A	IM	N3	MM	N2	-0.6441	0.8346	1281	-0.77	0.4404	0.9976
HARVEST A	IM	N3	MM	N3	-0.03158	0.6161	2649	-0.05	0.9591	1.0000
HARVEST A	MM	N1	MM	N2	0.1716	0.9446	1626	0.18	0.8558	1.0000
HARVEST A	MM	N1	MM	N3	0.7842	0.9813	1735	0.80	0.4243	0.9969
HARVEST A	MM	N2	MM	N3	0.6125	1.0428	1926	0.59	0.5570	0.9997



*Conservative Tukey-Kramer Grouping for MAT*Nitrogen*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*MAT*	*Nitrogen*	*Estimate*		
HARVEST A	MM	N1	5.6037		A
HARVEST A					A
HARVEST A	MM	N2	5.4321	B	A
HARVEST A				B	A

The LINES display does not reflect all significant comparisons.
The following additional pairs are significantly different: (IM N3 A,II N3 A), (IM N3 A,II N2 A), (IM N3 A,II N1 A), (IM N1 A,II N3 A), (IM N1 A,II N2 A), (IM N1 A,II N1 A), (IM N2 A,II N2 A), (IM N2 A,II N1 A).

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Conservative Tukey-Kramer Grouping for MAT*Nitrogen*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	MAT	Nitrogen	Estimate		
HARVEST A	MM	N3	4.8195	B	A
HARVEST A				B	A
HARVEST A	IM	N3	4.7880	B	A
HARVEST A				B	A
HARVEST A	IM	N1	4.7162	B	A
HARVEST A				B	A
HARVEST A	IM	N2	4.5513	B	A
HARVEST A				B	A
HARVEST A	II	N3	3.7871	B	A
HARVEST A				B	A
HARVEST A	II	N2	3.6589	B	A
HARVEST A				B	
HARVEST A	II	N1	3.5618	B	

The LINES display does not reflect all significant comparisons.
The following additional pairs are significantly different: (IM N3 A,II N3 A), (IM N3 A,II N2 A), (IM N3 A,II N1 A), (IM N1 A,II N3 A), (IM N1 A,II N2 A), (IM N1 A,II N1 A), (IM N2 A,II N2 A), (IM N2 A,II N1 A).

*F Test for MAT*Nitrogen*HARVEST Least Squares Means Slice*

Slice	Num DF	Den DF	F Value	Pr > F
HARVEST B	8	3.94	17.46	0.0078

*Simple Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	MAT	Nitrogen	_MAT	Nitrogen	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
HARVEST B	II	N1	II	N2	-0.02519	0.2419	2.146	-0.10	0.9260	1.0000
HARVEST B	II	N1	II	N3	0.08598	0.2466	2.749	0.35	0.7523	1.0000
HARVEST B	II	N1	IM	N1	-0.7197	0.1571	2660	-4.58	<.0001	0.0002
HARVEST B	II	N1	IM	N2	-0.4942	0.2573	4.859	-1.92	0.1144	0.5990
HARVEST B	II	N1	IM	N3	-0.6918	0.2632	4.047	-2.63	0.0576	0.1753
HARVEST B	II	N1	MM	N1	-0.9476	0.1422	2647	-6.66	<.0001	<.0001
HARVEST B	II	N1	MM	N2	-1.2155	0.2558	4.19	-4.75	0.0080	<.0001
HARVEST B	II	N1	MM	N3	-1.2443	0.2497	3.994	-4.98	0.0076	<.0001
HARVEST B	II	N2	II	N3	0.1112	0.2442	2.003	0.46	0.6936	1.0000
HARVEST B	II	N2	IM	N1	-0.6946	0.2600	3.303	-2.67	0.0683	0.1587
HARVEST B	II	N2	IM	N2	-0.4690	0.1473	2656	-3.18	0.0015	0.0394

Statistical Analysis: 06/05/2013

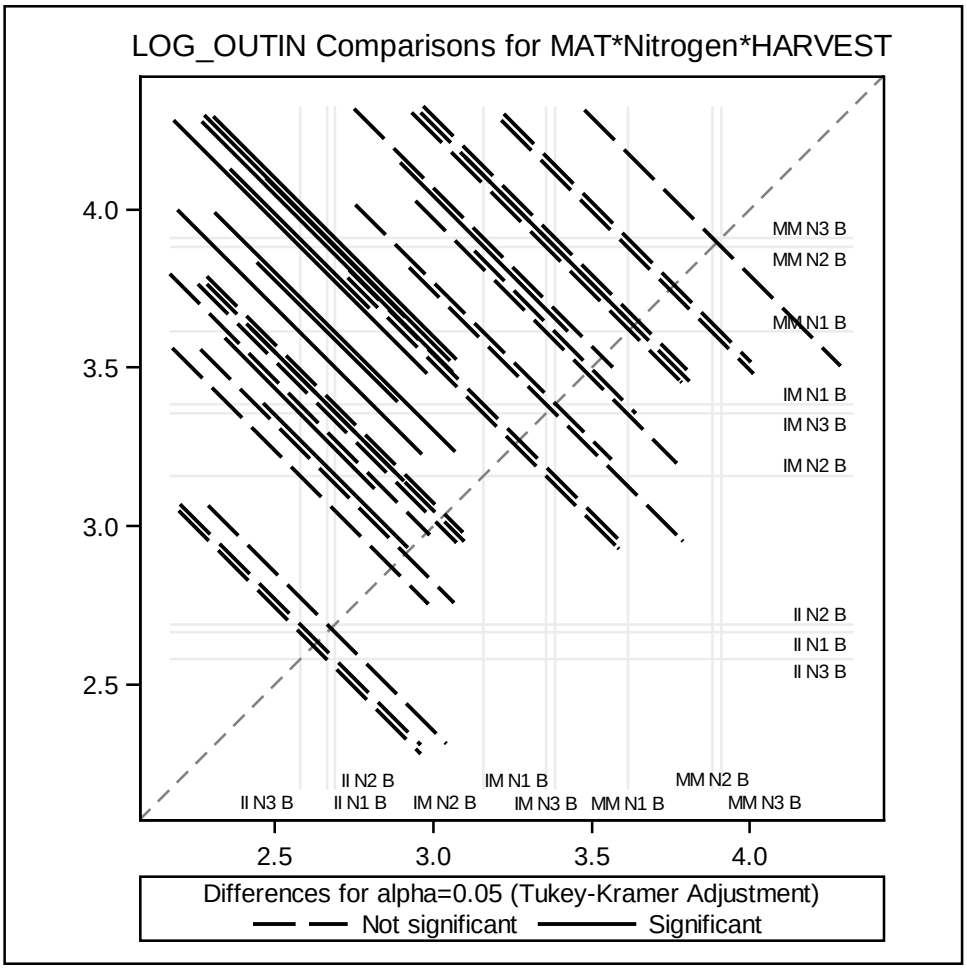
The GLIMMIX Procedure

*Simple Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*MAT*	*Nitrogen*	*_MAT*	*Nitrogen*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST B	II	N2	IM	N3	-0.6666	0.2611	3.097	-2.55	0.0811	0.2073
HARVEST B	II	N2	MM	N1	-0.9224	0.2444	2.994	-3.77	0.0327	0.0052
HARVEST B	II	N2	MM	N2	-1.1903	0.1416	2654	-8.40	<.0001	<.0001
HARVEST B	II	N2	MM	N3	-1.2191	0.2473	2.994	-4.93	0.0161	<.0001
HARVEST B	II	N3	IM	N1	-0.8057	0.2649	4.022	-3.04	0.0381	0.0601
HARVEST B	II	N3	IM	N2	-0.5802	0.2602	4.594	-2.23	0.0810	0.3866
HARVEST B	II	N3	IM	N3	-0.7777	0.1528	2638	-5.09	<.0001	<.0001
HARVEST B	II	N3	MM	N1	-1.0336	0.2488	3.722	-4.15	0.0165	0.0011
HARVEST B	II	N3	MM	N2	-1.3015	0.2577	3.846	-5.05	0.0080	<.0001
HARVEST B	II	N3	MM	N3	-1.3303	0.1419	2658	-9.37	<.0001	<.0001
HARVEST B	IM	N1	IM	N2	0.2255	0.2729	6.039	0.83	0.4401	0.9961
HARVEST B	IM	N1	IM	N3	0.02799	0.2792	5.131	0.10	0.9239	1.0000
HARVEST B	IM	N1	MM	N1	-0.2279	0.1648	2638	-1.38	0.1670	0.9047
HARVEST B	IM	N1	MM	N2	-0.4957	0.2734	5.648	-1.81	0.1228	0.6734
HARVEST B	IM	N1	MM	N3	-0.5246	0.2682	5.546	-1.96	0.1022	0.5748
HARVEST B	IM	N2	IM	N3	-0.1975	0.2757	5.949	-0.72	0.5009	0.9986
HARVEST B	IM	N2	MM	N1	-0.4534	0.2598	6.333	-1.74	0.1290	0.7184
HARVEST B	IM	N2	MM	N2	-0.7212	0.1710	2657	-4.22	<.0001	0.0009
HARVEST B	IM	N2	MM	N3	-0.7501	0.2626	6.174	-2.86	0.0281	0.1001
HARVEST B	IM	N3	MM	N1	-0.2558	0.2658	5.294	-0.96	0.3776	0.9891
HARVEST B	IM	N3	MM	N2	-0.5237	0.2743	5.292	-1.91	0.1113	0.6075
HARVEST B	IM	N3	MM	N3	-0.5526	0.1633	2644	-3.38	0.0007	0.0207
HARVEST B	MM	N1	MM	N2	-0.2679	0.2572	5.291	-1.04	0.3429	0.9818
HARVEST B	MM	N1	MM	N3	-0.2967	0.2515	5.213	-1.18	0.2891	0.9608
HARVEST B	MM	N2	MM	N3	-0.02886	0.2604	5.283	-0.11	0.9159	1.0000

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



*Conservative Tukey-Kramer Grouping for MAT*Nitrogen*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*MAT*	*Nitrogen*	*Estimate*		
HARVEST B	MM	N3	3.9096		A
HARVEST B					A
HARVEST B	MM	N2	3.8807		A
HARVEST B					A
HARVEST B	MM	N1	3.6128		A
HARVEST B					A
HARVEST B	IM	N1	3.3850	B	A
HARVEST B				B	A
HARVEST B	IM	N3	3.3570	B	A
HARVEST B				B	A
HARVEST B	IM	N2	3.1595	B	A
HARVEST B				B	
HARVEST B	II	N2	2.6904	B	

The LINES display does not reflect all significant comparisons.
The following additional pairs are significantly different: (MM N3 B,IM N3 B), (MM N2 B,IM N2 B), (IM N1 B,II N1 B), (IM N3 B,II N3 B), (IM N2 B,II N2 B).

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Conservative Tukey-Kramer Grouping for MAT*Nitrogen*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*MAT*	*Nitrogen*	*Estimate*	
HARVEST B				B
HARVEST B	II	N1	2.6652	B
HARVEST B				B
HARVEST B	II	N3	2.5793	B

The LINES display does not reflect all significant comparisons.
The following additional pairs are significantly different: (MM N3 B,IM N3 B), (MM N2 B,IM N2 B), (IM N1 B,II N1 B), (IM N3 B,II N3 B), (IM N2 B,II N2 B).

*F Test for MAT*Nitrogen*HARVEST Least Squares Means Slice*

Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST C	8	3.978	10.21	0.0201

*Simple Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*MAT*	*Nitrogen*	*_MAT*	*Nitrogen*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST C	II	N1	II	N2	-0.2233	0.2404	1.862	-0.93	0.4571	0.9913
HARVEST C	II	N1	II	N3	-0.3434	0.2418	1.841	-1.42	0.3013	0.8903
HARVEST C	II	N1	IM	N1	-0.5575	0.1302	2659	-4.28	<.0001	0.0006
HARVEST C	II	N1	IM	N2	-0.6947	0.2459	3.478	-2.83	0.0560	0.1085
HARVEST C	II	N1	IM	N3	-0.5114	0.2464	2.423	-2.08	0.1509	0.4904
HARVEST C	II	N1	MM	N1	-1.1611	0.1586	2658	-7.32	<.0001	<.0001
HARVEST C	II	N1	MM	N2	-1.2770	0.2588	4.277	-4.93	0.0066	<.0001
HARVEST C	II	N1	MM	N3	-1.0534	0.2794	7.956	-3.77	0.0055	0.0052
HARVEST C	II	N2	II	N3	-0.1200	0.2413	1.9	-0.50	0.6704	0.9999
HARVEST C	II	N2	IM	N1	-0.3342	0.2432	2.904	-1.37	0.2658	0.9075
HARVEST C	II	N2	IM	N2	-0.4714	0.1414	2642	-3.33	0.0009	0.0244
HARVEST C	II	N2	IM	N3	-0.2880	0.2461	2.496	-1.17	0.3413	0.9626
HARVEST C	II	N2	MM	N1	-0.9377	0.2627	4.983	-3.57	0.0161	0.0109
HARVEST C	II	N2	MM	N2	-1.0537	0.1537	2656	-6.86	<.0001	<.0001
HARVEST C	II	N2	MM	N3	-0.8301	0.2791	8.004	-2.97	0.0178	0.0728
HARVEST C	II	N3	IM	N1	-0.2142	0.2440	2.852	-0.88	0.4478	0.9941
HARVEST C	II	N3	IM	N2	-0.3514	0.2479	3.499	-1.42	0.2390	0.8914
HARVEST C	II	N3	IM	N3	-0.1680	0.1277	2658	-1.32	0.1886	0.9271
HARVEST C	II	N3	MM	N1	-0.8177	0.2644	4.91	-3.09	0.0277	0.0518
HARVEST C	II	N3	MM	N2	-0.9336	0.2594	4.359	-3.60	0.0197	0.0098

Statistical Analysis: 06/05/2013

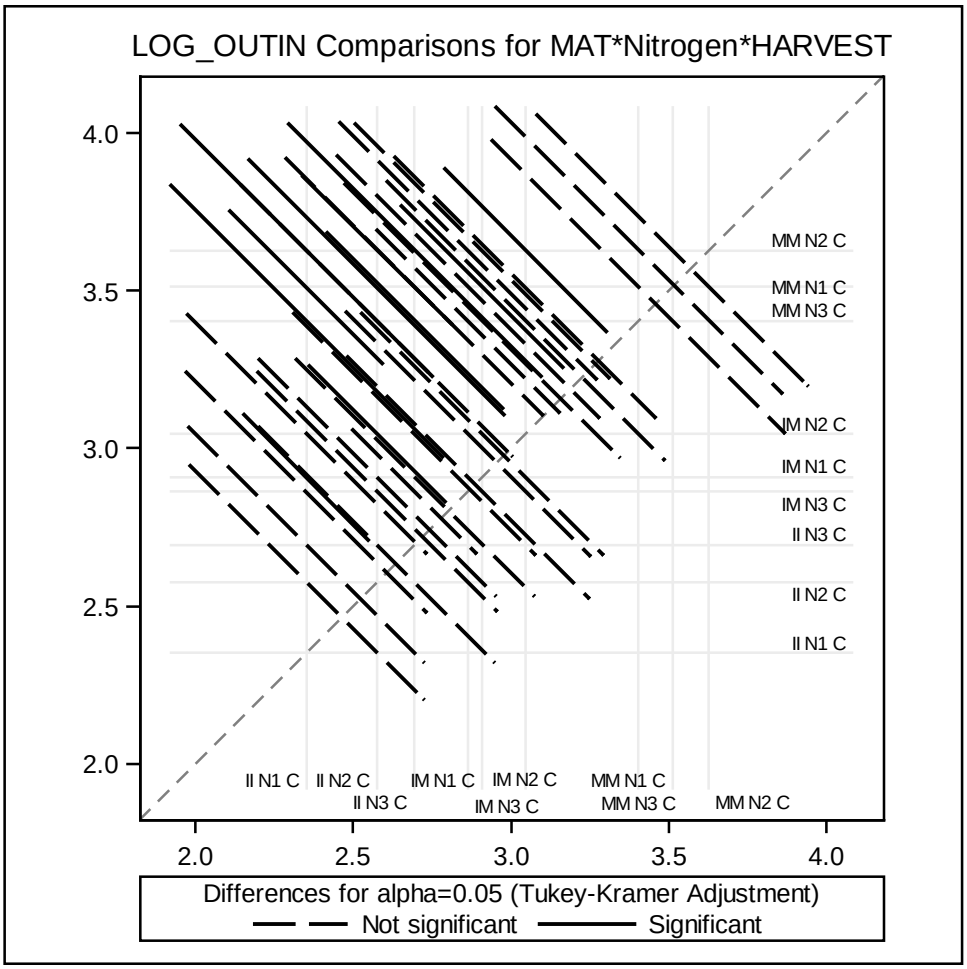
The GLIMMIX Procedure

*Simple Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*MAT*	*Nitrogen*	*_MAT*	*Nitrogen*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST C	II	N3	MM	N3	-0.7101	0.1821	2658	-3.90	<.0001	0.0032
HARVEST C	IM	N1	IM	N2	-0.1372	0.2482	5.012	-0.55	0.6041	0.9998
HARVEST C	IM	N1	IM	N3	0.04617	0.2485	3.604	0.19	0.8626	1.0000
HARVEST C	IM	N1	MM	N1	-0.6035	0.1678	2659	-3.60	0.0003	0.0099
HARVEST C	IM	N1	MM	N2	-0.7194	0.2611	5.945	-2.76	0.0334	0.1294
HARVEST C	IM	N1	MM	N3	-0.4959	0.2813	10.51	-1.76	0.1070	0.7069
HARVEST C	IM	N2	IM	N3	0.1834	0.2515	4.18	0.73	0.5046	0.9984
HARVEST C	IM	N2	MM	N1	-0.4663	0.2681	7.891	-1.74	0.1207	0.7219
HARVEST C	IM	N2	MM	N2	-0.5822	0.1679	2660	-3.47	0.0005	0.0156
HARVEST C	IM	N2	MM	N3	-0.3587	0.2859	11.91	-1.25	0.2336	0.9439
HARVEST C	IM	N3	MM	N1	-0.6497	0.2691	5.962	-2.41	0.0525	0.2763
HARVEST C	IM	N3	MM	N2	-0.7656	0.2640	5.31	-2.90	0.0315	0.0892
HARVEST C	IM	N3	MM	N3	-0.5421	0.1882	2651	-2.88	0.0040	0.0938
HARVEST C	MM	N1	MM	N2	-0.1159	0.2784	8.355	-0.42	0.6876	1.0000
HARVEST C	MM	N1	MM	N3	0.1076	0.3008	14.1	0.36	0.7258	1.0000
HARVEST C	MM	N2	MM	N3	0.2235	0.2947	12.51	0.76	0.4622	0.9979

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



*Conservative Tukey-Kramer Grouping for MAT*Nitrogen*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*MAT*	*Nitrogen*	*Estimate*				
HARVEST C	MM	N2	3.6280			A	
HARVEST C						A	
HARVEST C	MM	N1	3.5121	B		A	
HARVEST C				B		A	
HARVEST C	MM	N3	3.4045	B		A	C
HARVEST C				B		A	C
HARVEST C	IM	N2	3.0458	B	D	A	C
HARVEST C				B	D	A	C
HARVEST C	IM	N1	2.9086	B	D	A	C
HARVEST C				B	D	A	C
HARVEST C	IM	N3	2.8624	B	D	A	C
HARVEST C				B	D		C
HARVEST C	II	N3	2.6944	B	D		C

The LINES display does not reflect all significant comparisons. The following additional pairs are significantly different: (MM N2 C,IM N2 C), (MM N1 C,IM N1 C), (MM N3 C,II N3 C), (IM N2 C,II N2 C), (IM N1 C,II N1 C).

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Conservative Tukey-Kramer Grouping for MAT*Nitrogen*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*MAT*	*Nitrogen*	*Estimate*		
HARVEST C				D	C
HARVEST C	II	N2	2.5744	D	C
HARVEST C				D	
HARVEST C	II	N1	2.3510	D	

The LINES display does not reflect all significant comparisons. The following additional pairs are significantly different: (MM N2 C,IM N2 C), (MM N1 C,IM N1 C), (MM N3 C,II N3 C), (IM N2 C,II N2 C), (IM N1 C,II N1 C).

*F Test for MAT*Nitrogen*HARVEST Least Squares Means Slice*

Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST D	8	4.917	2.65	0.1514

*Simple Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

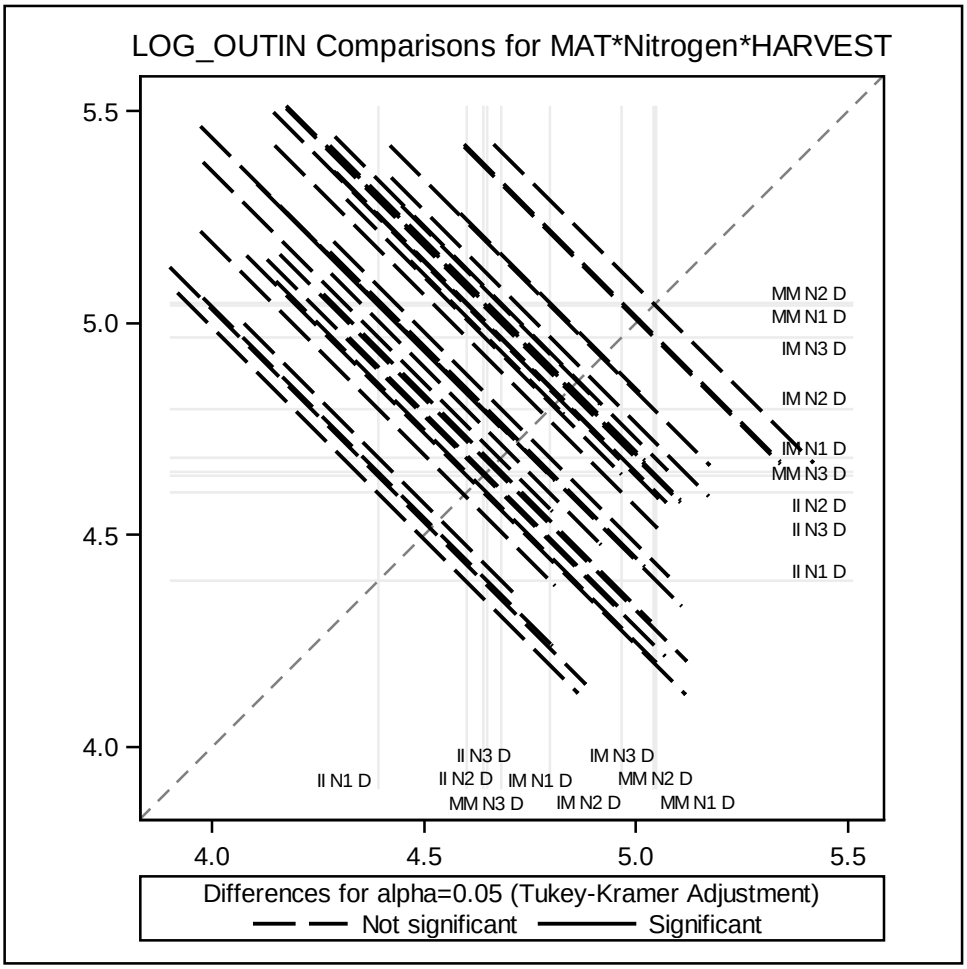
Slice	*MAT*	*Nitrogen*	*_MAT*	*Nitrogen*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST D	II	N1	II	N2	-0.2084	0.3049	19.7	-0.68	0.5024	0.9990
HARVEST D	II	N1	II	N3	-0.2495	0.3170	26.69	-0.79	0.4382	0.9972
HARVEST D	II	N1	IM	N1	-0.2910	0.2045	2656	-1.42	0.1549	0.8893
HARVEST D	II	N1	IM	N2	-0.4063	0.2696	13.31	-1.51	0.1551	0.8525
HARVEST D	II	N1	IM	N3	-0.5766	0.2662	11.06	-2.17	0.0530	0.4285
HARVEST D	II	N1	MM	N1	-0.6511	0.1851	2652	-3.52	0.0004	0.0132
HARVEST D	II	N1	MM	N2	-0.6564	0.2695	11.59	-2.44	0.0320	0.2647
HARVEST D	II	N1	MM	N3	-0.2578	0.2653	10.6	-0.97	0.3528	0.9883
HARVEST D	II	N2	II	N3	-0.04110	0.3339	20.96	-0.12	0.9032	1.0000
HARVEST D	II	N2	IM	N1	-0.08261	0.3023	12.78	-0.27	0.7890	1.0000
HARVEST D	II	N2	IM	N2	-0.1979	0.2060	2656	-0.96	0.3368	0.9892
HARVEST D	II	N2	IM	N3	-0.3682	0.2904	10.25	-1.27	0.2328	0.9405
HARVEST D	II	N2	MM	N1	-0.4427	0.2936	10.64	-1.51	0.1607	0.8522
HARVEST D	II	N2	MM	N2	-0.4481	0.2014	2660	-2.22	0.0262	0.3901
HARVEST D	II	N2	MM	N3	-0.04946	0.2897	9.997	-0.17	0.8678	1.0000
HARVEST D	II	N3	IM	N1	-0.04151	0.3092	16.02	-0.13	0.8949	1.0000
HARVEST D	II	N3	IM	N2	-0.1568	0.3006	14.41	-0.52	0.6098	0.9999
HARVEST D	II	N3	IM	N3	-0.3271	0.2091	2660	-1.56	0.1179	0.8243
HARVEST D	II	N3	MM	N1	-0.4016	0.2996	12.52	-1.34	0.2039	0.9191
HARVEST D	II	N3	MM	N2	-0.4070	0.3003	12.55	-1.36	0.1992	0.9142
HARVEST D	II	N3	MM	N3	-0.00836	0.2047	2659	-0.04	0.9674	1.0000

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Simple Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*MAT*	*Nitrogen*	*_MAT*	*Nitrogen*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST D	IM	N1	IM	N2	-0.1153	0.2558	5.452	-0.45	0.6695	1.0000
HARVEST D	IM	N1	IM	N3	-0.2856	0.2511	4.132	-1.14	0.3170	0.9685
HARVEST D	IM	N1	MM	N1	-0.3601	0.1509	2658	-2.39	0.0171	0.2918
HARVEST D	IM	N1	MM	N2	-0.3654	0.2539	4.371	-1.44	0.2177	0.8826
HARVEST D	IM	N1	MM	N3	0.03314	0.2501	3.894	0.13	0.9011	1.0000
HARVEST D	IM	N2	IM	N3	-0.1703	0.2418	3.206	-0.70	0.5290	0.9987
HARVEST D	IM	N2	MM	N1	-0.2448	0.2435	3.543	-1.01	0.3784	0.9855
HARVEST D	IM	N2	MM	N2	-0.2501	0.1368	2647	-1.83	0.0677	0.6636
HARVEST D	IM	N2	MM	N3	0.1485	0.2400	2.918	0.62	0.5811	0.9995
HARVEST D	IM	N3	MM	N1	-0.07451	0.2411	2.607	-0.31	0.7803	1.0000
HARVEST D	IM	N3	MM	N2	-0.07984	0.2410	2.499	-0.33	0.7662	1.0000
HARVEST D	IM	N3	MM	N3	0.3188	0.1167	2657	2.73	0.0064	0.1375
HARVEST D	MM	N1	MM	N2	-0.00533	0.2427	2.881	-0.02	0.9839	1.0000
HARVEST D	MM	N1	MM	N3	0.3933	0.2392	2.325	1.64	0.2243	0.7803
HARVEST D	MM	N2	MM	N3	0.3986	0.2393	2.276	1.67	0.2224	0.7676



Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Conservative Tukey-Kramer Grouping for MAT*Nitrogen*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*MAT*	*Nitrogen*	*Estimate*	
HARVEST D	MM	N2	5.0471	A
HARVEST D				A
HARVEST D	MM	N1	5.0418	A
HARVEST D				A
HARVEST D	IM	N3	4.9673	A
HARVEST D				A
HARVEST D	IM	N2	4.7970	A
HARVEST D				A
HARVEST D	IM	N1	4.6817	A
HARVEST D				A
HARVEST D	MM	N3	4.6485	A
HARVEST D				A
HARVEST D	II	N3	4.6401	A
HARVEST D				A
HARVEST D	II	N2	4.5990	A
HARVEST D				A
HARVEST D	II	N1	4.3907	A

The LINES display does not reflect all significant comparisons.
The following additional pairs are significantly different: (MM N1 D,II N1 D).

*F Test for MAT*Cultivar*HARVEST Least Squares Means Slice*

Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST A	5	1818	29.61	<.0001

*Simple Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

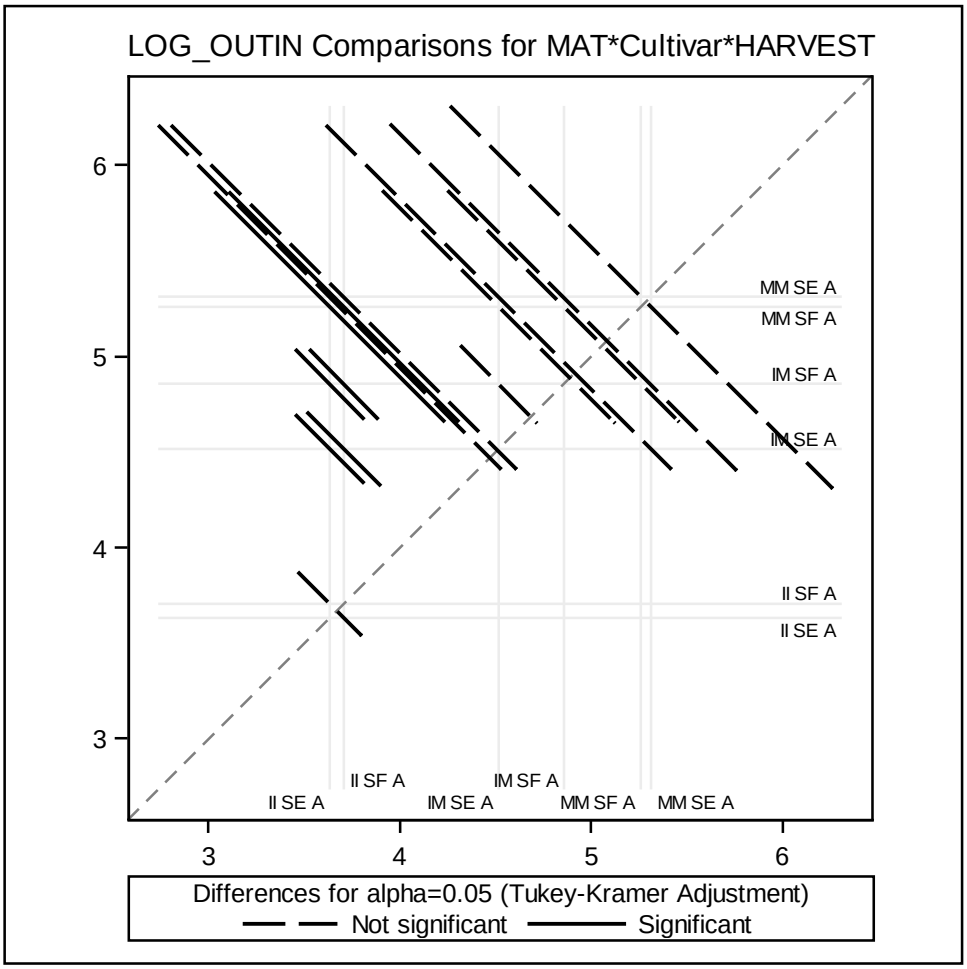
Slice	*MAT*	*Cultivar*	*_MAT*	*Cultivar*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST A	II	SE	II	SF	-0.07411	0.1188	860.1	-0.62	0.5329	0.9893
HARVEST A	II	SE	IM	SE	-0.8836	0.1249	2648	-7.08	<.0001	<.0001
HARVEST A	II	SE	IM	SF	-1.2223	0.1276	1031	-9.58	<.0001	<.0001
HARVEST A	II	SE	MM	SE	-1.6777	0.6294	2651	-2.67	0.0077	0.0826
HARVEST A	II	SE	MM	SF	-1.6282	0.4211	2647	-3.87	0.0001	0.0016
HARVEST A	II	SF	IM	SE	-0.8095	0.1349	1178	-6.00	<.0001	<.0001
HARVEST A	II	SF	IM	SF	-1.1482	0.1284	2655	-8.94	<.0001	<.0001
HARVEST A	II	SF	MM	SE	-1.6036	0.6322	2659	-2.54	0.0113	0.1140

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Simple Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*MAT*	*Cultivar*	*_MAT*	*Cultivar*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST A	II	SF	MM	SF	-1.5540	0.4212	2650	-3.69	0.0002	0.0031
HARVEST A	IM	SE	IM	SF	-0.3388	0.1425	1314	-2.38	0.0176	0.1647
HARVEST A	IM	SE	MM	SE	-0.7941	0.6325	2650	-1.26	0.2094	0.8090
HARVEST A	IM	SE	MM	SF	-0.7446	0.4270	2647	-1.74	0.0813	0.5029
HARVEST A	IM	SF	MM	SE	-0.4553	0.6342	2660	-0.72	0.4728	0.9798
HARVEST A	IM	SF	MM	SF	-0.4058	0.4248	2649	-0.96	0.3395	0.9318
HARVEST A	MM	SE	MM	SF	0.04952	0.7020	2659	0.07	0.9438	1.0000



Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Conservative Tukey-Kramer Grouping for MAT*Cultivar*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*MAT*	*Cultivar*	*Estimate*	
HARVEST A	MM	SE	5.3099	A
HARVEST A				A
HARVEST A	MM	SF	5.2604	A
HARVEST A				A
HARVEST A	IM	SF	4.8545	A
HARVEST A				A
HARVEST A	IM	SE	4.5158	A
HARVEST A				A
HARVEST A	II	SF	3.7063	A
HARVEST A				A
HARVEST A	II	SE	3.6322	A

The LINES display does not reflect all significant comparisons.
The following additional pairs are significantly different: (MM SF A,II SF A), (MM SF A,II SE A), (IM SF A,II SF A), (IM SF A,II SE A), (IM SE A,II SF A), (IM SE A,II SE A).

*F Test for MAT*Cultivar*HARVEST Least Squares Means Slice*

Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST B	5	1188	52.25	<.0001

*Simple Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

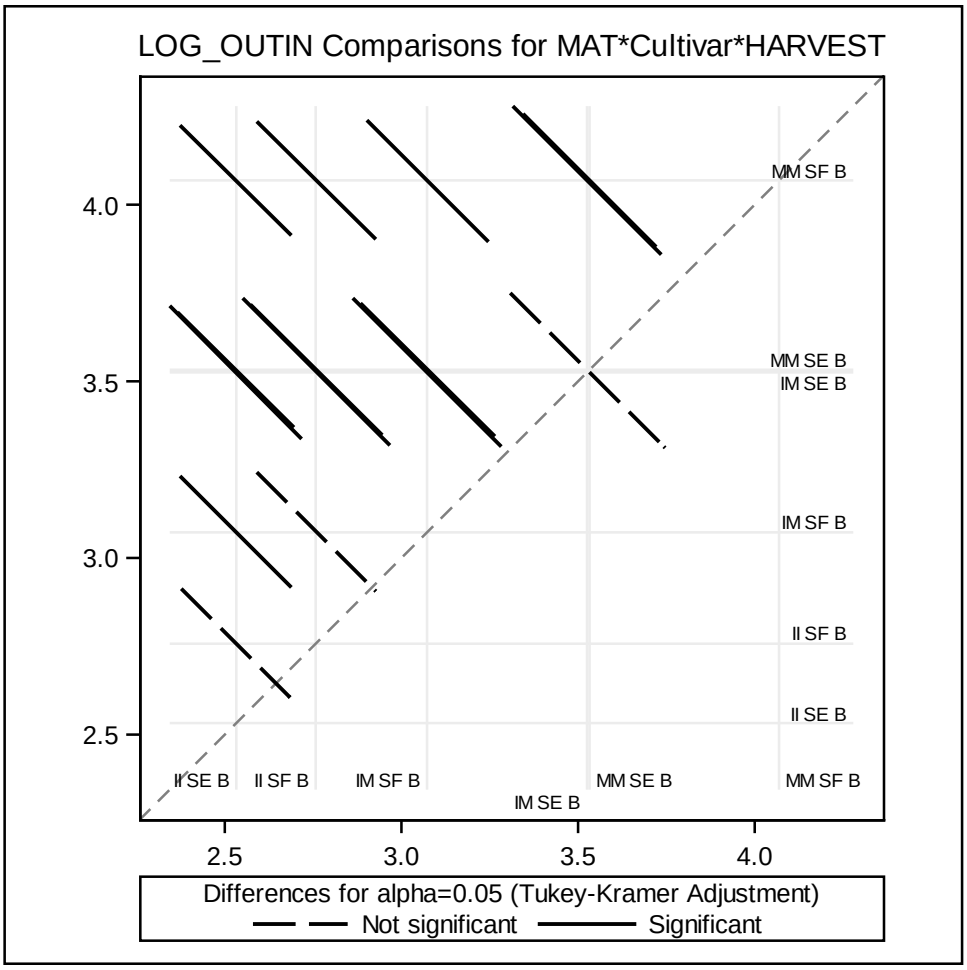
Slice	*MAT*	*Cultivar*	*_MAT*	*Cultivar*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST B	II	SE	II	SF	-0.2276	0.1077	617.5	-2.11	0.0350	0.2809
HARVEST B	II	SE	IM	SE	-0.9956	0.1318	2660	-7.56	<.0001	<.0001
HARVEST B	II	SE	IM	SF	-0.5431	0.1101	657.4	-4.93	<.0001	<.0001
HARVEST B	II	SE	MM	SE	-1.0017	0.1152	2660	-8.69	<.0001	<.0001
HARVEST B	II	SE	MM	SF	-1.5380	0.1100	667	-13.99	<.0001	<.0001
HARVEST B	II	SF	IM	SE	-0.7679	0.1464	1320	-5.24	<.0001	<.0001
HARVEST B	II	SF	IM	SF	-0.3155	0.1192	2656	-2.65	0.0082	0.0867
HARVEST B	II	SF	MM	SE	-0.7741	0.1309	1027	-5.91	<.0001	<.0001
HARVEST B	II	SF	MM	SF	-1.3104	0.1178	2657	-11.13	<.0001	<.0001
HARVEST B	IM	SE	IM	SF	0.4525	0.1475	1321	3.07	0.0022	0.0265
HARVEST B	IM	SE	MM	SE	-0.00616	0.1538	2642	-0.04	0.9680	1.0000
HARVEST B	IM	SE	MM	SF	-0.5425	0.1479	1358	-3.67	0.0003	0.0034
HARVEST B	IM	SF	MM	SE	-0.4586	0.1330	1065	-3.45	0.0006	0.0075

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Simple Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*MAT*	*Cultivar*	*_MAT*	*Cultivar*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST B	IM	SF	MM	SF	-0.9949	0.1205	2657	-8.26	<.0001	<.0001
HARVEST B	MM	SE	MM	SF	-0.5363	0.1325	1062	-4.05	<.0001	0.0008



*Tukey-Kramer Grouping for MAT*Cultivar*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*MAT*	*Cultivar*	*Estimate*		
HARVEST B	MM	SF	4.0692		A
HARVEST B					
HARVEST B	MM	SE	3.5329		B
HARVEST B					B
HARVEST B	IM	SE	3.5267		B
HARVEST B					
HARVEST B	IM	SF	3.0742		C
HARVEST B					C
HARVEST B	II	SF	2.7588	D	C

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Tukey-Kramer Grouping for MAT*Cultivar*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	MAT	Cultivar	Estimate	
HARVEST B				D
HARVEST B	II	SE	2.5312	D

*F Test for MAT*Cultivar*HARVEST Least Squares Means Slice*

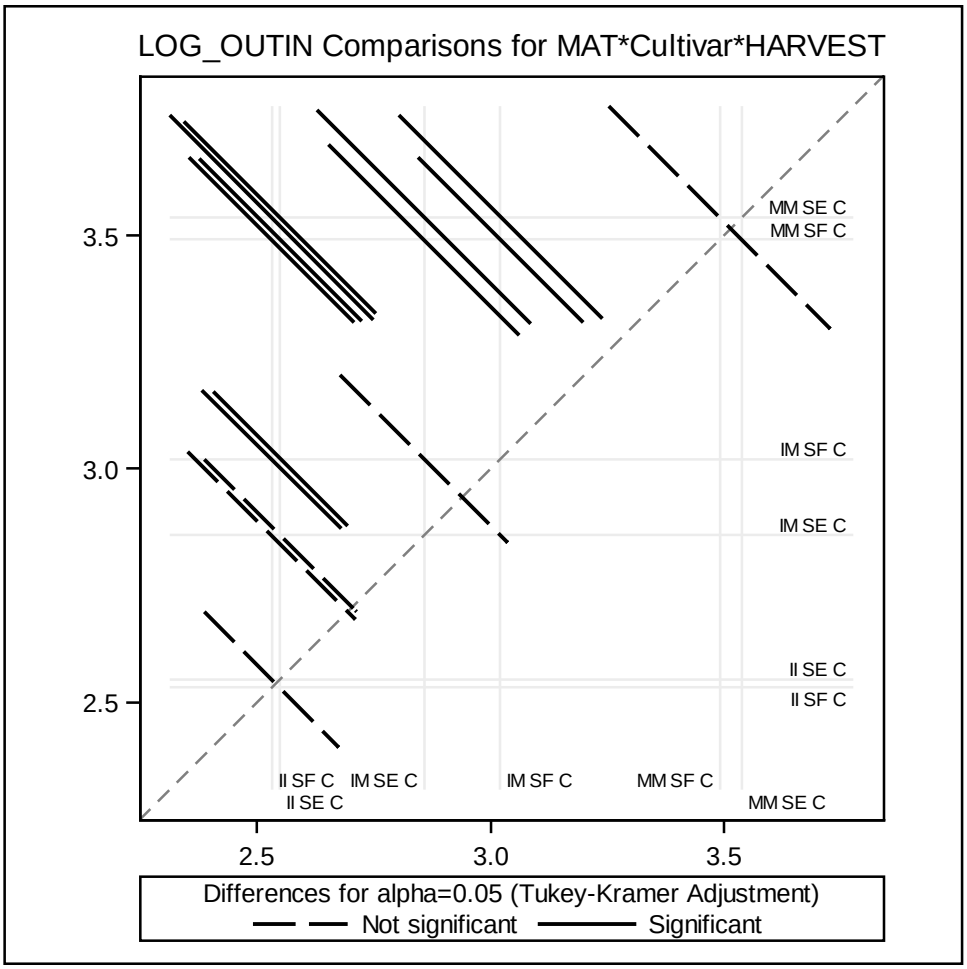
Slice	Num DF	Den DF	F Value	Pr > F
HARVEST C	5	1160	23.09	<.0001

*Simple Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	MAT	Cultivar	_MAT	Cultivar	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
HARVEST C	II	SE	II	SF	0.01826	0.1017	512.8	0.18	0.8576	1.0000
HARVEST C	II	SE	IM	SE	-0.3081	0.1146	2658	-2.69	0.0072	0.0776
HARVEST C	II	SE	IM	SF	-0.4716	0.1010	492.8	-4.67	<.0001	<.0001
HARVEST C	II	SE	MM	SE	-0.9900	0.1440	2659	-6.87	<.0001	<.0001
HARVEST C	II	SE	MM	SF	-0.9416	0.1221	874.9	-7.71	<.0001	<.0001
HARVEST C	II	SF	IM	SE	-0.3264	0.1263	945.8	-2.58	0.0099	0.1013
HARVEST C	II	SF	IM	SF	-0.4898	0.1041	2658	-4.70	<.0001	<.0001
HARVEST C	II	SF	MM	SE	-1.0082	0.1534	1428	-6.57	<.0001	<.0001
HARVEST C	II	SF	MM	SF	-0.9599	0.1241	2657	-7.74	<.0001	<.0001
HARVEST C	IM	SE	IM	SF	-0.1635	0.1256	904.9	-1.30	0.1933	0.7842
HARVEST C	IM	SE	MM	SE	-0.6819	0.1611	2654	-4.23	<.0001	0.0003
HARVEST C	IM	SE	MM	SF	-0.6335	0.1428	1269	-4.44	<.0001	0.0001
HARVEST C	IM	SF	MM	SE	-0.5184	0.1528	1415	-3.39	0.0007	0.0092
HARVEST C	IM	SF	MM	SF	-0.4700	0.1243	2660	-3.78	0.0002	0.0022
HARVEST C	MM	SE	MM	SF	0.04836	0.1670	1654	0.29	0.7721	0.9997

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



*Tukey-Kramer Grouping for MAT*Cultivar*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Slice	*MAT*	*Cultivar*	*Estimate*		
HARVEST C	MM	SE	3.5391		A
HARVEST C					A
HARVEST C	MM	SF	3.4907		A
HARVEST C					
HARVEST C	IM	SF	3.0207		B
HARVEST C					B
HARVEST C	IM	SE	2.8572	C	B
HARVEST C				C	
HARVEST C	II	SE	2.5491	C	
HARVEST C				C	
HARVEST C	II	SF	2.5308	C	

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*F Test for MAT*Cultivar*HARVEST Least Squares Means Slice*

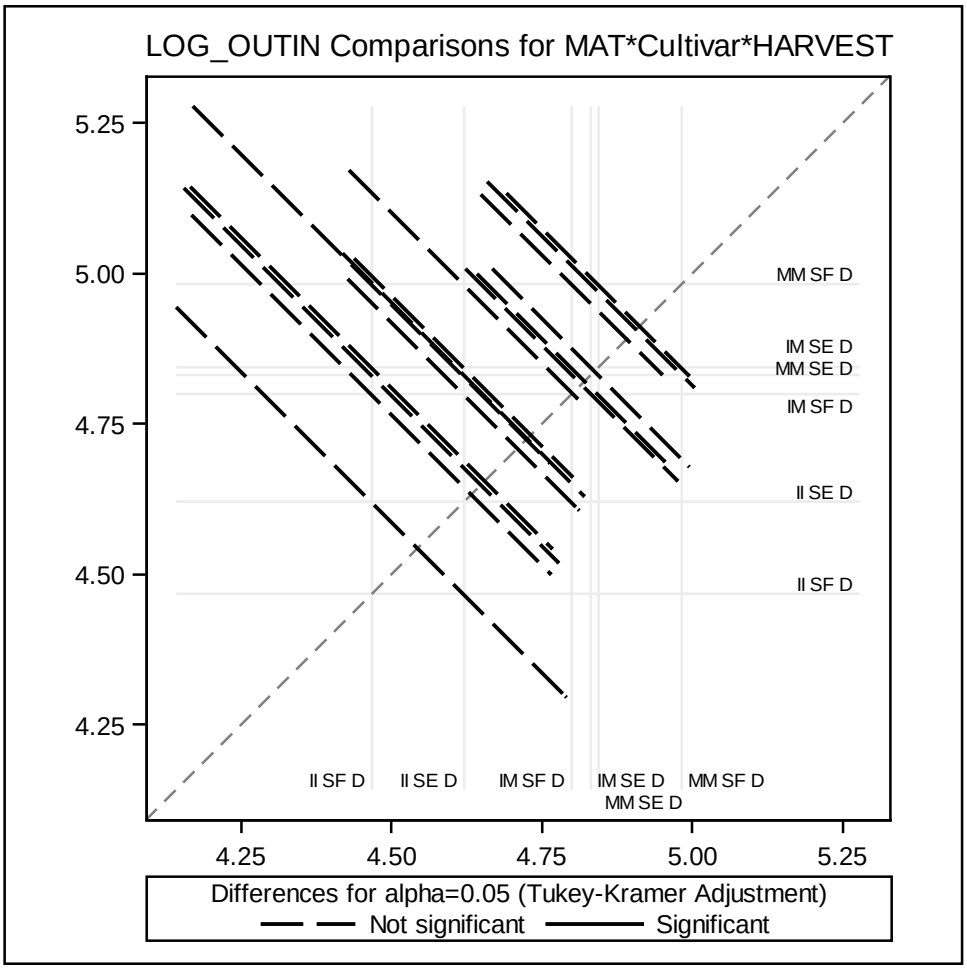
Slice	*Num DF*	*Den DF*	*F Value*	*Pr > F*
HARVEST D	5	1302	2.38	0.0368

*Simple Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Slice	*MAT*	*Cultivar*	*_MAT*	*Cultivar*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*
HARVEST D	II	SE	II	SF	0.1532	0.2279	2266	0.67	0.5015	0.9850
HARVEST D	II	SE	IM	SE	-0.2115	0.1416	2659	-1.49	0.1353	0.6683
HARVEST D	II	SE	IM	SF	-0.1793	0.1354	1138	-1.32	0.1856	0.7716
HARVEST D	II	SE	MM	SE	-0.2234	0.1272	2658	-1.76	0.0791	0.4944
HARVEST D	II	SE	MM	SF	-0.3617	0.1333	1097	-2.71	0.0068	0.0731
HARVEST D	II	SF	IM	SE	-0.3647	0.2187	2170	-1.67	0.0955	0.5533
HARVEST D	II	SF	IM	SF	-0.3325	0.2096	2655	-1.59	0.1128	0.6076
HARVEST D	II	SF	MM	SE	-0.3766	0.2109	2134	-1.79	0.0742	0.4748
HARVEST D	II	SF	MM	SF	-0.5149	0.2083	2653	-2.47	0.0135	0.1328
HARVEST D	IM	SE	IM	SF	0.03226	0.1239	916.8	0.26	0.7946	0.9998
HARVEST D	IM	SE	MM	SE	-0.01191	0.1155	2657	-0.10	0.9179	1.0000
HARVEST D	IM	SE	MM	SF	-0.1502	0.1207	833.4	-1.24	0.2139	0.8152
HARVEST D	IM	SF	MM	SE	-0.04417	0.1098	638.9	-0.40	0.6876	0.9986
HARVEST D	IM	SF	MM	SF	-0.1824	0.1057	2651	-1.73	0.0844	0.5144
HARVEST D	MM	SE	MM	SF	-0.1383	0.1068	580.8	-1.29	0.1961	0.7883

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



*Tukey-Kramer Grouping for MAT*Cultivar*HARVEST Least Squares Means Slice (Alpha=0.05)*

LS-means with the same letter are not significantly different.

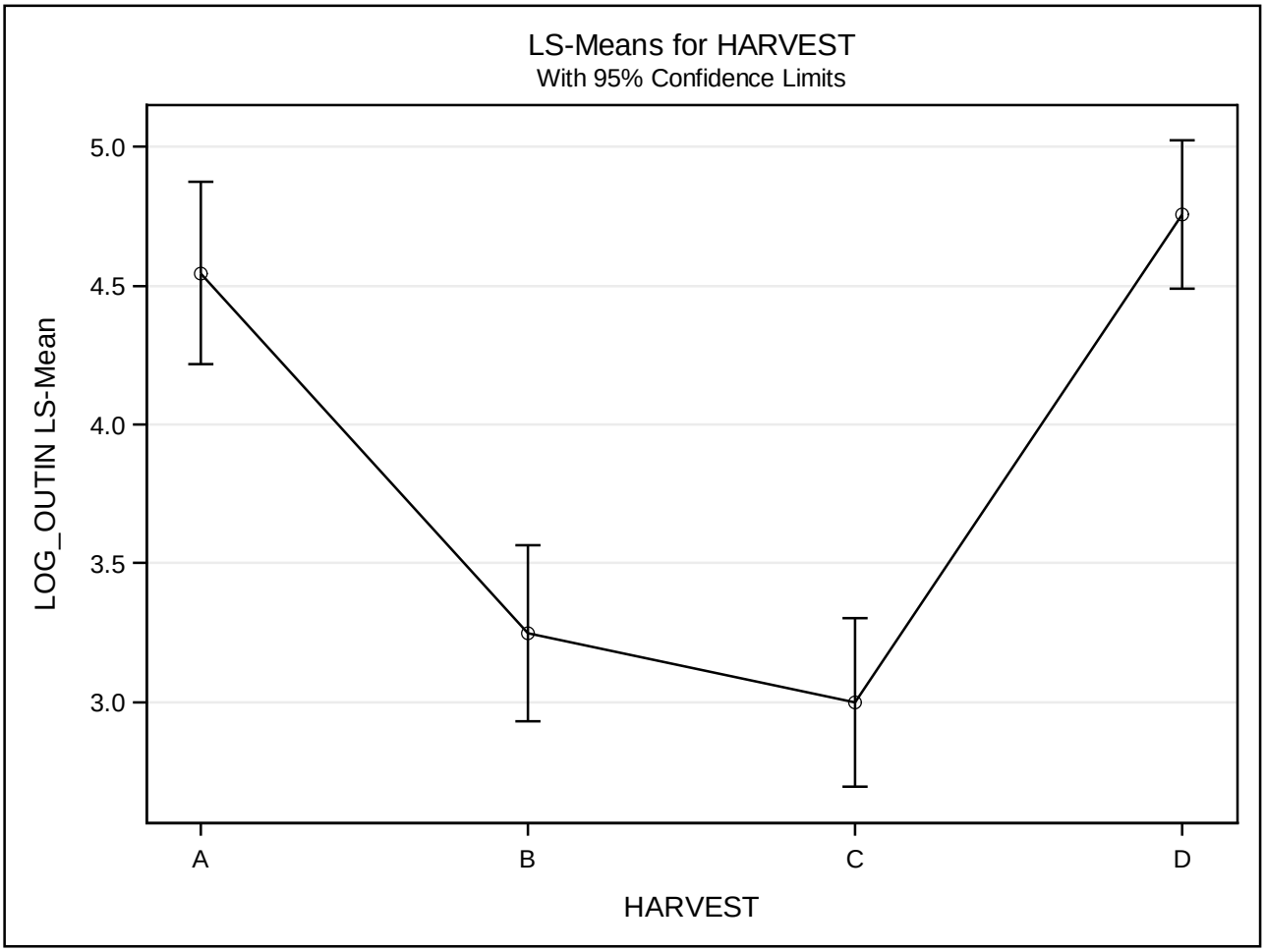
Slice	*MAT*	*Cultivar*	*Estimate*	
HARVEST D	MM	SF	4.9816	A
HARVEST D				A
HARVEST D	MM	SE	4.8433	A
HARVEST D				A
HARVEST D	IM	SE	4.8314	A
HARVEST D				A
HARVEST D	IM	SF	4.7992	A
HARVEST D				A
HARVEST D	II	SE	4.6199	A
HARVEST D				A
HARVEST D	II	SF	4.4667	A

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

HARVEST Least Squares Means

HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
A	4.5465	0.1668	121.5	27.25	<.0001	0.05	4.2162	4.8768
B	3.2488	0.1045	3.27	31.08	<.0001	0.05	2.9312	3.5665
C	2.9979	0.1043	3.588	28.75	<.0001	0.05	2.6948	3.3010
D	4.7570	0.1055	5.188	45.08	<.0001	0.05	4.4887	5.0253



Differences of HARVEST Least Squares Means
Adjustment for Multiple Comparisons: Tukey-Kramer

HARVEST	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha	Lower	Upper	Adj Lower	Adj Upper
A	B	1.2977	0.1402	2651	9.25	<.0001	<.0001	0.05	1.0227	1.5727	0.9372	1.6582
A	C	1.5486	0.1408	2655	11.00	<.0001	<.0001	0.05	1.2726	1.8246	1.1867	1.9105
A	D	-0.2105	0.1428	2650	-1.47	0.1405	0.4532	0.05	-0.4905	0.06947	-0.5776	0.1565
B	C	0.2509	0.05258	2657	4.77	<.0001	<.0001	0.05	0.1478	0.3540	0.1157	0.3861
B	D	-1.5082	0.05811	2660	-25.95	<.0001	<.0001	0.05	-1.6221	-1.3942	-1.6576	-1.3588
C	D	-1.7591	0.05863	2661	-30.00	<.0001	<.0001	0.05	-1.8741	-1.6441	-1.9098	-1.6084

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

Tukey-Kramer Grouping for HARVEST Least Squares Means (Alpha=0.05)

LS-means with the same letter are not significantly different.

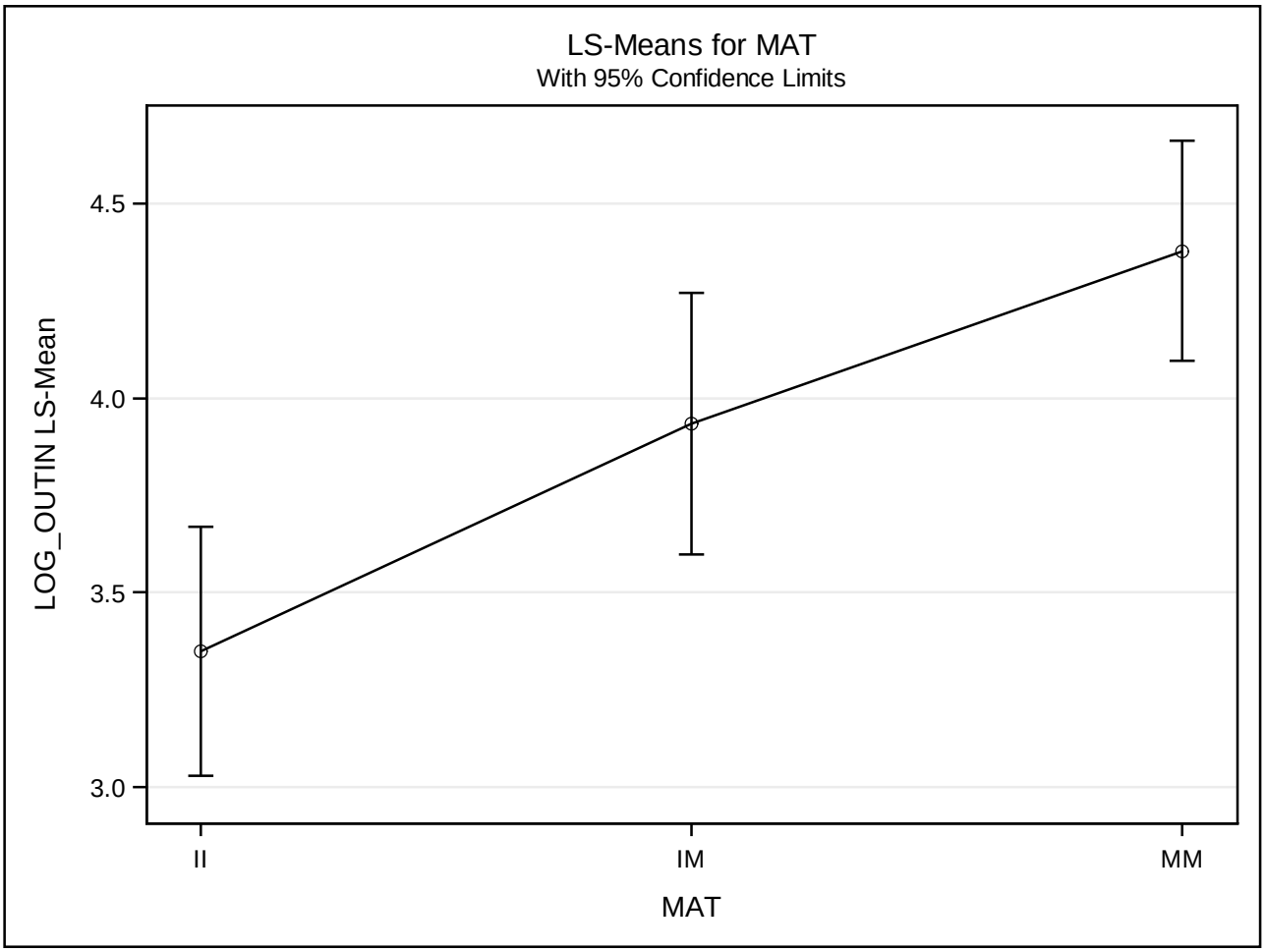
HARVEST	*Estimate*	
D	4.7570	A
		A
A	4.5465	A
B	3.2488	B
C	2.9979	C

MAT Least Squares Means

MAT	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Alpha*	*Lower*	*Upper*
II	3.3494	0.1040	3.222	32.19	<.0001	0.05	3.0308	3.6679
IM	3.9350	0.1025	2.853	38.39	<.0001	0.05	3.5990	4.2709
MM	4.3784	0.1411	50.67	31.03	<.0001	0.05	4.0951	4.6617

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



Differences of MAT Least Squares Means
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	*_MAT*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*	*Alpha*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
II	IM	-0.5856	0.04839	2648	-12.10	<.0001	<.0001	0.05	-0.6805	-0.4907	-0.6991	-0.4721
II	MM	-1.0290	0.1093	2652	-9.42	<.0001	<.0001	0.05	-1.2433	-0.8147	-1.2852	-0.7728
IM	MM	-0.4434	0.1086	2657	-4.08	<.0001	0.0001	0.05	-0.6564	-0.2304	-0.6981	-0.1887

Tukey-Kramer Grouping for MAT Least Squares Means (Alpha=0.05)

LS-means with the same letter are not significantly different.

MAT	*Estimate*	
MM	4.3784	A
IM	3.9350	B

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

Tukey-Kramer Grouping for MAT Least Squares Means (Alpha=0.05)

LS-means with the same letter are not significantly different.

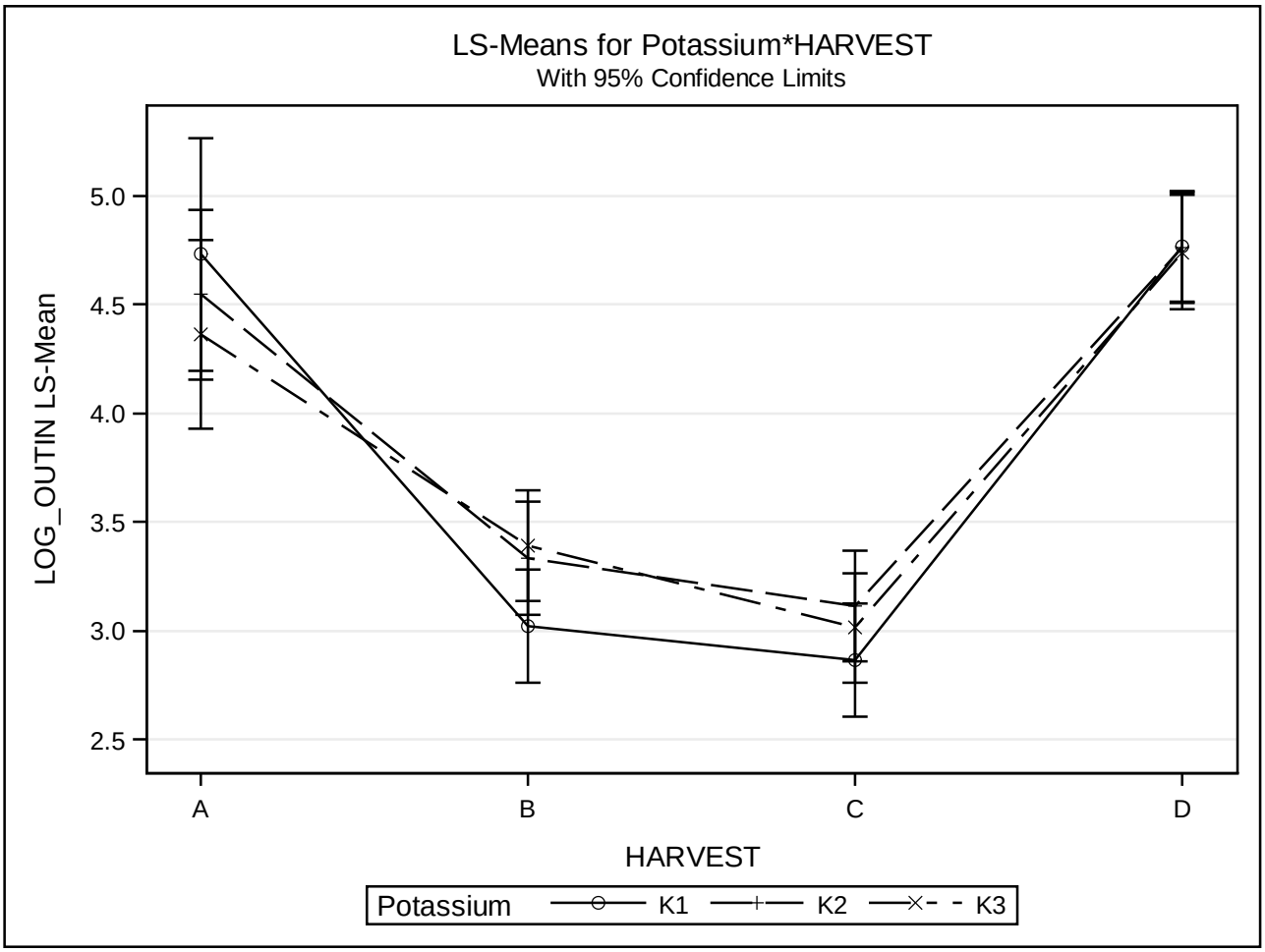
MAT	*Estimate*	
II	3.3494	C

*Potassium*HARVEST Least Squares Means*

Potassium	*HARVEST*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Alpha*	*Lower*	*Upper*
K1	A	4.7307	0.2729	823.9	17.34	<.0001	0.05	4.1951	5.2663
K1	B	3.0217	0.1204	13.26	25.09	<.0001	0.05	2.7620	3.2814
K1	C	2.8651	0.1194	11.11	23.99	<.0001	0.05	2.6025	3.1276
K1	D	4.7691	0.1204	18.5	39.62	<.0001	0.05	4.5166	5.0215
K2	A	4.5462	0.1987	252	22.87	<.0001	0.05	4.1548	4.9377
K2	B	3.3329	0.1172	10.72	28.44	<.0001	0.05	3.0741	3.5917
K2	C	3.1146	0.1198	15.03	25.99	<.0001	0.05	2.8592	3.3700
K2	D	4.7616	0.1200	17.26	39.68	<.0001	0.05	4.5087	5.0144
K3	A	4.3626	0.2203	535.3	19.81	<.0001	0.05	3.9299	4.7952
K3	B	3.3919	0.1176	11.8	28.85	<.0001	0.05	3.1352	3.6485
K3	C	3.0141	0.1184	15.18	25.46	<.0001	0.05	2.7620	3.2661
K3	D	4.7404	0.1277	24.47	37.11	<.0001	0.05	4.4770	5.0037

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



*Differences of Potassium*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Potassium	HARVEST	Potassium	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha	Lower	Upper
K1	A	K1	B	1.7090	0.2609	2651	6.55	<.0001	<.0001	0.05	1.1974	2.2207
K1	A	K1	C	1.8656	0.2609	2656	7.15	<.0001	<.0001	0.05	1.3541	2.3772
K1	A	K1	D	-0.03836	0.2621	2652	-0.15	0.8837	1.0000	0.05	-0.5523	0.4756
K1	A	K2	A	0.1845	0.2708	2315	0.68	0.4958	0.9999	0.05	-0.3466	0.7155
K1	A	K2	B	1.3978	0.2624	2270	5.33	<.0001	<.0001	0.05	0.8831	1.9124
K1	A	K2	C	1.6161	0.2646	2270	6.11	<.0001	<.0001	0.05	1.0972	2.1350
K1	A	K2	D	-0.03086	0.2656	2262	-0.12	0.9075	1.0000	0.05	-0.5516	0.4899
K1	A	K3	A	0.3682	0.3150	2460	1.17	0.2427	0.9912	0.05	-0.2496	0.9859
K1	A	K3	B	1.3388	0.2636	2274	5.08	<.0001	<.0001	0.05	0.8220	1.8557
K1	A	K3	C	1.7166	0.2640	2286	6.50	<.0001	<.0001	0.05	1.1989	2.2344
K1	A	K3	D	-0.00968	0.2687	2314	-0.04	0.9713	1.0000	0.05	-0.5366	0.5172
K1	B	K1	C	0.1566	0.08943	2654	1.75	0.0800	0.8439	0.05	-0.01874	0.3320
K1	B	K1	D	-1.7474	0.09618	2658	-18.17	<.0001	<.0001	0.05	-1.9360	-1.5588
K1	B	K2	A	-1.5245	0.1869	1506	-8.16	<.0001	<.0001	0.05	-1.8911	-1.1580
K1	B	K2	B	-0.3112	0.09656	217.2	-3.22	0.0015	0.0578	0.05	-0.5015	-0.1209
K1	B	K2	C	-0.09291	0.1022	262	-0.91	0.3642	0.9990	0.05	-0.2942	0.1084
K1	B	K2	D	-1.7399	0.1040	271.1	-16.72	<.0001	<.0001	0.05	-1.9447	-1.5350
K1	B	K3	A	-1.3409	0.2131	1825	-6.29	<.0001	<.0001	0.05	-1.7588	-0.9229
K1	B	K3	B	-0.3702	0.09823	226.4	-3.77	0.0002	0.0092	0.05	-0.5637	-0.1766
K1	B	K3	C	0.007636	0.1018	253.4	0.08	0.9402	1.0000	0.05	-0.1928	0.2081
K1	B	K3	D	-1.7187	0.1116	355.4	-15.41	<.0001	<.0001	0.05	-1.9381	-1.4993
K1	C	K1	D	-1.9040	0.09369	2652	-20.32	<.0001	<.0001	0.05	-2.0877	-1.7203
K1	C	K2	A	-1.6812	0.1861	1445	-9.03	<.0001	<.0001	0.05	-2.0462	-1.3161
K1	C	K2	B	-0.4678	0.09487	190.9	-4.93	<.0001	<.0001	0.05	-0.6550	-0.2807
K1	C	K2	C	-0.2495	0.09992	227	-2.50	0.0132	0.3419	0.05	-0.4464	-0.05264
K1	C	K2	D	-1.8965	0.1014	232.7	-18.71	<.0001	<.0001	0.05	-2.0962	-1.6968
K1	C	K3	A	-1.4975	0.2121	1793	-7.06	<.0001	<.0001	0.05	-1.9135	-1.0814
K1	C	K3	B	-0.5268	0.09597	198.2	-5.49	<.0001	<.0001	0.05	-0.7161	-0.3375
K1	C	K3	C	-0.1490	0.09796	209.3	-1.52	0.1298	0.9350	0.05	-0.3421	0.04413
K1	C	K3	D	-1.8753	0.1092	312.4	-17.17	<.0001	<.0001	0.05	-2.0902	-1.6605
K1	D	K2	A	0.2228	0.1889	1510	1.18	0.2384	0.9905	0.05	-0.1478	0.5934
K1	D	K2	B	1.4361	0.1015	249.4	14.15	<.0001	<.0001	0.05	1.2363	1.6360
K1	D	K2	C	1.6545	0.1056	283.2	15.66	<.0001	<.0001	0.05	1.4465	1.8624
K1	D	K2	D	0.007497	0.1051	272.4	0.07	0.9432	1.0000	0.05	-0.1995	0.2145
K1	D	K3	A	0.4065	0.2151	1843	1.89	0.0589	0.7657	0.05	-0.01532	0.8284
K1	D	K3	B	1.3772	0.1022	256.5	13.47	<.0001	<.0001	0.05	1.1759	1.5785

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Potassium*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Potassium	*HARVEST*	*Potassium*	*HARVEST*	*Adj Lower*	*Adj Upper*
K1	A	K1	B	0.8555	2.5625
K1	A	K1	C	1.0123	2.7189
K1	A	K1	D	-0.8957	0.8190
K1	A	K2	A	-0.7014	1.0703
K1	A	K2	B	0.5394	2.2562
K1	A	K2	C	0.7506	2.4816
K1	A	K2	D	-0.8995	0.8378
K1	A	K3	A	-0.6623	1.3986
K1	A	K3	B	0.4767	2.2009
K1	A	K3	C	0.8530	2.5803
K1	A	K3	D	-0.8885	0.8692
K1	B	K1	C	-0.1359	0.4491
K1	B	K1	D	-2.0620	-1.4328
K1	B	K2	A	-2.1358	-0.9133
K1	B	K2	B	-0.6271	0.004603
K1	B	K2	C	-0.4273	0.2414
K1	B	K2	D	-2.0802	-1.3996
K1	B	K3	A	-2.0379	-0.6438
K1	B	K3	B	-0.6915	-0.04887
K1	B	K3	C	-0.3253	0.3405
K1	B	K3	D	-2.0836	-1.3538
K1	C	K1	D	-2.2105	-1.5975
K1	C	K2	A	-2.2899	-1.0724
K1	C	K2	B	-0.7782	-0.1575
K1	C	K2	C	-0.5764	0.07731
K1	C	K2	D	-2.2281	-1.5649
K1	C	K3	A	-2.1913	-0.8036
K1	C	K3	B	-0.8407	-0.2129
K1	C	K3	C	-0.4694	0.1714
K1	C	K3	D	-2.2325	-1.5182
K1	D	K2	A	-0.3951	0.8408
K1	D	K2	B	1.1042	1.7681
K1	D	K2	C	1.3089	2.0000
K1	D	K2	D	-0.3364	0.3514
K1	D	K3	A	-0.2970	1.1101
K1	D	K3	B	1.0428	1.7116

*Differences of Potassium*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Potassium	HARVEST	Potassium	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha	Lower	Upper
K1	D	K3	C	1.7550	0.1052	275.6	16.68	<.0001	<.0001	0.05	1.5479	1.9621
K1	D	K3	D	0.02868	0.1111	338.8	0.26	0.7964	1.0000	0.05	-0.1898	0.2471
K2	A	K2	B	1.2133	0.1803	2651	6.73	<.0001	<.0001	0.05	0.8598	1.5669
K2	A	K2	C	1.4316	0.1827	2657	7.84	<.0001	<.0001	0.05	1.0734	1.7898
K2	A	K2	D	-0.2153	0.1838	2654	-1.17	0.2414	0.9910	0.05	-0.5757	0.1450
K2	A	K3	A	0.1837	0.2537	2177	0.72	0.4691	0.9999	0.05	-0.3138	0.6811
K2	A	K3	B	1.1544	0.1860	1479	6.21	<.0001	<.0001	0.05	0.7895	1.5193
K2	A	K3	C	1.5322	0.1871	1496	8.19	<.0001	<.0001	0.05	1.1653	1.8991
K2	A	K3	D	-0.1941	0.1921	1576	-1.01	0.3122	0.9975	0.05	-0.5709	0.1826
K2	B	K2	C	0.2183	0.08951	2652	2.44	0.0148	0.3798	0.05	0.04280	0.3938
K2	B	K2	D	-1.4287	0.09113	2659	-15.68	<.0001	<.0001	0.05	-1.6073	-1.2500
K2	B	K3	A	-1.0296	0.2113	1805	-4.87	<.0001	<.0001	0.05	-1.4441	-0.6151
K2	B	K3	B	-0.05896	0.09420	191.5	-0.63	0.5321	1.0000	0.05	-0.2448	0.1268
K2	B	K3	C	0.3189	0.09834	219.9	3.24	0.0014	0.0545	0.05	0.1251	0.5127
K2	B	K3	D	-1.4075	0.1084	315.7	-12.99	<.0001	<.0001	0.05	-1.6207	-1.1943
K2	C	K2	D	-1.6470	0.09574	2655	-17.20	<.0001	<.0001	0.05	-1.8347	-1.4592
K2	C	K3	A	-1.2479	0.2133	1833	-5.85	<.0001	<.0001	0.05	-1.6663	-0.8296
K2	C	K3	B	-0.2773	0.09983	233	-2.78	0.0059	0.1902	0.05	-0.4739	-0.08059
K2	C	K3	C	0.1006	0.1024	250.7	0.98	0.3272	0.9981	0.05	-0.1012	0.3023
K2	C	K3	D	-1.6258	0.1126	353.8	-14.44	<.0001	<.0001	0.05	-1.8472	-1.4043
K2	D	K3	A	0.3990	0.2142	1825	1.86	0.0626	0.7821	0.05	-0.02103	0.8191
K2	D	K3	B	1.3697	0.1015	240.2	13.50	<.0001	<.0001	0.05	1.1698	1.5696
K2	D	K3	C	1.7475	0.1042	260.8	16.76	<.0001	<.0001	0.05	1.5423	1.9528
K2	D	K3	D	0.02118	0.1097	315.3	0.19	0.8469	1.0000	0.05	-0.1946	0.2369
K3	A	K3	B	0.9707	0.2079	2651	4.67	<.0001	0.0002	0.05	0.5629	1.3784
K3	A	K3	C	1.3485	0.2099	2659	6.42	<.0001	<.0001	0.05	0.9369	1.7601
K3	A	K3	D	-0.3778	0.2143	2656	-1.76	0.0780	0.8379	0.05	-0.7981	0.04238
K3	B	K3	C	0.3778	0.09022	2656	4.19	<.0001	0.0017	0.05	0.2009	0.5547
K3	B	K3	D	-1.3485	0.1002	2656	-13.46	<.0001	<.0001	0.05	-1.5450	-1.1520
K3	C	K3	D	-1.7263	0.1025	2657	-16.84	<.0001	<.0001	0.05	-1.9274	-1.5253

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Potassium*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Potassium	*HARVEST*	*Potassium*	*HARVEST*	*Adj Lower*	*Adj Upper*
K1	D	K3	C	1.4109	2.0991
K1	D	K3	D	-0.3346	0.3920
K2	A	K2	B	0.6235	1.8031
K2	A	K2	C	0.8341	2.0292
K2	A	K2	D	-0.8164	0.3858
K2	A	K3	A	-0.6460	1.0134
K2	A	K3	B	0.5459	1.7628
K2	A	K3	C	0.9203	2.1441
K2	A	K3	D	-0.8224	0.4341
K2	B	K2	C	-0.07446	0.5111
K2	B	K2	D	-1.7267	-1.1306
K2	B	K3	A	-1.7209	-0.3383
K2	B	K3	B	-0.3671	0.2492
K2	B	K3	C	-0.00279	0.6405
K2	B	K3	D	-1.7619	-1.0530
K2	C	K2	D	-1.9601	-1.3338
K2	C	K3	A	-1.9456	-0.5503
K2	C	K3	B	-0.6038	0.04926
K2	C	K3	C	-0.2345	0.4356
K2	C	K3	D	-1.9941	-1.2575
K2	D	K3	A	-0.3015	1.0996
K2	D	K3	B	1.0378	1.7016
K2	D	K3	C	1.4066	2.0885
K2	D	K3	D	-0.3375	0.3798
K3	A	K3	B	0.2905	1.6508
K3	A	K3	C	0.6619	2.0351
K3	A	K3	D	-1.0788	0.3231
K3	B	K3	C	0.08272	0.6729
K3	B	K3	D	-1.6762	-1.0208
K3	C	K3	D	-2.0617	-1.3910

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Tukey-Kramer Grouping for Potassium*HARVEST Least Squares Means (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Potassium	*HARVEST*	*Estimate*			
K1	D	4.7691		A	
				A	
K2	D	4.7616		A	
				A	
K3	D	4.7404		A	
				A	
K1	A	4.7307		A	
				A	
K2	A	4.5462		A	
				A	
K3	A	4.3626		A	
K3	B	3.3919		B	
				B	
K2	B	3.3329	C	B	
			C	B	
K2	C	3.1146	C	B	D
			C		D
K1	B	3.0217	C		D
			C		D
K3	C	3.0141	C		D
					D
K1	C	2.8651			D

*Nitrog*Potass*HARVES Least Squares Means*

Nitrogen	*Potassium*	*HARVEST*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Alpha*	*Lower*	*Upper*
N1	K1	A	4.7794	0.3791	534.1	12.61	<.0001	0.05	4.0346	5.5242
N1	K1	B	3.1133	0.1909	12.57	16.31	<.0001	0.05	2.6995	3.5271
N1	K1	C	2.7878	0.1889	9.852	14.76	<.0001	0.05	2.3661	3.2096
N1	K1	D	4.7533	0.1937	27.49	24.55	<.0001	0.05	4.3563	5.1504
N1	K2	A	4.6427	0.2841	181.8	16.34	<.0001	0.05	4.0822	5.2032
N1	K2	B	3.0951	0.1909	11.88	16.21	<.0001	0.05	2.6786	3.5115
N1	K2	C	3.0780	0.2013	20.01	15.29	<.0001	0.05	2.6581	3.4978
N1	K2	D	4.5209	0.1949	18.72	23.20	<.0001	0.05	4.1127	4.9292

Statistical Analysis: 06/05/2013

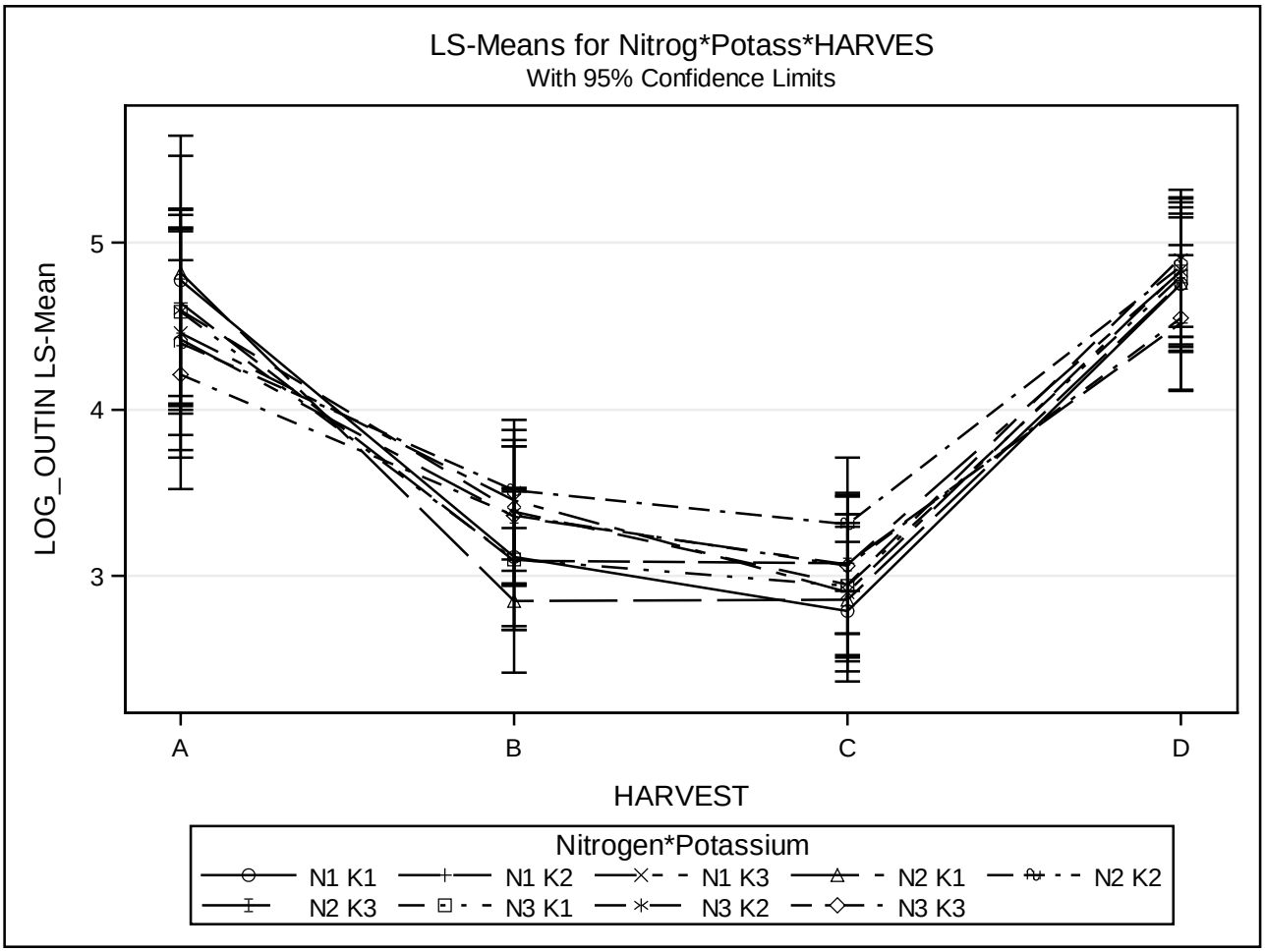
The GLIMMIX Procedure

*Nitrog*Potass*HARVES Least Squares Means*

Nitrogen	*Potassium*	*HARVEST*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Alpha*	*Lower*	*Upper*
N1	K3	A	4.4596	0.3101	256.6	14.38	<.0001	0.05	3.8489	5.0703
N1	K3	B	3.4547	0.1905	11.03	18.13	<.0001	0.05	3.0355	3.8739
N1	K3	C	2.9059	0.1844	9.17	15.76	<.0001	0.05	2.4900	3.3219
N1	K3	D	4.8398	0.1937	19.11	24.98	<.0001	0.05	4.4345	5.2452
N2	K1	A	4.8233	0.4183	732.1	11.53	<.0001	0.05	4.0021	5.6445
N2	K1	B	2.8522	0.2006	13.01	14.22	<.0001	0.05	2.4189	3.2854
N2	K1	C	2.8624	0.1952	10.51	14.67	<.0001	0.05	2.4304	3.2944
N2	K1	D	4.7585	0.1993	21.09	23.88	<.0001	0.05	4.3442	5.1729
N2	K2	A	4.4004	0.3519	377.3	12.50	<.0001	0.05	3.7084	5.0924
N2	K2	B	3.5185	0.1863	9.441	18.89	<.0001	0.05	3.1000	3.9370
N2	K2	C	3.3143	0.1866	13.88	17.76	<.0001	0.05	2.9137	3.7150
N2	K2	D	4.8551	0.1947	12.72	24.93	<.0001	0.05	4.4334	5.2767
N2	K3	A	4.4185	0.3373	401.1	13.10	<.0001	0.05	3.7554	5.0816
N2	K3	B	3.3599	0.1923	11.45	17.47	<.0001	0.05	2.9386	3.7812
N2	K3	C	3.0715	0.1916	13.21	16.03	<.0001	0.05	2.6582	3.4847
N2	K3	D	4.8295	0.2090	18.92	23.11	<.0001	0.05	4.3920	5.2670
N3	K1	A	4.5894	0.3091	170.2	14.85	<.0001	0.05	3.9792	5.1995
N3	K1	B	3.0996	0.1932	11.72	16.05	<.0001	0.05	2.6777	3.5216
N3	K1	C	2.9450	0.1992	13.12	14.78	<.0001	0.05	2.5150	3.3750
N3	K1	D	4.7953	0.1896	10.88	25.30	<.0001	0.05	4.3775	5.2132
N3	K2	A	4.5957	0.2905	183.2	15.82	<.0001	0.05	4.0225	5.1688
N3	K2	B	3.3852	0.1955	11.17	17.32	<.0001	0.05	2.9558	3.8146
N3	K2	C	2.9515	0.1920	10.84	15.37	<.0001	0.05	2.5280	3.3750
N3	K2	D	4.9087	0.1943	15.33	25.26	<.0001	0.05	4.4954	5.3221
N3	K3	A	4.2095	0.3477	390.2	12.11	<.0001	0.05	3.5260	4.8931
N3	K3	B	3.3610	0.1911	12.34	17.58	<.0001	0.05	2.9458	3.7762
N3	K3	C	3.0648	0.1987	21.72	15.42	<.0001	0.05	2.6524	3.4772
N3	K3	D	4.5518	0.2094	20.81	21.74	<.0001	0.05	4.1161	4.9876

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
N1	K1	A	N1	K1	B	1.6662	0.3591	2656	4.64	<.0001	0.0020	0.05
N1	K1	A	N1	K1	C	1.9916	0.3563	2656	5.59	<.0001	<.0001	0.05
N1	K1	A	N1	K1	D	0.02611	0.3673	2660	0.07	0.9433	1.0000	0.05
N1	K1	A	N1	K2	A	0.1368	0.3255	1561	0.42	0.6744	1.0000	0.05
N1	K1	A	N1	K2	B	1.6844	0.3650	1808	4.61	<.0001	0.0022	0.05
N1	K1	A	N1	K2	C	1.7015	0.3765	1776	4.52	<.0001	0.0034	0.05
N1	K1	A	N1	K2	D	0.2585	0.3681	1710	0.70	0.4826	1.0000	0.05
N1	K1	A	N1	K3	A	0.3198	0.3629	1807	0.88	0.3783	1.0000	0.05
N1	K1	A	N1	K3	B	1.3247	0.3658	1805	3.62	0.0003	0.1024	0.05
N1	K1	A	N1	K3	C	1.8735	0.3640	1784	5.15	<.0001	0.0002	0.05
N1	K1	A	N1	K3	D	-0.06040	0.3699	1819	-0.16	0.8703	1.0000	0.05
N1	K1	A	N2	K1	A	-0.04387	0.4199	98.43	-0.10	0.9170	1.0000	0.05
N1	K1	A	N2	K1	B	1.9273	0.4237	98.22	4.55	<.0001	0.0030	0.05
N1	K1	A	N2	K1	C	1.9171	0.4210	97.14	4.55	<.0001	0.0029	0.05
N1	K1	A	N2	K1	D	0.02089	0.4233	115.3	0.05	0.9607	1.0000	0.05
N1	K1	A	N2	K2	A	0.3790	0.4971	213	0.76	0.4466	1.0000	0.05
N1	K1	A	N2	K2	B	1.2609	0.4166	100.4	3.03	0.0031	0.4461	0.05
N1	K1	A	N2	K2	C	1.4651	0.4175	111.9	3.51	0.0006	0.1429	0.05
N1	K1	A	N2	K2	D	-0.07563	0.4218	101.7	-0.18	0.8581	1.0000	0.05
N1	K1	A	N2	K3	A	0.3609	0.5077	256.4	0.71	0.4778	1.0000	0.05
N1	K1	A	N2	K3	B	1.4195	0.4201	102	3.38	0.0010	0.2038	0.05
N1	K1	A	N2	K3	C	1.7080	0.4195	108.3	4.07	<.0001	0.0217	0.05
N1	K1	A	N2	K3	D	-0.05006	0.4293	103.6	-0.12	0.9074	1.0000	0.05
N1	K1	A	N3	K1	A	0.1901	0.4372	100.8	0.43	0.6647	1.0000	0.05
N1	K1	A	N3	K1	B	1.6798	0.4218	101.6	3.98	0.0001	0.0303	0.05
N1	K1	A	N3	K1	C	1.8344	0.4278	104.6	4.29	<.0001	0.0092	0.05
N1	K1	A	N3	K1	D	-0.01590	0.4187	99.72	-0.04	0.9698	1.0000	0.05
N1	K1	A	N3	K2	A	0.1838	0.5270	284.1	0.35	0.7276	1.0000	0.05
N1	K1	A	N3	K2	B	1.3943	0.4218	97.31	3.31	0.0013	0.2456	0.05
N1	K1	A	N3	K2	C	1.8279	0.4199	98.09	4.35	<.0001	0.0070	0.05
N1	K1	A	N3	K2	D	-0.1293	0.4255	109.4	-0.30	0.7618	1.0000	0.05
N1	K1	A	N3	K3	A	0.5699	0.5798	398.1	0.98	0.3262	1.0000	0.05
N1	K1	A	N3	K3	B	1.4185	0.4208	103.7	3.37	0.0011	0.2084	0.05
N1	K1	A	N3	K3	C	1.7146	0.4234	113.4	4.05	<.0001	0.0236	0.05
N1	K1	A	N3	K3	D	0.2276	0.4311	109.5	0.53	0.5986	1.0000	0.05
N1	K1	B	N1	K1	C	0.3254	0.1451	2654	2.24	0.0249	0.9564	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	*Potassium*	*HARVEST*	*Nitrogen*	*Potassium*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
N1	K1	A	N1	K1	B	0.9620	2.3704	0.2865	3.0459
N1	K1	A	N1	K1	C	1.2930	2.6902	0.6229	3.3603
N1	K1	A	N1	K1	D	-0.6941	0.7463	-1.3849	1.4371
N1	K1	A	N1	K2	A	-0.5017	0.7752	-1.1137	1.3872
N1	K1	A	N1	K2	B	0.9685	2.4003	0.2820	3.0867
N1	K1	A	N1	K2	C	0.9630	2.4399	0.2550	3.1480
N1	K1	A	N1	K2	D	-0.4635	0.9805	-1.1557	1.6727
N1	K1	A	N1	K3	A	-0.3919	1.0316	-1.0743	1.7140
N1	K1	A	N1	K3	B	0.6074	2.0421	-0.08041	2.7299
N1	K1	A	N1	K3	C	1.1597	2.5874	0.4752	3.2718
N1	K1	A	N1	K3	D	-0.7859	0.6651	-1.4815	1.3607
N1	K1	A	N2	K1	A	-0.8771	0.7894	-1.6570	1.5693
N1	K1	A	N2	K1	B	1.0865	2.7681	0.2995	3.5550
N1	K1	A	N2	K1	C	1.0815	2.7526	0.2997	3.5345
N1	K1	A	N2	K1	D	-0.8175	0.8593	-1.6052	1.6469
N1	K1	A	N2	K2	A	-0.6009	1.3590	-1.5308	2.2889
N1	K1	A	N2	K2	B	0.4345	2.0873	-0.3394	2.8612
N1	K1	A	N2	K2	C	0.6379	2.2923	-0.1388	3.0690
N1	K1	A	N2	K2	D	-0.9123	0.7610	-1.6960	1.5448
N1	K1	A	N2	K3	A	-0.6389	1.3607	-1.5896	2.3114
N1	K1	A	N2	K3	B	0.5863	2.2527	-0.1943	3.0333
N1	K1	A	N2	K3	C	0.8764	2.5395	0.09625	3.3197
N1	K1	A	N2	K3	D	-0.9014	0.8013	-1.6993	1.5992
N1	K1	A	N3	K1	A	-0.6773	1.0574	-1.4897	1.8698
N1	K1	A	N3	K1	B	0.8432	2.5164	0.05949	3.3001
N1	K1	A	N3	K1	C	0.9861	2.6828	0.1909	3.4780
N1	K1	A	N3	K1	D	-0.8465	0.8147	-1.6243	1.5925
N1	K1	A	N3	K2	A	-0.8536	1.2211	-1.8409	2.2084
N1	K1	A	N3	K2	B	0.5571	2.2314	-0.2263	3.0148
N1	K1	A	N3	K2	C	0.9947	2.6611	0.2149	3.4410
N1	K1	A	N3	K2	D	-0.9727	0.7141	-1.7641	1.5056
N1	K1	A	N3	K3	A	-0.5699	1.7097	-1.6575	2.7973
N1	K1	A	N3	K3	B	0.5839	2.2530	-0.1983	3.0352
N1	K1	A	N3	K3	C	0.8758	2.5534	0.08804	3.3412
N1	K1	A	N3	K3	D	-0.6267	1.0819	-1.4284	1.8836
N1	K1	B	N1	K1	C	0.04100	0.6099	-0.2318	0.8827

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
N1	K1	B	N1	K1	D	-1.6401	0.1646	2658	-9.96	<.0001	<.0001	0.05
N1	K1	B	N1	K2	A	-1.5294	0.2689	1021	-5.69	<.0001	<.0001	0.05
N1	K1	B	N1	K2	B	0.01822	0.1620	197.5	0.11	0.9106	1.0000	0.05
N1	K1	B	N1	K2	C	0.03531	0.1772	260.3	0.20	0.8422	1.0000	0.05
N1	K1	B	N1	K2	D	-1.4076	0.1732	229.8	-8.13	<.0001	<.0001	0.05
N1	K1	B	N1	K3	A	-1.3463	0.2968	1258	-4.54	<.0001	0.0032	0.05
N1	K1	B	N1	K3	B	-0.3414	0.1620	197.1	-2.11	0.0364	0.9815	0.05
N1	K1	B	N1	K3	C	0.2074	0.1581	179.3	1.31	0.1914	1.0000	0.05
N1	K1	B	N1	K3	D	-1.7266	0.1730	246.7	-9.98	<.0001	<.0001	0.05
N1	K1	B	N2	K1	A	-1.7100	0.4541	155.4	-3.77	0.0002	0.0646	0.05
N1	K1	B	N2	K1	B	0.2611	0.2654	5.363	0.98	0.3674	1.0000	0.05
N1	K1	B	N2	K1	C	0.2509	0.2630	5.128	0.95	0.3829	1.0000	0.05
N1	K1	B	N2	K1	D	-1.6453	0.2666	7.45	-6.17	0.0004	<.0001	0.05
N1	K1	B	N2	K2	A	-1.2871	0.3937	75.01	-3.27	0.0016	0.2681	0.05
N1	K1	B	N2	K2	B	-0.4052	0.2568	4.813	-1.58	0.1776	0.9999	0.05
N1	K1	B	N2	K2	C	-0.2011	0.2580	6.003	-0.78	0.4654	1.0000	0.05
N1	K1	B	N2	K2	D	-1.7418	0.2644	5.74	-6.59	0.0007	<.0001	0.05
N1	K1	B	N2	K3	A	-1.3052	0.3827	72.4	-3.41	0.0011	0.1876	0.05
N1	K1	B	N2	K3	B	-0.2467	0.2617	5.475	-0.94	0.3857	1.0000	0.05
N1	K1	B	N2	K3	C	0.04182	0.2604	5.899	0.16	0.8778	1.0000	0.05
N1	K1	B	N2	K3	D	-1.7162	0.2751	7.201	-6.24	0.0004	<.0001	0.05
N1	K1	B	N3	K1	A	-1.4761	0.3574	36.32	-4.13	0.0002	0.0174	0.05
N1	K1	B	N3	K1	B	0.01364	0.2618	4.961	0.05	0.9605	1.0000	0.05
N1	K1	B	N3	K1	C	0.1683	0.2681	5.708	0.63	0.5545	1.0000	0.05
N1	K1	B	N3	K1	D	-1.6821	0.2615	5.084	-6.43	0.0013	<.0001	0.05
N1	K1	B	N3	K2	A	-1.4824	0.3418	35.01	-4.34	0.0001	0.0075	0.05
N1	K1	B	N3	K2	B	-0.2719	0.2658	5.274	-1.02	0.3510	1.0000	0.05
N1	K1	B	N3	K2	C	0.1618	0.2634	5.127	0.61	0.5653	1.0000	0.05
N1	K1	B	N3	K2	D	-1.7954	0.2670	6.265	-6.72	0.0004	<.0001	0.05
N1	K1	B	N3	K3	A	-1.0963	0.3934	71.67	-2.79	0.0068	0.6481	0.05
N1	K1	B	N3	K3	B	-0.2477	0.2635	5.592	-0.94	0.3860	1.0000	0.05
N1	K1	B	N3	K3	C	0.04847	0.2694	7.519	0.18	0.8620	1.0000	0.05
N1	K1	B	N3	K3	D	-1.4386	0.2768	7.658	-5.20	0.0009	0.0001	0.05
N1	K1	C	N1	K1	D	-1.9655	0.1609	2647	-12.21	<.0001	<.0001	0.05
N1	K1	C	N1	K2	A	-1.8548	0.2661	963.7	-6.97	<.0001	<.0001	0.05
N1	K1	C	N1	K2	B	-0.3072	0.1597	178.2	-1.92	0.0560	0.9956	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	*Potassium*	*HARVEST*	*Nitrogen*	*Potassium*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
N1	K1	B	N1	K1	D	-1.9629	-1.3172	-2.2726	-1.0075
N1	K1	B	N1	K2	A	-2.0571	-1.0017	-2.5625	-0.4963
N1	K1	B	N1	K2	B	-0.3013	0.3378	-0.6043	0.6407
N1	K1	B	N1	K2	C	-0.3136	0.3843	-0.6455	0.7161
N1	K1	B	N1	K2	D	-1.7489	-1.0664	-2.0731	-0.7422
N1	K1	B	N1	K3	A	-1.9285	-0.7641	-2.4864	-0.2063
N1	K1	B	N1	K3	B	-0.6610	-0.02188	-0.9640	0.2811
N1	K1	B	N1	K3	C	-0.1046	0.5194	-0.4001	0.8148
N1	K1	B	N1	K3	D	-2.0673	-1.3858	-2.3912	-1.0619
N1	K1	B	N2	K1	A	-2.6070	-0.8131	-3.4545	0.03445
N1	K1	B	N2	K1	B	-0.4074	0.9296	-0.7584	1.2806
N1	K1	B	N2	K1	C	-0.4202	0.9220	-0.7595	1.2613
N1	K1	B	N2	K1	D	-2.2679	-1.0226	-2.6693	-0.6212
N1	K1	B	N2	K2	A	-2.0715	-0.5027	-2.7998	0.2256
N1	K1	B	N2	K2	B	-1.0731	0.2626	-1.3917	0.5813
N1	K1	B	N2	K2	C	-0.8323	0.4302	-1.1923	0.7902
N1	K1	B	N2	K2	D	-2.3958	-1.0878	-2.7574	-0.7262
N1	K1	B	N2	K3	A	-2.0681	-0.5424	-2.7755	0.1650
N1	K1	B	N2	K3	B	-0.9023	0.4090	-1.2522	0.7589
N1	K1	B	N2	K3	C	-0.5981	0.6817	-0.9587	1.0424
N1	K1	B	N2	K3	D	-2.3631	-1.0693	-2.7732	-0.6593
N1	K1	B	N3	K1	A	-2.2008	-0.7514	-2.8493	-0.1029
N1	K1	B	N3	K1	B	-0.6609	0.6882	-0.9921	1.0193
N1	K1	B	N3	K1	C	-0.4961	0.8326	-0.8619	1.1984
N1	K1	B	N3	K1	D	-2.3510	-1.0132	-2.6867	-0.6774
N1	K1	B	N3	K2	A	-2.1763	-0.7885	-2.7955	-0.1692
N1	K1	B	N3	K2	B	-0.9447	0.4009	-1.2932	0.7494
N1	K1	B	N3	K2	C	-0.5102	0.8338	-0.8500	1.1735
N1	K1	B	N3	K2	D	-2.4421	-1.1488	-2.8212	-0.7697
N1	K1	B	N3	K3	A	-1.8805	-0.3120	-2.6075	0.4150
N1	K1	B	N3	K3	B	-0.9041	0.4087	-1.2601	0.7647
N1	K1	B	N3	K3	C	-0.5798	0.6768	-0.9866	1.0836
N1	K1	B	N3	K3	D	-2.0819	-0.7952	-2.5020	-0.3751
N1	K1	C	N1	K1	D	-2.2810	-1.6499	-2.5837	-1.3473
N1	K1	C	N1	K2	A	-2.3771	-1.3326	-2.8772	-0.8325
N1	K1	C	N1	K2	B	-0.6224	0.007941	-0.9208	0.3063

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
N1	K1	C	N1	K2	C	-0.2901	0.1720	223.8	-1.69	0.0930	0.9996	0.05
N1	K1	C	N1	K2	D	-1.7331	0.1690	198.8	-10.26	<.0001	<.0001	0.05
N1	K1	C	N1	K3	A	-1.6718	0.2941	1206	-5.68	<.0001	<.0001	0.05
N1	K1	C	N1	K3	B	-0.6669	0.1587	173.5	-4.20	<.0001	0.0131	0.05
N1	K1	C	N1	K3	C	-0.1181	0.1528	150.1	-0.77	0.4410	1.0000	0.05
N1	K1	C	N1	K3	D	-2.0520	0.1691	216.9	-12.13	<.0001	<.0001	0.05
N1	K1	C	N2	K1	A	-2.0355	0.4536	148.5	-4.49	<.0001	0.0039	0.05
N1	K1	C	N2	K1	B	-0.06432	0.2668	5.211	-0.24	0.8187	1.0000	0.05
N1	K1	C	N2	K1	C	-0.07453	0.2615	4.484	-0.29	0.7883	1.0000	0.05
N1	K1	C	N2	K1	D	-1.9707	0.2656	6.696	-7.42	0.0002	<.0001	0.05
N1	K1	C	N2	K2	A	-1.6125	0.3934	71.45	-4.10	0.0001	0.0196	0.05
N1	K1	C	N2	K2	B	-0.7307	0.2556	4.245	-2.86	0.0429	0.5881	0.05
N1	K1	C	N2	K2	C	-0.5265	0.2563	5.218	-2.05	0.0928	0.9873	0.05
N1	K1	C	N2	K2	D	-2.0672	0.2626	5	-7.87	0.0005	<.0001	0.05
N1	K1	C	N2	K3	A	-1.6307	0.3822	68.6	-4.27	<.0001	0.0101	0.05
N1	K1	C	N2	K3	B	-0.5721	0.2598	4.723	-2.20	0.0821	0.9658	0.05
N1	K1	C	N2	K3	C	-0.2836	0.2591	5.214	-1.09	0.3217	1.0000	0.05
N1	K1	C	N2	K3	D	-2.0417	0.2738	6.429	-7.46	0.0002	<.0001	0.05
N1	K1	C	N3	K1	A	-1.8015	0.3564	34.2	-5.06	<.0001	0.0003	0.05
N1	K1	C	N3	K1	B	-0.3118	0.2623	4.71	-1.19	0.2910	1.0000	0.05
N1	K1	C	N3	K1	C	-0.1571	0.2664	5.028	-0.59	0.5808	1.0000	0.05
N1	K1	C	N3	K1	D	-2.0075	0.2598	4.454	-7.73	0.0010	<.0001	0.05
N1	K1	C	N3	K2	A	-1.8078	0.3407	32.82	-5.31	<.0001	<.0001	0.05
N1	K1	C	N3	K2	B	-0.5973	0.2638	4.585	-2.26	0.0778	0.9510	0.05
N1	K1	C	N3	K2	C	-0.1637	0.2616	4.487	-0.63	0.5620	1.0000	0.05
N1	K1	C	N3	K2	D	-2.1209	0.2648	5.439	-8.01	0.0003	<.0001	0.05
N1	K1	C	N3	K3	A	-1.4217	0.3923	67.93	-3.62	0.0006	0.1018	0.05
N1	K1	C	N3	K3	B	-0.5731	0.2612	4.808	-2.19	0.0819	0.9674	0.05
N1	K1	C	N3	K3	C	-0.2770	0.2681	6.747	-1.03	0.3372	1.0000	0.05
N1	K1	C	N3	K3	D	-1.7640	0.2747	6.748	-6.42	0.0004	<.0001	0.05
N1	K1	D	N1	K2	A	0.1107	0.2763	1032	0.40	0.6889	1.0000	0.05
N1	K1	D	N1	K2	B	1.6583	0.1778	257.1	9.33	<.0001	<.0001	0.05
N1	K1	D	N1	K2	C	1.6754	0.1883	301.7	8.90	<.0001	<.0001	0.05
N1	K1	D	N1	K2	D	0.2324	0.1831	262.8	1.27	0.2055	1.0000	0.05
N1	K1	D	N1	K3	A	0.2937	0.3050	1282	0.96	0.3358	1.0000	0.05
N1	K1	D	N1	K3	B	1.2986	0.1760	247.9	7.38	<.0001	<.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	*Potassium*	*HARVEST*	*Nitrogen*	*Potassium*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
N1	K1	C	N1	K2	C	-0.6290	0.04874	-0.9507	0.3705
N1	K1	C	N1	K2	D	-2.0663	-1.3999	-2.3822	-1.0840
N1	K1	C	N1	K3	A	-2.2488	-1.0948	-2.8016	-0.5419
N1	K1	C	N1	K3	B	-0.9801	-0.3536	-1.2766	-0.05714
N1	K1	C	N1	K3	C	-0.4201	0.1839	-0.7052	0.4691
N1	K1	C	N1	K3	D	-2.3854	-1.7186	-2.7018	-1.4022
N1	K1	C	N2	K1	A	-2.9318	-1.1391	-3.7781	-0.2928
N1	K1	C	N2	K1	B	-0.7418	0.6131	-1.0891	0.9605
N1	K1	C	N2	K1	C	-0.7706	0.6215	-1.0790	0.9300
N1	K1	C	N2	K1	D	-2.6045	-1.3369	-2.9909	-0.9505
N1	K1	C	N2	K2	A	-2.3970	-0.8281	-3.1241	-0.1010
N1	K1	C	N2	K2	B	-1.4245	-0.03681	-1.7127	0.2514
N1	K1	C	N2	K2	C	-1.1772	0.1242	-1.5111	0.4581
N1	K1	C	N2	K2	D	-2.7422	-1.3922	-3.0760	-1.0584
N1	K1	C	N2	K3	A	-2.3932	-0.8681	-3.0990	-0.1624
N1	K1	C	N2	K3	B	-1.2518	0.1077	-1.5702	0.4260
N1	K1	C	N2	K3	C	-0.9416	0.3744	-1.2792	0.7120
N1	K1	C	N2	K3	D	-2.7009	-1.3824	-3.0934	-0.9899
N1	K1	C	N3	K1	A	-2.5256	-1.0775	-3.1706	-0.4325
N1	K1	C	N3	K1	B	-0.9987	0.3751	-1.3194	0.6958
N1	K1	C	N3	K1	C	-0.8408	0.5265	-1.1806	0.8663
N1	K1	C	N3	K1	D	-2.7008	-1.3142	-3.0057	-1.0093
N1	K1	C	N3	K2	A	-2.5012	-1.1145	-3.1168	-0.4989
N1	K1	C	N3	K2	B	-1.2944	0.09974	-1.6109	0.4162
N1	K1	C	N3	K2	C	-0.8600	0.5326	-1.1687	0.8414
N1	K1	C	N3	K2	D	-2.7854	-1.4563	-3.1382	-1.1035
N1	K1	C	N3	K3	A	-2.2046	-0.6388	-2.9290	0.08560
N1	K1	C	N3	K3	B	-1.2528	0.1065	-1.5767	0.4304
N1	K1	C	N3	K3	C	-0.9158	0.3619	-1.3070	0.7530
N1	K1	C	N3	K3	D	-2.4186	-1.1094	-2.8194	-0.7086
N1	K1	D	N1	K2	A	-0.4315	0.6528	-0.9508	1.1721
N1	K1	D	N1	K2	B	1.3081	2.0084	0.9752	2.3413
N1	K1	D	N1	K2	C	1.3048	2.0459	0.9519	2.3988
N1	K1	D	N1	K2	D	-0.1282	0.5930	-0.4711	0.9359
N1	K1	D	N1	K3	A	-0.3047	0.8922	-0.8782	1.4656
N1	K1	D	N1	K3	B	0.9520	1.6452	0.6225	1.9747

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
N1	K1	D	N1	K3	C	1.8474	0.1709	220.8	10.81	<.0001	<.0001	0.05
N1	K1	D	N1	K3	D	-0.08651	0.1819	275.7	-0.48	0.6348	1.0000	0.05
N1	K1	D	N2	K1	A	-0.06998	0.4552	189.3	-0.15	0.8780	1.0000	0.05
N1	K1	D	N2	K1	B	1.9012	0.2700	8.64	7.04	<.0001	<.0001	0.05
N1	K1	D	N2	K1	C	1.8910	0.2655	7.786	7.12	0.0001	<.0001	0.05
N1	K1	D	N2	K1	D	-0.00522	0.2661	10.21	-0.02	0.9847	1.0000	0.05
N1	K1	D	N2	K2	A	0.3529	0.3957	94.73	0.89	0.3747	1.0000	0.05
N1	K1	D	N2	K2	B	1.2348	0.2605	7.773	4.74	0.0016	0.0013	0.05
N1	K1	D	N2	K2	C	1.4390	0.2610	9.345	5.51	0.0003	<.0001	0.05
N1	K1	D	N2	K2	D	-0.1017	0.2663	8.549	-0.38	0.7118	1.0000	0.05
N1	K1	D	N2	K3	A	0.3348	0.3851	92.9	0.87	0.3869	1.0000	0.05
N1	K1	D	N2	K3	B	1.3934	0.2643	8.359	5.27	0.0007	<.0001	0.05
N1	K1	D	N2	K3	C	1.6819	0.2634	9.096	6.38	0.0001	<.0001	0.05
N1	K1	D	N2	K3	D	-0.07617	0.2768	10.34	-0.28	0.7886	1.0000	0.05
N1	K1	D	N3	K1	A	0.1639	0.3585	47.51	0.46	0.6496	1.0000	0.05
N1	K1	D	N3	K1	B	1.6537	0.2655	8.28	6.23	0.0002	<.0001	0.05
N1	K1	D	N3	K1	C	1.8083	0.2695	8.644	6.71	0.0001	<.0001	0.05
N1	K1	D	N3	K1	D	-0.04201	0.2617	7.584	-0.16	0.8767	1.0000	0.05
N1	K1	D	N3	K2	A	0.1577	0.3440	47.46	0.46	0.6488	1.0000	0.05
N1	K1	D	N3	K2	B	1.3681	0.2680	8.257	5.11	0.0008	0.0002	0.05
N1	K1	D	N3	K2	C	1.8018	0.2657	8.133	6.78	0.0001	<.0001	0.05
N1	K1	D	N3	K2	D	-0.1554	0.2692	9.754	-0.58	0.5768	1.0000	0.05
N1	K1	D	N3	K3	A	0.5438	0.3958	93.56	1.37	0.1727	1.0000	0.05
N1	K1	D	N3	K3	B	1.3923	0.2649	8.603	5.26	0.0006	<.0001	0.05
N1	K1	D	N3	K3	C	1.6885	0.2715	11.52	6.22	<.0001	<.0001	0.05
N1	K1	D	N3	K3	D	0.2015	0.2793	11.65	0.72	0.4849	1.0000	0.05
N1	K2	A	N1	K2	B	1.5476	0.2587	2647	5.98	<.0001	<.0001	0.05
N1	K2	A	N1	K2	C	1.5647	0.2655	2655	5.89	<.0001	<.0001	0.05
N1	K2	A	N1	K2	D	0.1217	0.2659	2655	0.46	0.6471	1.0000	0.05
N1	K2	A	N1	K3	A	0.1831	0.3056	1345	0.60	0.5492	1.0000	0.05
N1	K2	A	N1	K3	B	1.1880	0.2679	985.6	4.43	<.0001	0.0050	0.05
N1	K2	A	N1	K3	C	1.7368	0.2646	947	6.56	<.0001	<.0001	0.05
N1	K2	A	N1	K3	D	-0.1972	0.2730	1018	-0.72	0.4703	1.0000	0.05
N1	K2	A	N2	K1	A	-0.1806	0.4756	200.2	-0.38	0.7045	1.0000	0.05
N1	K2	A	N2	K1	B	1.7905	0.3404	34.2	5.26	<.0001	<.0001	0.05
N1	K2	A	N2	K1	C	1.7803	0.3370	33.01	5.28	<.0001	<.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	*Potassium*	*HARVEST*	*Nitrogen*	*Potassium*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
N1	K1	D	N1	K3	C	1.5105	2.1843	1.1907	2.5041
N1	K1	D	N1	K3	D	-0.4446	0.2716	-0.7854	0.6123
N1	K1	D	N2	K1	A	-0.9679	0.8279	-1.8187	1.6787
N1	K1	D	N2	K1	B	1.2865	2.5159	0.8639	2.9385
N1	K1	D	N2	K1	C	1.2759	2.5060	0.8711	2.9108
N1	K1	D	N2	K1	D	-0.5965	0.5860	-1.0274	1.0170
N1	K1	D	N2	K2	A	-0.4327	1.1386	-1.1674	1.8733
N1	K1	D	N2	K2	B	0.6309	1.8387	0.2338	2.2358
N1	K1	D	N2	K2	C	0.8518	2.0261	0.4362	2.4417
N1	K1	D	N2	K2	D	-0.7090	0.5056	-1.1248	0.9213
N1	K1	D	N2	K3	A	-0.4300	1.0996	-1.1447	1.8144
N1	K1	D	N2	K3	B	0.7884	1.9984	0.3779	2.4089
N1	K1	D	N2	K3	C	1.0869	2.2768	0.6699	2.6939
N1	K1	D	N2	K3	D	-0.6903	0.5380	-1.1397	0.9874
N1	K1	D	N3	K1	A	-0.5571	0.8850	-1.2135	1.5414
N1	K1	D	N3	K1	B	1.0450	2.2624	0.6336	2.6738
N1	K1	D	N3	K1	C	1.1949	2.4218	0.7730	2.8436
N1	K1	D	N3	K1	D	-0.6513	0.5672	-1.0473	0.9633
N1	K1	D	N3	K2	A	-0.5343	0.8496	-1.1641	1.4794
N1	K1	D	N3	K2	B	0.7536	1.9827	0.3387	2.3976
N1	K1	D	N3	K2	C	1.1910	2.4127	0.7813	2.8224
N1	K1	D	N3	K2	D	-0.7572	0.4464	-1.1895	0.8787
N1	K1	D	N3	K3	A	-0.2420	1.3296	-0.9766	2.0642
N1	K1	D	N3	K3	B	0.7888	1.9959	0.3745	2.4102
N1	K1	D	N3	K3	C	1.0942	2.2829	0.6453	2.7317
N1	K1	D	N3	K3	D	-0.4092	0.8122	-0.8717	1.2746
N1	K2	A	N1	K2	B	1.0403	2.0550	0.5536	2.5416
N1	K2	A	N1	K2	C	1.0442	2.0852	0.5448	2.5846
N1	K2	A	N1	K2	D	-0.3997	0.6432	-0.9000	1.1434
N1	K2	A	N1	K3	A	-0.4164	0.7825	-0.9909	1.3571
N1	K2	A	N1	K3	B	0.6622	1.7137	0.1588	2.2172
N1	K2	A	N1	K3	C	1.2176	2.2560	0.7204	2.7531
N1	K2	A	N1	K3	D	-0.7328	0.3385	-1.2459	0.8516
N1	K2	A	N2	K1	A	-1.1185	0.7573	-2.0079	1.6467
N1	K2	A	N2	K1	B	1.0989	2.4822	0.4827	3.0983
N1	K2	A	N2	K1	C	1.0947	2.4659	0.4857	3.0749

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
N1	K2	A	N2	K1	D	-0.1159	0.3400	41.55	-0.34	0.7350	1.0000	0.05
N1	K2	A	N2	K2	A	0.2423	0.3994	84.68	0.61	0.5457	1.0000	0.05
N1	K2	A	N2	K2	B	1.1242	0.3319	33.56	3.39	0.0018	0.1998	0.05
N1	K2	A	N2	K2	C	1.3283	0.3326	38.26	3.99	0.0003	0.0291	0.05
N1	K2	A	N2	K2	D	-0.2124	0.3370	34.61	-0.63	0.5327	1.0000	0.05
N1	K2	A	N2	K3	A	0.2241	0.4436	157.6	0.51	0.6141	1.0000	0.05
N1	K2	A	N2	K3	B	1.2827	0.3356	34.67	3.82	0.0005	0.0534	0.05
N1	K2	A	N2	K3	C	1.5712	0.3350	37.19	4.69	<.0001	0.0016	0.05
N1	K2	A	N2	K3	D	-0.1868	0.3465	37.48	-0.54	0.5930	1.0000	0.05
N1	K2	A	N3	K1	A	0.05329	0.4326	109.2	0.12	0.9022	1.0000	0.05
N1	K2	A	N3	K1	B	1.5430	0.3367	34.53	4.58	<.0001	0.0026	0.05
N1	K2	A	N3	K1	C	1.6977	0.3409	35.25	4.98	<.0001	0.0004	0.05
N1	K2	A	N3	K1	D	-0.1527	0.3354	34.52	-0.46	0.6518	1.0000	0.05
N1	K2	A	N3	K2	A	0.04701	0.4040	94.4	0.12	0.9076	1.0000	0.05
N1	K2	A	N3	K2	B	1.2575	0.3383	33.7	3.72	0.0007	0.0760	0.05
N1	K2	A	N3	K2	C	1.6912	0.3368	34.1	5.02	<.0001	0.0003	0.05
N1	K2	A	N3	K2	D	-0.2661	0.3382	36.8	-0.79	0.4365	1.0000	0.05
N1	K2	A	N3	K3	A	0.4331	0.4911	223.5	0.88	0.3787	1.0000	0.05
N1	K2	A	N3	K3	B	1.2817	0.3364	35.74	3.81	0.0005	0.0558	0.05
N1	K2	A	N3	K3	C	1.5779	0.3405	41.19	4.63	<.0001	0.0020	0.05
N1	K2	A	N3	K3	D	0.09084	0.3474	39.92	0.26	0.7951	1.0000	0.05
N1	K2	B	N1	K2	C	0.01709	0.1620	2658	0.11	0.9160	1.0000	0.05
N1	K2	B	N1	K2	D	-1.4259	0.1570	2641	-9.08	<.0001	<.0001	0.05
N1	K2	B	N1	K3	A	-1.3645	0.2958	1229	-4.61	<.0001	0.0022	0.05
N1	K2	B	N1	K3	B	-0.3597	0.1614	186.2	-2.23	0.0270	0.9600	0.05
N1	K2	B	N1	K3	C	0.1891	0.1570	167	1.20	0.2299	1.0000	0.05
N1	K2	B	N1	K3	D	-1.7448	0.1722	233.4	-10.13	<.0001	<.0001	0.05
N1	K2	B	N2	K1	A	-1.7282	0.4544	152.8	-3.80	0.0002	0.0571	0.05
N1	K2	B	N2	K1	B	0.2429	0.2678	5.602	0.91	0.4017	1.0000	0.05
N1	K2	B	N2	K1	C	0.2327	0.2635	5.015	0.88	0.4175	1.0000	0.05
N1	K2	B	N2	K1	D	-1.6635	0.2676	7.423	-6.22	0.0003	<.0001	0.05
N1	K2	B	N2	K2	A	-1.3053	0.3944	74.04	-3.31	0.0014	0.2428	0.05
N1	K2	B	N2	K2	B	-0.4235	0.2568	4.628	-1.65	0.1647	0.9998	0.05
N1	K2	B	N2	K2	C	-0.2193	0.2581	5.799	-0.85	0.4292	1.0000	0.05
N1	K2	B	N2	K2	D	-1.7600	0.2642	5.502	-6.66	0.0008	<.0001	0.05
N1	K2	B	N2	K3	A	-1.3235	0.3829	70.93	-3.46	0.0009	0.1657	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Lower	Upper	Adj Lower	Adj Upper
N1	K2	A	N2	K1	D	-0.8023	0.5705	-1.4221	1.1904
N1	K2	A	N2	K2	A	-0.5518	1.0364	-1.2920	1.7766
N1	K2	A	N2	K2	B	0.4493	1.7990	-0.1510	2.3993
N1	K2	A	N2	K2	C	0.6552	2.0015	0.05055	2.6061
N1	K2	A	N2	K2	D	-0.8969	0.4721	-1.5072	1.0824
N1	K2	A	N2	K3	A	-0.6521	1.1004	-1.4801	1.9284
N1	K2	A	N2	K3	B	0.6012	1.9643	-0.00652	2.5720
N1	K2	A	N2	K3	C	0.8926	2.2499	0.2843	2.8582
N1	K2	A	N2	K3	D	-0.8887	0.5150	-1.5181	1.1445
N1	K2	A	N3	K1	A	-0.8040	0.9106	-1.6085	1.7151
N1	K2	A	N3	K1	B	0.8593	2.2268	0.2497	2.8364
N1	K2	A	N3	K1	C	1.0059	2.3895	0.3882	3.0072
N1	K2	A	N3	K1	D	-0.8339	0.5285	-1.4411	1.1358
N1	K2	A	N3	K2	A	-0.7551	0.8491	-1.5050	1.5990
N1	K2	A	N3	K2	B	0.5697	1.9453	-0.04236	2.5573
N1	K2	A	N3	K2	C	1.0068	2.3756	0.3972	2.9851
N1	K2	A	N3	K2	D	-0.9514	0.4193	-1.5653	1.0332
N1	K2	A	N3	K3	A	-0.5347	1.4010	-1.4536	2.3199
N1	K2	A	N3	K3	B	0.5992	1.9641	-0.01072	2.5741
N1	K2	A	N3	K3	C	0.8904	2.2654	0.2699	2.8859
N1	K2	A	N3	K3	D	-0.6114	0.7931	-1.2439	1.4256
N1	K2	B	N1	K2	C	-0.3005	0.3347	-0.6051	0.6393
N1	K2	B	N1	K2	D	-1.7338	-1.1179	-2.0291	-0.8226
N1	K2	B	N1	K3	A	-1.9449	-0.7842	-2.5009	-0.2282
N1	K2	B	N1	K3	B	-0.6780	-0.04128	-0.9797	0.2603
N1	K2	B	N1	K3	C	-0.1208	0.4991	-0.4139	0.7922
N1	K2	B	N1	K3	D	-2.0841	-1.4055	-2.4064	-1.0832
N1	K2	B	N2	K1	A	-2.6260	-0.8304	-3.4741	0.01761
N1	K2	B	N2	K1	B	-0.4237	0.9095	-0.7858	1.2716
N1	K2	B	N2	K1	C	-0.4440	0.9094	-0.7795	1.2449
N1	K2	B	N2	K1	D	-2.2890	-1.0380	-2.6915	-0.6354
N1	K2	B	N2	K2	A	-2.0911	-0.5195	-2.8204	0.2098
N1	K2	B	N2	K2	B	-1.0998	0.2529	-1.4099	0.5630
N1	K2	B	N2	K2	C	-0.8562	0.4176	-1.2108	0.7722
N1	K2	B	N2	K2	D	-2.4209	-1.0992	-2.7749	-0.7451
N1	K2	B	N2	K3	A	-2.0869	-0.5600	-2.7944	0.1475

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
N1	K2	B	N2	K3	B	-0.2649	0.2615	5.225	-1.01	0.3557	1.0000	0.05
N1	K2	B	N2	K3	C	0.02360	0.2608	5.749	0.09	0.9310	1.0000	0.05
N1	K2	B	N2	K3	D	-1.7344	0.2755	7.031	-6.30	0.0004	<.0001	0.05
N1	K2	B	N3	K1	A	-1.4943	0.3572	35.93	-4.18	0.0002	0.0141	0.05
N1	K2	B	N3	K1	B	-0.00458	0.2629	5.104	-0.02	0.9868	1.0000	0.05
N1	K2	B	N3	K1	C	0.1501	0.2679	5.599	0.56	0.5971	1.0000	0.05
N1	K2	B	N3	K1	D	-1.7003	0.2613	4.983	-6.51	0.0013	<.0001	0.05
N1	K2	B	N3	K2	A	-1.5006	0.3417	34.64	-4.39	0.0001	0.0060	0.05
N1	K2	B	N3	K2	B	-0.2901	0.2652	5.098	-1.09	0.3229	1.0000	0.05
N1	K2	B	N3	K2	C	0.1435	0.2627	4.953	0.55	0.6085	1.0000	0.05
N1	K2	B	N3	K2	D	-1.8137	0.2659	5.96	-6.82	0.0005	<.0001	0.05
N1	K2	B	N3	K3	A	-1.1145	0.3932	71.02	-2.83	0.0060	0.6085	0.05
N1	K2	B	N3	K3	B	-0.2659	0.2627	5.367	-1.01	0.3548	1.0000	0.05
N1	K2	B	N3	K3	C	0.03026	0.2692	7.378	0.11	0.9135	1.0000	0.05
N1	K2	B	N3	K3	D	-1.4568	0.2762	7.431	-5.28	0.0010	<.0001	0.05
N1	K2	C	N1	K2	D	-1.4430	0.1725	2653	-8.37	<.0001	<.0001	0.05
N1	K2	C	N1	K3	A	-1.3816	0.3074	1249	-4.49	<.0001	0.0038	0.05
N1	K2	C	N1	K3	B	-0.3767	0.1761	243.6	-2.14	0.0334	0.9771	0.05
N1	K2	C	N1	K3	C	0.1721	0.1679	204.3	1.02	0.3066	1.0000	0.05
N1	K2	C	N1	K3	D	-1.7619	0.1830	277.8	-9.63	<.0001	<.0001	0.05
N1	K2	C	N2	K1	A	-1.7453	0.4582	164.5	-3.81	0.0002	0.0560	0.05
N1	K2	C	N2	K1	B	0.2258	0.2751	7.517	0.82	0.4370	1.0000	0.05
N1	K2	C	N2	K1	C	0.2156	0.2713	6.926	0.79	0.4532	1.0000	0.05
N1	K2	C	N2	K1	D	-1.6806	0.2745	9.672	-6.12	0.0001	<.0001	0.05
N1	K2	C	N2	K2	A	-1.3224	0.3993	82.11	-3.31	0.0014	0.2419	0.05
N1	K2	C	N2	K2	B	-0.4405	0.2656	6.692	-1.66	0.1431	0.9997	0.05
N1	K2	C	N2	K2	C	-0.2364	0.2625	7.153	-0.90	0.3971	1.0000	0.05
N1	K2	C	N2	K2	D	-1.7771	0.2703	7.143	-6.58	0.0003	<.0001	0.05
N1	K2	C	N2	K3	A	-1.3406	0.3858	76.82	-3.47	0.0008	0.1576	0.05
N1	K2	C	N2	K3	B	-0.2820	0.2683	6.971	-1.05	0.3283	1.0000	0.05
N1	K2	C	N2	K3	C	0.006513	0.2685	7.838	0.02	0.9813	1.0000	0.05
N1	K2	C	N2	K3	D	-1.7515	0.2828	9.211	-6.19	0.0001	<.0001	0.05
N1	K2	C	N3	K1	A	-1.5114	0.3615	39.48	-4.18	0.0002	0.0142	0.05
N1	K2	C	N3	K1	B	-0.02167	0.2711	6.963	-0.08	0.9385	1.0000	0.05
N1	K2	C	N3	K1	C	0.1330	0.2776	7.887	0.48	0.6449	1.0000	0.05
N1	K2	C	N3	K1	D	-1.7174	0.2695	6.831	-6.37	0.0004	<.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Lower	Upper	Adj Lower	Adj Upper
N1	K2	B	N2	K3	B	-0.9285	0.3987	-1.2695	0.7397
N1	K2	B	N2	K3	C	-0.6214	0.6686	-0.9783	1.0255
N1	K2	B	N2	K3	D	-2.3853	-1.0836	-2.7928	-0.6761
N1	K2	B	N3	K1	A	-2.2188	-0.7698	-2.8667	-0.1220
N1	K2	B	N3	K1	B	-0.6763	0.6671	-1.0146	1.0054
N1	K2	B	N3	K1	C	-0.5170	0.8171	-0.8791	1.1793
N1	K2	B	N3	K1	D	-2.3726	-1.0279	-2.7041	-0.6965
N1	K2	B	N3	K2	A	-2.1945	-0.8067	-2.8132	-0.1880
N1	K2	B	N3	K2	B	-0.9679	0.3876	-1.3089	0.7286
N1	K2	B	N3	K2	C	-0.5337	0.8208	-0.8658	1.1529
N1	K2	B	N3	K2	D	-2.4652	-1.1621	-2.8350	-0.7923
N1	K2	B	N3	K3	A	-1.8985	-0.3304	-2.6251	0.3962
N1	K2	B	N3	K3	B	-0.9275	0.3957	-1.2751	0.7432
N1	K2	B	N3	K3	C	-0.5998	0.6603	-1.0040	1.0645
N1	K2	B	N3	K3	D	-2.1022	-0.8114	-2.5177	-0.3958
N1	K2	C	N1	K2	D	-1.7812	-1.1048	-2.1056	-0.7804
N1	K2	C	N1	K3	A	-1.9847	-0.7785	-2.5626	-0.2006
N1	K2	C	N1	K3	B	-0.7237	-0.02979	-1.0534	0.2999
N1	K2	C	N1	K3	C	-0.1589	0.5030	-0.4729	0.8170
N1	K2	C	N1	K3	D	-2.1221	-1.4016	-2.4649	-1.0588
N1	K2	C	N2	K1	A	-2.6501	-0.8405	-3.5058	0.01512
N1	K2	C	N2	K1	B	-0.4157	0.8673	-0.8311	1.2827
N1	K2	C	N2	K1	C	-0.4274	0.8586	-0.8268	1.2580
N1	K2	C	N2	K1	D	-2.2950	-1.0661	-2.7352	-0.6260
N1	K2	C	N2	K2	A	-2.1168	-0.5280	-2.8566	0.2118
N1	K2	C	N2	K2	B	-1.0744	0.1933	-1.4608	0.5797
N1	K2	C	N2	K2	C	-0.8543	0.3816	-1.2447	0.7720
N1	K2	C	N2	K2	D	-2.4136	-1.1406	-2.8154	-0.7388
N1	K2	C	N2	K3	A	-2.1088	-0.5723	-2.8228	0.1416
N1	K2	C	N2	K3	B	-0.9168	0.3529	-1.3126	0.7487
N1	K2	C	N2	K3	C	-0.6148	0.6278	-1.0248	1.0379
N1	K2	C	N2	K3	D	-2.3889	-1.1141	-2.8378	-0.6652
N1	K2	C	N3	K1	A	-2.2423	-0.7806	-2.9001	-0.1228
N1	K2	C	N3	K1	B	-0.6634	0.6201	-1.0631	1.0198
N1	K2	C	N3	K1	C	-0.5087	0.7747	-0.9334	1.1994
N1	K2	C	N3	K1	D	-2.3578	-1.0769	-2.7527	-0.6820

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
N1	K2	C	N3	K2	A	-1.5177	0.3465	38.64	-4.38	<.0001	0.0063	0.05
N1	K2	C	N3	K2	B	-0.3072	0.2731	6.887	-1.12	0.2984	1.0000	0.05
N1	K2	C	N3	K2	C	0.1265	0.2684	6.242	0.47	0.6535	1.0000	0.05
N1	K2	C	N3	K2	D	-1.8308	0.2723	7.598	-6.72	0.0002	<.0001	0.05
N1	K2	C	N3	K3	A	-1.1316	0.3959	75.35	-2.86	0.0055	0.5883	0.05
N1	K2	C	N3	K3	B	-0.2830	0.2703	7.171	-1.05	0.3291	1.0000	0.05
N1	K2	C	N3	K3	C	0.01317	0.2794	10.32	0.05	0.9633	1.0000	0.05
N1	K2	C	N3	K3	D	-1.4739	0.2838	9.587	-5.19	0.0005	0.0001	0.05
N1	K2	D	N1	K3	A	0.06132	0.2997	1165	0.20	0.8379	1.0000	0.05
N1	K2	D	N1	K3	B	1.0662	0.1709	208.7	6.24	<.0001	<.0001	0.05
N1	K2	D	N1	K3	C	1.6150	0.1662	188.1	9.72	<.0001	<.0001	0.05
N1	K2	D	N1	K3	D	-0.3189	0.1784	242.5	-1.79	0.0752	0.9988	0.05
N1	K2	D	N2	K1	A	-0.3024	0.4568	167.2	-0.66	0.5090	1.0000	0.05
N1	K2	D	N2	K1	B	1.6688	0.2718	7.135	6.14	0.0004	<.0001	0.05
N1	K2	D	N2	K1	C	1.6585	0.2674	6.433	6.20	0.0006	<.0001	0.05
N1	K2	D	N2	K1	D	-0.2376	0.2709	9.181	-0.88	0.4028	1.0000	0.05
N1	K2	D	N2	K2	A	0.1205	0.3966	81.91	0.30	0.7620	1.0000	0.05
N1	K2	D	N2	K2	B	1.0024	0.2606	5.992	3.85	0.0085	0.0491	0.05
N1	K2	D	N2	K2	C	1.2066	0.2615	7.343	4.61	0.0022	0.0022	0.05
N1	K2	D	N2	K2	D	-0.3341	0.2659	6.566	-1.26	0.2518	1.0000	0.05
N1	K2	D	N2	K3	A	0.1024	0.3859	79.73	0.27	0.7914	1.0000	0.05
N1	K2	D	N2	K3	B	1.1610	0.2658	6.787	4.37	0.0035	0.0066	0.05
N1	K2	D	N2	K3	C	1.4495	0.2648	7.371	5.47	0.0008	<.0001	0.05
N1	K2	D	N2	K3	D	-0.3086	0.2794	8.781	-1.10	0.2987	1.0000	0.05
N1	K2	D	N3	K1	A	-0.06845	0.3601	41.43	-0.19	0.8502	1.0000	0.05
N1	K2	D	N3	K1	B	1.4213	0.2670	6.787	5.32	0.0012	<.0001	0.05
N1	K2	D	N3	K1	C	1.5759	0.2714	7.224	5.81	0.0006	<.0001	0.05
N1	K2	D	N3	K1	D	-0.2744	0.2653	6.637	-1.03	0.3372	1.0000	0.05
N1	K2	D	N3	K2	A	-0.07474	0.3444	40.15	-0.22	0.8293	1.0000	0.05
N1	K2	D	N3	K2	B	1.1357	0.2682	6.529	4.23	0.0045	0.0114	0.05
N1	K2	D	N3	K2	C	1.5694	0.2658	6.392	5.90	0.0008	<.0001	0.05
N1	K2	D	N3	K2	D	-0.3878	0.2659	6.918	-1.46	0.1886	1.0000	0.05
N1	K2	D	N3	K3	A	0.3114	0.3959	80.54	0.79	0.4339	1.0000	0.05
N1	K2	D	N3	K3	B	1.1599	0.2660	6.946	4.36	0.0034	0.0068	0.05
N1	K2	D	N3	K3	C	1.4561	0.2725	9.375	5.34	0.0004	<.0001	0.05
N1	K2	D	N3	K3	D	-0.03091	0.2805	9.639	-0.11	0.9145	1.0000	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Lower	Upper	Adj Lower	Adj Upper
N1	K2	C	N3	K2	A	-2.2187	-0.8167	-2.8487	-0.1866
N1	K2	C	N3	K2	B	-0.9553	0.3408	-1.3566	0.7422
N1	K2	C	N3	K2	C	-0.5241	0.7770	-0.9046	1.1575
N1	K2	C	N3	K2	D	-2.4644	-1.1971	-2.8767	-0.7848
N1	K2	C	N3	K3	A	-1.9202	-0.3429	-2.6526	0.3895
N1	K2	C	N3	K3	B	-0.9191	0.3531	-1.3215	0.7554
N1	K2	C	N3	K3	C	-0.6068	0.6332	-1.0603	1.0866
N1	K2	C	N3	K3	D	-2.1099	-0.8378	-2.5641	-0.3836
N1	K2	D	N1	K3	A	-0.5267	0.6493	-1.0900	1.2127
N1	K2	D	N1	K3	B	0.7293	1.4031	0.4096	1.7228
N1	K2	D	N1	K3	C	1.2872	1.9428	0.9766	2.2534
N1	K2	D	N1	K3	D	-0.6704	0.03259	-1.0045	0.3666
N1	K2	D	N2	K1	A	-1.2043	0.5995	-2.0575	1.4527
N1	K2	D	N2	K1	B	1.0286	2.3089	0.6247	2.7128
N1	K2	D	N2	K1	C	1.0148	2.3023	0.6312	2.6859
N1	K2	D	N2	K1	D	-0.8486	0.3733	-1.2783	0.8031
N1	K2	D	N2	K2	A	-0.6684	0.9095	-1.4031	1.6442
N1	K2	D	N2	K2	B	0.3646	1.6402	0.001324	2.0035
N1	K2	D	N2	K2	C	0.5940	1.8192	0.2019	2.2113
N1	K2	D	N2	K2	D	-0.9715	0.3032	-1.3558	0.6875
N1	K2	D	N2	K3	A	-0.6656	0.8704	-1.3801	1.5849
N1	K2	D	N2	K3	B	0.5285	1.7935	0.1399	2.1820
N1	K2	D	N2	K3	C	0.8297	2.0692	0.4322	2.4667
N1	K2	D	N2	K3	D	-0.9429	0.3258	-1.3818	0.7647
N1	K2	D	N3	K1	A	-0.7955	0.6586	-1.4520	1.3151
N1	K2	D	N3	K1	B	0.7859	2.0567	0.3956	2.4470
N1	K2	D	N3	K1	C	0.9382	2.2136	0.5333	2.6185
N1	K2	D	N3	K1	D	-0.9088	0.3600	-1.2936	0.7448
N1	K2	D	N3	K2	A	-0.7707	0.6212	-1.3978	1.2484
N1	K2	D	N3	K2	B	0.4921	1.7794	0.1054	2.1661
N1	K2	D	N3	K2	C	0.9285	2.2103	0.5481	2.5907
N1	K2	D	N3	K2	D	-1.0181	0.2425	-1.4094	0.6338
N1	K2	D	N3	K3	A	-0.4765	1.0993	-1.2097	1.8325
N1	K2	D	N3	K3	B	0.5300	1.7899	0.1381	2.1817
N1	K2	D	N3	K3	C	0.8434	2.0689	0.4092	2.5031
N1	K2	D	N3	K3	D	-0.6592	0.5973	-1.1087	1.0468

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
N1	K3	A	N1	K3	B	1.0049	0.2860	2655	3.51	0.0004	0.1412	0.05
N1	K3	A	N1	K3	C	1.5537	0.2841	2657	5.47	<.0001	<.0001	0.05
N1	K3	A	N1	K3	D	-0.3802	0.2947	2659	-1.29	0.1971	1.0000	0.05
N1	K3	A	N2	K1	A	-0.3637	0.5325	290.4	-0.68	0.4951	1.0000	0.05
N1	K3	A	N2	K1	B	1.6074	0.3660	44.63	4.39	<.0001	0.0060	0.05
N1	K3	A	N2	K1	C	1.5972	0.3626	43.35	4.40	<.0001	0.0056	0.05
N1	K3	A	N2	K1	D	-0.2989	0.3655	53.54	-0.82	0.4170	1.0000	0.05
N1	K3	A	N2	K2	A	0.05921	0.4954	208.4	0.12	0.9050	1.0000	0.05
N1	K3	A	N2	K2	B	0.9411	0.3575	44.2	2.63	0.0116	0.7686	0.05
N1	K3	A	N2	K2	C	1.1453	0.3582	49.98	3.20	0.0024	0.3159	0.05
N1	K3	A	N2	K2	D	-0.3955	0.3638	46.1	-1.09	0.2826	1.0000	0.05
N1	K3	A	N2	K3	A	0.04108	0.4267	115	0.10	0.9235	1.0000	0.05
N1	K3	A	N2	K3	B	1.0997	0.3616	45.7	3.04	0.0039	0.4347	0.05
N1	K3	A	N2	K3	C	1.3881	0.3610	48.79	3.85	0.0003	0.0493	0.05
N1	K3	A	N2	K3	D	-0.3699	0.3713	47.79	-1.00	0.3241	1.0000	0.05
N1	K3	A	N3	K1	A	-0.1298	0.4478	125.1	-0.29	0.7724	1.0000	0.05
N1	K3	A	N3	K1	B	1.3600	0.3602	49.16	3.78	0.0004	0.0626	0.05
N1	K3	A	N3	K1	C	1.5146	0.3634	49.2	4.17	0.0001	0.0149	0.05
N1	K3	A	N3	K1	D	-0.3357	0.3587	49	-0.94	0.3538	1.0000	0.05
N1	K3	A	N3	K2	A	-0.1361	0.4498	153.6	-0.30	0.7627	1.0000	0.05
N1	K3	A	N3	K2	B	1.0744	0.3611	47.44	2.98	0.0046	0.4889	0.05
N1	K3	A	N3	K2	C	1.5081	0.3593	47.74	4.20	0.0001	0.0133	0.05
N1	K3	A	N3	K2	D	-0.4491	0.3632	53.27	-1.24	0.2217	1.0000	0.05
N1	K3	A	N3	K3	A	0.2501	0.4291	115.4	0.58	0.5611	1.0000	0.05
N1	K3	A	N3	K3	B	1.0986	0.3595	50.45	3.06	0.0036	0.4228	0.05
N1	K3	A	N3	K3	C	1.3948	0.3660	59.51	3.81	0.0003	0.0556	0.05
N1	K3	A	N3	K3	D	-0.09223	0.3684	53.71	-0.25	0.8033	1.0000	0.05
N1	K3	B	N1	K3	C	0.5488	0.1372	2633	4.00	<.0001	0.0285	0.05
N1	K3	B	N1	K3	D	-1.3851	0.1562	2650	-8.87	<.0001	<.0001	0.05
N1	K3	B	N2	K1	A	-1.3686	0.4544	150.6	-3.01	0.0030	0.4587	0.05
N1	K3	B	N2	K1	B	0.6026	0.2677	5.446	2.25	0.0699	0.9545	0.05
N1	K3	B	N2	K1	C	0.5923	0.2631	4.804	2.25	0.0763	0.9543	0.05
N1	K3	B	N2	K1	D	-1.3038	0.2675	7.199	-4.87	0.0017	0.0007	0.05
N1	K3	B	N2	K2	A	-0.9457	0.3940	72.46	-2.40	0.0190	0.9033	0.05
N1	K3	B	N2	K2	B	-0.06380	0.2572	4.566	-0.25	0.8149	1.0000	0.05
N1	K3	B	N2	K2	C	0.1404	0.2581	5.639	0.54	0.6074	1.0000	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	*Potassium*	*HARVEST*	*Nitrogen*	*Potassium*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
N1	K3	A	N1	K3	B	0.4440	1.5657	-0.09392	2.1037
N1	K3	A	N1	K3	C	0.9967	2.1107	0.4623	2.6451
N1	K3	A	N1	K3	D	-0.9581	0.1976	-1.5124	0.7519
N1	K3	A	N2	K1	A	-1.4117	0.6843	-2.4093	1.6819
N1	K3	A	N2	K1	B	0.8701	2.3448	0.2013	3.0136
N1	K3	A	N2	K1	C	0.8661	2.3284	0.2040	2.9904
N1	K3	A	N2	K1	D	-1.0319	0.4340	-1.7031	1.1052
N1	K3	A	N2	K2	A	-0.9174	1.0358	-1.8439	1.9623
N1	K3	A	N2	K2	B	0.2206	1.6616	-0.4325	2.3146
N1	K3	A	N2	K2	C	0.4258	1.8647	-0.2309	2.5214
N1	K3	A	N2	K2	D	-1.1276	0.3367	-1.7930	1.0021
N1	K3	A	N2	K3	A	-0.8041	0.8863	-1.5982	1.6804
N1	K3	A	N2	K3	B	0.3716	1.8277	-0.2896	2.4889
N1	K3	A	N2	K3	C	0.6627	2.1136	0.001392	2.7749
N1	K3	A	N2	K3	D	-1.1165	0.3767	-1.7962	1.0564
N1	K3	A	N3	K1	A	-1.0159	0.7564	-1.8500	1.5904
N1	K3	A	N3	K1	B	0.6362	2.0838	-0.02385	2.7438
N1	K3	A	N3	K1	C	0.7845	2.2448	0.1186	2.9106
N1	K3	A	N3	K1	D	-1.0565	0.3850	-1.7137	1.0422
N1	K3	A	N3	K2	A	-1.0247	0.7526	-1.8642	1.5921
N1	K3	A	N3	K2	B	0.3481	1.8007	-0.3129	2.4617
N1	K3	A	N3	K2	C	0.7856	2.2306	0.1279	2.8883
N1	K3	A	N3	K2	D	-1.1775	0.2793	-1.8445	0.9462
N1	K3	A	N3	K3	A	-0.5998	1.0999	-1.3983	1.8984
N1	K3	A	N3	K3	B	0.3766	1.8206	-0.2826	2.4798
N1	K3	A	N3	K3	C	0.6625	2.1271	-0.01146	2.8011
N1	K3	A	N3	K3	D	-0.8310	0.6465	-1.5077	1.3232
N1	K3	B	N1	K3	C	0.2797	0.8179	0.02163	1.0760
N1	K3	B	N1	K3	D	-1.6915	-1.0788	-1.9853	-0.7849
N1	K3	B	N2	K1	A	-2.2665	-0.4707	-3.1144	0.3772
N1	K3	B	N2	K1	B	-0.06904	1.2741	-0.4259	1.6311
N1	K3	B	N2	K1	C	-0.09226	1.2769	-0.4182	1.6029
N1	K3	B	N2	K1	D	-1.9328	-0.6749	-2.3314	-0.2763
N1	K3	B	N2	K2	A	-1.7310	-0.1604	-2.4593	0.5679
N1	K3	B	N2	K2	B	-0.7443	0.6167	-1.0519	0.9243
N1	K3	B	N2	K2	C	-0.5012	0.7819	-0.8513	1.1320

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
N1	K3	B	N2	K2	D	-1.4003	0.2644	5.4	-5.30	0.0025	<.0001	0.05
N1	K3	B	N2	K3	A	-0.9638	0.3834	70.21	-2.51	0.0142	0.8455	0.05
N1	K3	B	N2	K3	B	0.09479	0.2601	4.832	0.36	0.7309	1.0000	0.05
N1	K3	B	N2	K3	C	0.3833	0.2605	5.53	1.47	0.1957	1.0000	0.05
N1	K3	B	N2	K3	D	-1.3748	0.2741	6.566	-5.02	0.0019	0.0003	0.05
N1	K3	B	N3	K1	A	-1.1347	0.3580	35.37	-3.17	0.0031	0.3356	0.05
N1	K3	B	N3	K1	B	0.3551	0.2634	4.953	1.35	0.2359	1.0000	0.05
N1	K3	B	N3	K1	C	0.5097	0.2678	5.343	1.90	0.1117	0.9964	0.05
N1	K3	B	N3	K1	D	-1.3406	0.2615	4.8	-5.13	0.0041	0.0002	0.05
N1	K3	B	N3	K2	A	-1.1409	0.3420	33.79	-3.34	0.0021	0.2273	0.05
N1	K3	B	N3	K2	B	0.06953	0.2653	4.889	0.26	0.8039	1.0000	0.05
N1	K3	B	N3	K2	C	0.5032	0.2629	4.763	1.91	0.1167	0.9960	0.05
N1	K3	B	N3	K2	D	-1.4540	0.2665	5.823	-5.46	0.0017	<.0001	0.05
N1	K3	B	N3	K3	A	-0.7548	0.3942	70.13	-1.91	0.0596	0.9960	0.05
N1	K3	B	N3	K3	B	0.09373	0.2621	5.019	0.36	0.7352	1.0000	0.05
N1	K3	B	N3	K3	C	0.3899	0.2695	7.136	1.45	0.1904	1.0000	0.05
N1	K3	B	N3	K3	D	-1.0971	0.2746	6.799	-3.99	0.0055	0.0290	0.05
N1	K3	C	N1	K3	D	-1.9339	0.1506	2646	-12.84	<.0001	<.0001	0.05
N1	K3	C	N2	K1	A	-1.9174	0.4519	151.1	-4.24	<.0001	0.0111	0.05
N1	K3	C	N2	K1	B	0.05375	0.2636	4.987	0.20	0.8465	1.0000	0.05
N1	K3	C	N2	K1	C	0.04354	0.2590	4.389	0.17	0.8740	1.0000	0.05
N1	K3	C	N2	K1	D	-1.8526	0.2633	6.651	-7.04	0.0003	<.0001	0.05
N1	K3	C	N2	K2	A	-1.4945	0.3910	71.88	-3.82	0.0003	0.0534	0.05
N1	K3	C	N2	K2	B	-0.6126	0.2532	4.161	-2.42	0.0703	0.8946	0.05
N1	K3	C	N2	K2	C	-0.4084	0.2536	5.097	-1.61	0.1672	0.9999	0.05
N1	K3	C	N2	K2	D	-1.9492	0.2603	4.936	-7.49	0.0007	<.0001	0.05
N1	K3	C	N2	K3	A	-1.5126	0.3808	70.07	-3.97	0.0002	0.0315	0.05
N1	K3	C	N2	K3	B	-0.4540	0.2574	4.634	-1.76	0.1426	0.9991	0.05
N1	K3	C	N2	K3	C	-0.1655	0.2543	4.688	-0.65	0.5456	1.0000	0.05
N1	K3	C	N2	K3	D	-1.9236	0.2698	6.026	-7.13	0.0004	<.0001	0.05
N1	K3	C	N3	K1	A	-1.6835	0.3550	35.04	-4.74	<.0001	0.0012	0.05
N1	K3	C	N3	K1	B	-0.1937	0.2591	4.532	-0.75	0.4916	1.0000	0.05
N1	K3	C	N3	K1	C	-0.03908	0.2639	4.969	-0.15	0.8881	1.0000	0.05
N1	K3	C	N3	K1	D	-1.8894	0.2572	4.376	-7.35	0.0013	<.0001	0.05
N1	K3	C	N3	K2	A	-1.6897	0.3389	33.41	-4.99	<.0001	0.0004	0.05
N1	K3	C	N3	K2	B	-0.4793	0.2610	4.467	-1.84	0.1327	0.9981	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Lower	Upper	Adj Lower	Adj Upper
N1	K3	B	N2	K2	D	-2.0652	-0.7355	-2.4163	-0.3844
N1	K3	B	N2	K3	A	-1.7284	-0.1992	-2.4367	0.5091
N1	K3	B	N2	K3	B	-0.5808	0.7704	-0.9044	1.0940
N1	K3	B	N2	K3	C	-0.2675	1.0340	-0.6175	1.3840
N1	K3	B	N2	K3	D	-2.0317	-0.7178	-2.4278	-0.3217
N1	K3	B	N3	K1	A	-1.8611	-0.4082	-2.5100	0.2406
N1	K3	B	N3	K1	B	-0.3238	1.0340	-0.6567	1.3668
N1	K3	B	N3	K1	C	-0.1657	1.1851	-0.5192	1.5387
N1	K3	B	N3	K1	D	-2.0214	-0.6598	-2.3454	-0.3358
N1	K3	B	N3	K2	A	-1.8361	-0.4458	-2.4547	0.1728
N1	K3	B	N3	K2	B	-0.6171	0.7562	-0.9497	1.0887
N1	K3	B	N3	K2	C	-0.1829	1.1893	-0.5069	1.5133
N1	K3	B	N3	K2	D	-2.1109	-0.7971	-2.4778	-0.4303
N1	K3	B	N3	K3	A	-1.5410	0.03142	-2.2693	0.7597
N1	K3	B	N3	K3	B	-0.5792	0.7667	-0.9132	1.1006
N1	K3	B	N3	K3	C	-0.2449	1.0248	-0.6455	1.4253
N1	K3	B	N3	K3	D	-1.7504	-0.4438	-2.1522	-0.04203
N1	K3	C	N1	K3	D	-2.2293	-1.6386	-2.5126	-1.3553
N1	K3	C	N2	K1	A	-2.8103	-1.0245	-3.6536	-0.1812
N1	K3	C	N2	K1	B	-0.6244	0.7318	-0.9589	1.0664
N1	K3	C	N2	K1	C	-0.6511	0.7382	-0.9516	1.0386
N1	K3	C	N2	K1	D	-2.4820	-1.2233	-2.8643	-0.8410
N1	K3	C	N2	K2	A	-2.2739	-0.7151	-2.9965	0.007538
N1	K3	C	N2	K2	B	-1.3049	0.07974	-1.5853	0.3601
N1	K3	C	N2	K2	C	-1.0567	0.2399	-1.3829	0.5660
N1	K3	C	N2	K2	D	-2.6208	-1.2775	-2.9491	-0.9492
N1	K3	C	N2	K3	A	-2.2721	-0.7532	-2.9755	-0.04970
N1	K3	C	N2	K3	B	-1.1317	0.2236	-1.4428	0.5347
N1	K3	C	N2	K3	C	-0.8325	0.5014	-1.1425	0.8114
N1	K3	C	N2	K3	D	-2.5831	-1.2641	-2.9601	-0.8871
N1	K3	C	N3	K1	A	-2.4041	-0.9628	-3.0473	-0.3196
N1	K3	C	N3	K1	B	-0.8810	0.4936	-1.1892	0.8017
N1	K3	C	N3	K1	C	-0.7188	0.6407	-1.0531	0.9749
N1	K3	C	N3	K1	D	-2.5800	-1.1988	-2.8777	-0.9012
N1	K3	C	N3	K2	A	-2.3789	-1.0006	-2.9916	-0.3879
N1	K3	C	N3	K2	B	-1.1750	0.2165	-1.4820	0.5235

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
N1	K3	C	N3	K2	C	-0.04560	0.2586	4.343	-0.18	0.8680	1.0000	0.05
N1	K3	C	N3	K2	D	-2.0028	0.2618	5.281	-7.65	0.0005	<.0001	0.05
N1	K3	C	N3	K3	A	-1.3036	0.3913	70.01	-3.33	0.0014	0.2302	0.05
N1	K3	C	N3	K3	B	-0.4551	0.2582	4.654	-1.76	0.1426	0.9991	0.05
N1	K3	C	N3	K3	C	-0.1589	0.2622	5.987	-0.61	0.5668	1.0000	0.05
N1	K3	C	N3	K3	D	-1.6459	0.2705	6.335	-6.08	0.0007	<.0001	0.05
N1	K3	D	N2	K1	A	0.01653	0.4567	169.2	0.04	0.9712	1.0000	0.05
N1	K3	D	N2	K1	B	1.9877	0.2711	7.18	7.33	0.0001	<.0001	0.05
N1	K3	D	N2	K1	C	1.9775	0.2671	6.552	7.40	0.0002	<.0001	0.05
N1	K3	D	N2	K1	D	0.08129	0.2682	8.712	0.30	0.7689	1.0000	0.05
N1	K3	D	N2	K2	A	0.4394	0.3962	82.73	1.11	0.2705	1.0000	0.05
N1	K3	D	N2	K2	B	1.3213	0.2615	6.361	5.05	0.0020	0.0003	0.05
N1	K3	D	N2	K2	C	1.5255	0.2622	7.727	5.82	0.0005	<.0001	0.05
N1	K3	D	N2	K2	D	-0.01523	0.2656	6.684	-0.06	0.9560	1.0000	0.05
N1	K3	D	N2	K3	A	0.4213	0.3840	78.97	1.10	0.2758	1.0000	0.05
N1	K3	D	N2	K3	B	1.4799	0.2640	6.599	5.60	0.0010	<.0001	0.05
N1	K3	D	N2	K3	C	1.7684	0.2630	7.16	6.72	0.0002	<.0001	0.05
N1	K3	D	N2	K3	D	0.01034	0.2731	7.483	0.04	0.9708	1.0000	0.05
N1	K3	D	N3	K1	A	0.2505	0.3591	41.27	0.70	0.4895	1.0000	0.05
N1	K3	D	N3	K1	B	1.7402	0.2670	6.942	6.52	0.0003	<.0001	0.05
N1	K3	D	N3	K1	C	1.8948	0.2712	7.318	6.99	0.0002	<.0001	0.05
N1	K3	D	N3	K1	D	0.04450	0.2638	6.465	0.17	0.8712	1.0000	0.05
N1	K3	D	N3	K2	A	0.2442	0.3432	39.88	0.71	0.4809	1.0000	0.05
N1	K3	D	N3	K2	B	1.4547	0.2681	6.652	5.43	0.0012	<.0001	0.05
N1	K3	D	N3	K2	C	1.8883	0.2664	6.653	7.09	0.0002	<.0001	0.05
N1	K3	D	N3	K2	D	-0.06889	0.2675	7.443	-0.26	0.8038	1.0000	0.05
N1	K3	D	N3	K3	A	0.6303	0.3936	79	1.60	0.1133	0.9999	0.05
N1	K3	D	N3	K3	B	1.4789	0.2653	6.95	5.57	0.0009	<.0001	0.05
N1	K3	D	N3	K3	C	1.7750	0.2702	8.942	6.57	0.0001	<.0001	0.05
N1	K3	D	N3	K3	D	0.2880	0.2731	7.9	1.05	0.3227	1.0000	0.05
N2	K1	A	N2	K1	B	1.9711	0.4018	2648	4.91	<.0001	0.0006	0.05
N2	K1	A	N2	K1	C	1.9609	0.3969	2653	4.94	<.0001	0.0005	0.05
N2	K1	A	N2	K1	D	0.06476	0.4057	2652	0.16	0.8732	1.0000	0.05
N2	K1	A	N2	K2	A	0.4229	0.3325	1603	1.27	0.2036	1.0000	0.05
N2	K1	A	N2	K2	B	1.3048	0.4039	2054	3.23	0.0013	0.2933	0.05
N2	K1	A	N2	K2	C	1.5090	0.4061	2060	3.72	0.0002	0.0762	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	*Potassium*	*HARVEST*	*Nitrogen*	*Potassium*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
N1	K3	C	N3	K2	C	-0.7418	0.6506	-1.0392	0.9480
N1	K3	C	N3	K2	D	-2.6651	-1.3405	-3.0085	-0.9971
N1	K3	C	N3	K3	A	-2.0841	-0.5232	-2.8069	0.1997
N1	K3	C	N3	K3	B	-1.1339	0.2237	-1.4470	0.5368
N1	K3	C	N3	K3	C	-0.8009	0.4831	-1.1664	0.8486
N1	K3	C	N3	K3	D	-2.2995	-0.9923	-2.6853	-0.6066
N1	K3	D	N2	K1	A	-0.8850	0.9180	-1.7378	1.7709
N1	K3	D	N2	K1	B	1.3499	2.6255	0.9462	3.0292
N1	K3	D	N2	K1	C	1.3370	2.6179	0.9513	3.0037
N1	K3	D	N2	K1	D	-0.5285	0.6911	-0.9491	1.1117
N1	K3	D	N2	K2	A	-0.3485	1.2274	-1.0825	1.9614
N1	K3	D	N2	K2	B	0.6902	1.9525	0.3167	2.3259
N1	K3	D	N2	K2	C	0.9171	2.1339	0.5181	2.5329
N1	K3	D	N2	K2	D	-0.6494	0.6189	-1.0357	1.0052
N1	K3	D	N2	K3	A	-0.3429	1.1856	-1.0538	1.8964
N1	K3	D	N2	K3	B	0.8478	2.1120	0.4655	2.4943
N1	K3	D	N2	K3	C	1.1493	2.3874	0.7580	2.7787
N1	K3	D	N2	K3	D	-0.6270	0.6476	-1.0387	1.0593
N1	K3	D	N3	K1	A	-0.4747	0.9756	-1.1292	1.6301
N1	K3	D	N3	K1	B	1.1077	2.3727	0.7143	2.7661
N1	K3	D	N3	K1	C	1.2593	2.5304	0.8531	2.9366
N1	K3	D	N3	K1	D	-0.5900	0.6790	-0.9691	1.0581
N1	K3	D	N3	K2	A	-0.4495	0.9378	-1.0743	1.5626
N1	K3	D	N3	K2	B	0.8138	2.0955	0.4245	2.4848
N1	K3	D	N3	K2	C	1.2517	2.5250	0.8649	2.9118
N1	K3	D	N3	K2	D	-0.6940	0.5562	-1.0967	0.9589
N1	K3	D	N3	K3	A	-0.1531	1.4137	-0.8817	2.1423
N1	K3	D	N3	K3	B	0.8505	2.1072	0.4595	2.4982
N1	K3	D	N3	K3	C	1.1632	2.3869	0.7370	2.8131
N1	K3	D	N3	K3	D	-0.3431	0.9191	-0.7610	1.3370
N2	K1	A	N2	K1	B	1.1832	2.7591	0.4274	3.5149
N2	K1	A	N2	K1	C	1.1826	2.7392	0.4360	3.4858
N2	K1	A	N2	K1	D	-0.7307	0.8603	-1.4938	1.6233
N2	K1	A	N2	K2	A	-0.2294	1.0752	-0.8546	1.7005
N2	K1	A	N2	K2	B	0.5126	2.0969	-0.2470	2.8566
N2	K1	A	N2	K2	C	0.7125	2.3054	-0.05120	3.0691

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	*Potassium*	*HARVEST*	*Nitrogen*	*Potassium*	*HARVEST*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*	*Alpha*
N2	K1	A	N2	K2	D	-0.03176	0.4056	2070	-0.08	0.9376	1.0000	0.05
N2	K1	A	N2	K3	A	0.4048	0.3754	1880	1.08	0.2811	1.0000	0.05
N2	K1	A	N2	K3	B	1.4634	0.4067	2074	3.60	0.0003	0.1100	0.05
N2	K1	A	N2	K3	C	1.7518	0.4059	2063	4.32	<.0001	0.0082	0.05
N2	K1	A	N2	K3	D	-0.00619	0.4102	2095	-0.02	0.9880	1.0000	0.05
N2	K1	A	N3	K1	A	0.2339	0.4530	132	0.52	0.6064	1.0000	0.05
N2	K1	A	N3	K1	B	1.7237	0.4564	148	3.78	0.0002	0.0623	0.05
N2	K1	A	N3	K1	C	1.8783	0.4628	148.6	4.06	<.0001	0.0228	0.05
N2	K1	A	N3	K1	D	0.02797	0.4536	147.2	0.06	0.9509	1.0000	0.05
N2	K1	A	N3	K2	A	0.2276	0.5346	336.7	0.43	0.6705	1.0000	0.05
N2	K1	A	N3	K2	B	1.4381	0.4573	141.4	3.14	0.0020	0.3538	0.05
N2	K1	A	N3	K2	C	1.8718	0.4549	144.8	4.11	<.0001	0.0184	0.05
N2	K1	A	N3	K2	D	-0.08542	0.4590	158.5	-0.19	0.8526	1.0000	0.05
N2	K1	A	N3	K3	A	0.6138	0.6022	486.8	1.02	0.3086	1.0000	0.05
N2	K1	A	N3	K3	B	1.4623	0.4557	151.1	3.21	0.0016	0.3076	0.05
N2	K1	A	N3	K3	C	1.7585	0.4573	163.2	3.85	0.0002	0.0494	0.05
N2	K1	A	N3	K3	D	0.2715	0.4653	153.9	0.58	0.5605	1.0000	0.05
N2	K1	B	N2	K1	C	-0.01021	0.1549	2645	-0.07	0.9474	1.0000	0.05
N2	K1	B	N2	K1	D	-1.9064	0.1701	2659	-11.21	<.0001	<.0001	0.05
N2	K1	B	N2	K2	A	-1.5482	0.3396	1643	-4.56	<.0001	0.0029	0.05
N2	K1	B	N2	K2	B	-0.6663	0.1652	200.3	-4.03	<.0001	0.0251	0.05
N2	K1	B	N2	K2	C	-0.4622	0.1719	232.8	-2.69	0.0077	0.7262	0.05
N2	K1	B	N2	K2	D	-2.0029	0.1732	239.1	-11.57	<.0001	<.0001	0.05
N2	K1	B	N2	K3	A	-1.5664	0.3283	1508	-4.77	<.0001	0.0011	0.05
N2	K1	B	N2	K3	B	-0.5078	0.1689	219.3	-3.01	0.0030	0.4630	0.05
N2	K1	B	N2	K3	C	-0.2193	0.1735	236.6	-1.26	0.2075	1.0000	0.05
N2	K1	B	N2	K3	D	-1.9773	0.1865	311	-10.60	<.0001	<.0001	0.05
N2	K1	B	N3	K1	A	-1.7372	0.3597	37.44	-4.83	<.0001	0.0008	0.05
N2	K1	B	N3	K1	B	-0.2475	0.2691	5.281	-0.92	0.3979	1.0000	0.05
N2	K1	B	N3	K1	C	-0.09283	0.2751	5.732	-0.34	0.7478	1.0000	0.05
N2	K1	B	N3	K1	D	-1.9432	0.2675	5.233	-7.26	0.0006	<.0001	0.05
N2	K1	B	N3	K2	A	-1.7435	0.3436	37.16	-5.07	<.0001	0.0002	0.05
N2	K1	B	N3	K2	B	-0.5330	0.2727	5.376	-1.95	0.1040	0.9943	0.05
N2	K1	B	N3	K2	C	-0.09935	0.2695	5.276	-0.37	0.7267	1.0000	0.05
N2	K1	B	N3	K2	D	-2.0566	0.2729	6.451	-7.54	0.0002	<.0001	0.05
N2	K1	B	N3	K3	A	-1.3574	0.3961	71.83	-3.43	0.0010	0.1796	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Lower	Upper	Adj Lower	Adj Upper
N2	K1	A	N2	K2	D	-0.8271	0.7636	-1.5898	1.5263
N2	K1	A	N2	K3	A	-0.3315	1.1410	-1.0374	1.8470
N2	K1	A	N2	K3	B	0.6658	2.2610	-0.09907	3.0258
N2	K1	A	N2	K3	C	0.9559	2.5478	0.1926	3.3111
N2	K1	A	N2	K3	D	-0.8106	0.7982	-1.5820	1.5697
N2	K1	A	N3	K1	A	-0.6621	1.1300	-1.5064	1.9742
N2	K1	A	N3	K1	B	0.8218	2.6256	-0.02969	3.4770
N2	K1	A	N3	K1	C	0.9638	2.7928	0.1004	3.6562
N2	K1	A	N3	K1	D	-0.8684	0.9243	-1.7146	1.7705
N2	K1	A	N3	K2	A	-0.8240	1.2793	-1.8262	2.2815
N2	K1	A	N3	K2	B	0.5341	2.3421	-0.3187	3.1950
N2	K1	A	N3	K2	C	0.9726	2.7710	0.1240	3.6196
N2	K1	A	N3	K2	D	-0.9919	0.8210	-1.8486	1.6778
N2	K1	A	N3	K3	A	-0.5694	1.7969	-1.6996	2.9271
N2	K1	A	N3	K3	B	0.5620	2.3626	-0.2882	3.2129
N2	K1	A	N3	K3	C	0.8554	2.6616	0.001528	3.5155
N2	K1	A	N3	K3	D	-0.6478	1.1907	-1.5162	2.0591
N2	K1	B	N2	K1	C	-0.3139	0.2935	-0.6052	0.5848
N2	K1	B	N2	K1	D	-2.2399	-1.5728	-2.5598	-1.2529
N2	K1	B	N2	K2	A	-2.2144	-0.8820	-2.8531	-0.2434
N2	K1	B	N2	K2	B	-0.9921	-0.3406	-1.3011	-0.03161
N2	K1	B	N2	K2	C	-0.8008	-0.1236	-1.1224	0.1981
N2	K1	B	N2	K2	D	-2.3440	-1.6618	-2.6682	-1.3376
N2	K1	B	N2	K3	A	-2.2103	-0.9224	-2.8275	-0.3052
N2	K1	B	N2	K3	B	-0.8406	-0.1749	-1.1566	0.1411
N2	K1	B	N2	K3	C	-0.5611	0.1225	-0.8858	0.4472
N2	K1	B	N2	K3	D	-2.3443	-1.6104	-2.6937	-1.2609
N2	K1	B	N3	K1	A	-2.4657	-1.0087	-3.1191	-0.3554
N2	K1	B	N3	K1	B	-0.9284	0.4335	-1.2815	0.7865
N2	K1	B	N3	K1	C	-0.7737	0.5881	-1.1498	0.9641
N2	K1	B	N3	K1	D	-2.6218	-1.2645	-2.9710	-0.9153
N2	K1	B	N3	K2	A	-2.4396	-1.0474	-3.0635	-0.4235
N2	K1	B	N3	K2	B	-1.2195	0.1535	-1.5806	0.5146
N2	K1	B	N3	K2	C	-0.7813	0.5826	-1.1346	0.9360
N2	K1	B	N3	K2	D	-2.7132	-1.4000	-3.1050	-1.0082
N2	K1	B	N3	K3	A	-2.1470	-0.5677	-2.8791	0.1643

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	*Potassium*	*HARVEST*	*Nitrogen*	*Potassium*	*HARVEST*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*	*Alpha*
N2	K1	B	N3	K3	B	-0.5088	0.2702	5.776	-1.88	0.1106	0.9970	0.05
N2	K1	B	N3	K3	C	-0.2126	0.2757	7.623	-0.77	0.4638	1.0000	0.05
N2	K1	B	N3	K3	D	-1.6997	0.2836	7.605	-5.99	0.0004	<.0001	0.05
N2	K1	C	N2	K1	D	-1.8962	0.1632	2638	-11.62	<.0001	<.0001	0.05
N2	K1	C	N2	K2	A	-1.5380	0.3357	1591	-4.58	<.0001	0.0026	0.05
N2	K1	C	N2	K2	B	-0.6561	0.1591	169.9	-4.12	<.0001	0.0178	0.05
N2	K1	C	N2	K2	C	-0.4520	0.1632	187.6	-2.77	0.0062	0.6632	0.05
N2	K1	C	N2	K2	D	-1.9927	0.1667	202.9	-11.95	<.0001	<.0001	0.05
N2	K1	C	N2	K3	A	-1.5561	0.3255	1470	-4.78	<.0001	0.0010	0.05
N2	K1	C	N2	K3	B	-0.4975	0.1647	195.3	-3.02	0.0029	0.4506	0.05
N2	K1	C	N2	K3	C	-0.2091	0.1645	191.4	-1.27	0.2054	1.0000	0.05
N2	K1	C	N2	K3	D	-1.9671	0.1802	269	-10.91	<.0001	<.0001	0.05
N2	K1	C	N3	K1	A	-1.7270	0.3558	36.22	-4.85	<.0001	0.0007	0.05
N2	K1	C	N3	K1	B	-0.2373	0.2654	4.865	-0.89	0.4134	1.0000	0.05
N2	K1	C	N3	K1	C	-0.08262	0.2696	4.986	-0.31	0.7716	1.0000	0.05
N2	K1	C	N3	K1	D	-1.9330	0.2629	4.671	-7.35	0.0010	<.0001	0.05
N2	K1	C	N3	K2	A	-1.7333	0.3397	35.91	-5.10	<.0001	0.0002	0.05
N2	K1	C	N3	K2	B	-0.5228	0.2676	4.737	-1.95	0.1114	0.9943	0.05
N2	K1	C	N3	K2	C	-0.08913	0.2652	4.765	-0.34	0.7511	1.0000	0.05
N2	K1	C	N3	K2	D	-2.0463	0.2681	5.769	-7.63	0.0003	<.0001	0.05
N2	K1	C	N3	K3	A	-1.3472	0.3930	70.9	-3.43	0.0010	0.1791	0.05
N2	K1	C	N3	K3	B	-0.4986	0.2648	5.028	-1.88	0.1181	0.9970	0.05
N2	K1	C	N3	K3	C	-0.2024	0.2715	6.993	-0.75	0.4802	1.0000	0.05
N2	K1	C	N3	K3	D	-1.6895	0.2787	6.852	-6.06	0.0006	<.0001	0.05
N2	K1	D	N2	K2	A	0.3582	0.3414	1637	1.05	0.2942	1.0000	0.05
N2	K1	D	N2	K2	B	1.2400	0.1710	223.2	7.25	<.0001	<.0001	0.05
N2	K1	D	N2	K2	C	1.4442	0.1756	247.1	8.23	<.0001	<.0001	0.05
N2	K1	D	N2	K2	D	-0.09652	0.1726	231.8	-0.56	0.5765	1.0000	0.05
N2	K1	D	N2	K3	A	0.3400	0.3310	1518	1.03	0.3045	1.0000	0.05
N2	K1	D	N2	K3	B	1.3986	0.1757	248.4	7.96	<.0001	<.0001	0.05
N2	K1	D	N2	K3	C	1.6871	0.1770	250.2	9.53	<.0001	<.0001	0.05
N2	K1	D	N2	K3	D	-0.07095	0.1851	297.4	-0.38	0.7017	1.0000	0.05
N2	K1	D	N3	K1	A	0.1692	0.3579	45.59	0.47	0.6387	1.0000	0.05
N2	K1	D	N3	K1	B	1.6589	0.2682	7.278	6.18	0.0004	<.0001	0.05
N2	K1	D	N3	K1	C	1.8136	0.2724	7.409	6.66	0.0002	<.0001	0.05
N2	K1	D	N3	K1	D	-0.03679	0.2641	6.671	-0.14	0.8933	1.0000	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Lower	Upper	Adj Lower	Adj Upper
N2	K1	B	N3	K3	B	-1.1763	0.1587	-1.5470	0.5293
N2	K1	B	N3	K3	C	-0.8540	0.4287	-1.2719	0.8466
N2	K1	B	N3	K3	D	-2.3597	-1.0397	-2.7893	-0.6100
N2	K1	C	N2	K1	D	-2.2161	-1.5762	-2.5230	-1.2693
N2	K1	C	N2	K2	A	-2.1965	-0.8795	-2.8278	-0.2482
N2	K1	C	N2	K2	B	-0.9703	-0.3420	-1.2675	-0.04483
N2	K1	C	N2	K2	C	-0.7740	-0.1299	-1.0791	0.1752
N2	K1	C	N2	K2	D	-2.3214	-1.6640	-2.6331	-1.3522
N2	K1	C	N2	K3	A	-2.1946	-0.9177	-2.8065	-0.3058
N2	K1	C	N2	K3	B	-0.8223	-0.1728	-1.1302	0.1351
N2	K1	C	N2	K3	C	-0.5336	0.1155	-0.8412	0.4230
N2	K1	C	N2	K3	D	-2.3220	-1.6123	-2.6596	-1.2747
N2	K1	C	N3	K1	A	-2.4484	-1.0056	-3.0938	-0.3602
N2	K1	C	N3	K1	B	-0.9252	0.4507	-1.2568	0.7823
N2	K1	C	N3	K1	C	-0.7761	0.6109	-1.1182	0.9530
N2	K1	C	N3	K1	D	-2.6234	-1.2425	-2.9431	-0.9228
N2	K1	C	N3	K2	A	-2.4223	-1.0443	-3.0384	-0.4282
N2	K1	C	N3	K2	B	-1.2224	0.1768	-1.5509	0.5053
N2	K1	C	N3	K2	C	-0.7810	0.6027	-1.1079	0.9296
N2	K1	C	N3	K2	D	-2.7087	-1.3840	-3.0762	-1.0165
N2	K1	C	N3	K3	A	-2.1308	-0.5635	-2.8569	0.1626
N2	K1	C	N3	K3	B	-1.1781	0.1809	-1.5158	0.5186
N2	K1	C	N3	K3	C	-0.8445	0.4397	-1.2454	0.8405
N2	K1	C	N3	K3	D	-2.3514	-1.0276	-2.7601	-0.6188
N2	K1	D	N2	K2	A	-0.3114	1.0277	-0.9533	1.6696
N2	K1	D	N2	K2	B	0.9030	1.5770	0.5831	1.8970
N2	K1	D	N2	K2	C	1.0984	1.7900	0.7697	2.1187
N2	K1	D	N2	K2	D	-0.4365	0.2435	-0.7594	0.5664
N2	K1	D	N2	K3	A	-0.3093	0.9894	-0.9317	1.6118
N2	K1	D	N2	K3	B	1.0526	1.7447	0.7236	2.0736
N2	K1	D	N2	K3	C	1.3384	2.0357	1.0070	2.3672
N2	K1	D	N2	K3	D	-0.4352	0.2933	-0.7819	0.6400
N2	K1	D	N3	K1	A	-0.5513	0.8897	-1.2056	1.5440
N2	K1	D	N3	K1	B	1.0295	2.2883	0.6285	2.6893
N2	K1	D	N3	K1	C	1.1765	2.4506	0.7669	2.8602
N2	K1	D	N3	K1	D	-0.6676	0.5940	-1.0514	0.9778

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
N2	K1	D	N3	K2	A	0.1629	0.3423	46.24	0.48	0.6365	1.0000	0.05
N2	K1	D	N3	K2	B	1.3734	0.2709	7.164	5.07	0.0013	0.0002	0.05
N2	K1	D	N3	K2	C	1.8070	0.2683	7.2	6.74	0.0002	<.0001	0.05
N2	K1	D	N3	K2	D	-0.1502	0.2716	8.695	-0.55	0.5942	1.0000	0.05
N2	K1	D	N3	K3	A	0.5490	0.3946	87.05	1.39	0.1677	1.0000	0.05
N2	K1	D	N3	K3	B	1.3976	0.2679	7.594	5.22	0.0010	0.0001	0.05
N2	K1	D	N3	K3	C	1.6937	0.2744	10.2	6.17	<.0001	<.0001	0.05
N2	K1	D	N3	K3	D	0.2067	0.2825	10.1	0.73	0.4809	1.0000	0.05
N2	K2	A	N2	K2	B	0.8819	0.3244	2653	2.72	0.0066	0.7035	0.05
N2	K2	A	N2	K2	C	1.0861	0.3273	2654	3.32	0.0009	0.2378	0.05
N2	K2	A	N2	K2	D	-0.4547	0.3308	2647	-1.37	0.1694	1.0000	0.05
N2	K2	A	N2	K3	A	-0.01813	0.3231	1481	-0.06	0.9553	1.0000	0.05
N2	K2	A	N2	K3	B	1.0405	0.3375	1621	3.08	0.0021	0.4009	0.05
N2	K2	A	N2	K3	C	1.3289	0.3369	1611	3.94	<.0001	0.0348	0.05
N2	K2	A	N2	K3	D	-0.4291	0.3408	1655	-1.26	0.2081	1.0000	0.05
N2	K2	A	N3	K1	A	-0.1890	0.4684	159.8	-0.40	0.6871	1.0000	0.05
N2	K2	A	N3	K1	B	1.3008	0.3945	74.15	3.30	0.0015	0.2504	0.05
N2	K2	A	N3	K1	C	1.4554	0.3989	73.41	3.65	0.0005	0.0944	0.05
N2	K2	A	N3	K1	D	-0.3949	0.3936	75.28	-1.00	0.3189	1.0000	0.05
N2	K2	A	N3	K2	A	-0.1953	0.4343	138.7	-0.45	0.6537	1.0000	0.05
N2	K2	A	N3	K2	B	1.0152	0.3971	72.23	2.56	0.0127	0.8194	0.05
N2	K2	A	N3	K2	C	1.4489	0.3954	74.51	3.66	0.0005	0.0897	0.05
N2	K2	A	N3	K2	D	-0.5083	0.3948	78.07	-1.29	0.2017	1.0000	0.05
N2	K2	A	N3	K3	A	0.1909	0.5356	316.1	0.36	0.7218	1.0000	0.05
N2	K2	A	N3	K3	B	1.0394	0.3944	76.46	2.64	0.0102	0.7663	0.05
N2	K2	A	N3	K3	C	1.3356	0.3965	83.88	3.37	0.0011	0.2094	0.05
N2	K2	A	N3	K3	D	-0.1514	0.4044	79.72	-0.37	0.7090	1.0000	0.05
N2	K2	B	N2	K2	C	0.2042	0.1405	2641	1.45	0.1462	1.0000	0.05
N2	K2	B	N2	K2	D	-1.3365	0.1462	2658	-9.14	<.0001	<.0001	0.05
N2	K2	B	N2	K3	A	-0.9000	0.3235	1452	-2.78	0.0055	0.6522	0.05
N2	K2	B	N2	K3	B	0.1586	0.1571	165.6	1.01	0.3141	1.0000	0.05
N2	K2	B	N2	K3	C	0.4471	0.1610	178.6	2.78	0.0061	0.6561	0.05
N2	K2	B	N2	K3	D	-1.3110	0.1755	249.5	-7.47	<.0001	<.0001	0.05
N2	K2	B	N3	K1	A	-1.0709	0.3522	37.59	-3.04	0.0043	0.4349	0.05
N2	K2	B	N3	K1	B	0.4189	0.2594	4.602	1.61	0.1723	0.9999	0.05
N2	K2	B	N3	K1	C	0.5735	0.2647	4.912	2.17	0.0834	0.9725	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	*Potassium*	*HARVEST*	*Nitrogen*	*Potassium*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
N2	K1	D	N3	K2	A	-0.5261	0.8519	-1.1523	1.4781
N2	K1	D	N3	K2	B	0.7358	2.0109	0.3327	2.4140
N2	K1	D	N3	K2	C	1.1762	2.4378	0.7764	2.8377
N2	K1	D	N3	K2	D	-0.7678	0.4675	-1.1935	0.8931
N2	K1	D	N3	K3	A	-0.2353	1.3333	-0.9669	2.0649
N2	K1	D	N3	K3	B	0.7740	2.0211	0.3684	2.4267
N2	K1	D	N3	K3	C	1.0840	2.3035	0.6396	2.7479
N2	K1	D	N3	K3	D	-0.4218	0.8352	-0.8784	1.2918
N2	K2	A	N2	K2	B	0.2458	1.5180	-0.3644	2.1281
N2	K2	A	N2	K2	C	0.4443	1.7278	-0.1713	2.3434
N2	K2	A	N2	K2	D	-1.1033	0.1940	-1.7255	0.8161
N2	K2	A	N2	K3	A	-0.6520	0.6157	-1.2595	1.2232
N2	K2	A	N2	K3	B	0.3786	1.7024	-0.2560	2.3369
N2	K2	A	N2	K3	C	0.6680	1.9898	0.03449	2.6234
N2	K2	A	N2	K3	D	-1.0975	0.2393	-1.7383	0.8801
N2	K2	A	N3	K1	A	-1.1141	0.7361	-1.9885	1.6105
N2	K2	A	N3	K1	B	0.5147	2.0868	-0.2148	2.8163
N2	K2	A	N3	K1	C	0.6604	2.2504	-0.07721	2.9880
N2	K2	A	N3	K1	D	-1.1790	0.3891	-1.9071	1.1172
N2	K2	A	N3	K2	A	-1.0539	0.6634	-1.8637	1.4731
N2	K2	A	N3	K2	B	0.2237	1.8067	-0.5102	2.5406
N2	K2	A	N3	K2	C	0.6611	2.2366	-0.07015	2.9679
N2	K2	A	N3	K2	D	-1.2944	0.2777	-2.0252	1.0085
N2	K2	A	N3	K3	A	-0.8630	1.2447	-1.8669	2.2486
N2	K2	A	N3	K3	B	0.2540	1.8249	-0.4758	2.5546
N2	K2	A	N3	K3	C	0.5472	2.1240	-0.1875	2.8587
N2	K2	A	N3	K3	D	-0.9562	0.6533	-1.7050	1.4021
N2	K2	B	N2	K2	C	-0.07125	0.4796	-0.3354	0.7438
N2	K2	B	N2	K2	D	-1.6232	-1.0499	-1.8982	-0.7749
N2	K2	B	N2	K3	A	-1.5346	-0.2654	-2.1429	0.3429
N2	K2	B	N2	K3	B	-0.1515	0.4687	-0.4448	0.7620
N2	K2	B	N2	K3	C	0.1294	0.7647	-0.1714	1.0655
N2	K2	B	N2	K3	D	-1.6567	-0.9653	-1.9853	-0.6366
N2	K2	B	N3	K1	A	-1.7841	-0.3576	-2.4239	0.2821
N2	K2	B	N3	K1	B	-0.2657	1.1034	-0.5777	1.4154
N2	K2	B	N3	K1	C	-0.1105	1.2576	-0.4433	1.5904

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
N2	K2	B	N3	K1	D	-1.2768	0.2574	4.494	-4.96	0.0057	0.0004	0.05
N2	K2	B	N3	K2	A	-1.0771	0.3359	37.25	-3.21	0.0028	0.3092	0.05
N2	K2	B	N3	K2	B	0.1333	0.2612	4.405	0.51	0.6342	1.0000	0.05
N2	K2	B	N3	K2	C	0.5670	0.2590	4.473	2.19	0.0866	0.9684	0.05
N2	K2	B	N3	K2	D	-1.3902	0.2609	5.289	-5.33	0.0026	<.0001	0.05
N2	K2	B	N3	K3	A	-0.6910	0.3891	73.73	-1.78	0.0799	0.9990	0.05
N2	K2	B	N3	K3	B	0.1575	0.2588	4.766	0.61	0.5705	1.0000	0.05
N2	K2	B	N3	K3	C	0.4537	0.2651	6.634	1.71	0.1331	0.9995	0.05
N2	K2	B	N3	K3	D	-1.0333	0.2734	6.707	-3.78	0.0075	0.0616	0.05
N2	K2	C	N2	K2	D	-1.5407	0.1529	2657	-10.08	<.0001	<.0001	0.05
N2	K2	C	N2	K3	A	-1.1042	0.3264	1482	-3.38	0.0007	0.2017	0.05
N2	K2	C	N2	K3	B	-0.04559	0.1657	203.6	-0.28	0.7835	1.0000	0.05
N2	K2	C	N2	K3	C	0.2429	0.1631	189.5	1.49	0.1381	1.0000	0.05
N2	K2	C	N2	K3	D	-1.5152	0.1806	277.9	-8.39	<.0001	<.0001	0.05
N2	K2	C	N3	K1	A	-1.2750	0.3523	42.26	-3.62	0.0008	0.1034	0.05
N2	K2	C	N3	K1	B	0.2147	0.2605	5.762	0.82	0.4425	1.0000	0.05
N2	K2	C	N3	K1	C	0.3693	0.2663	6.218	1.39	0.2131	1.0000	0.05
N2	K2	C	N3	K1	D	-1.4810	0.2581	5.564	-5.74	0.0016	<.0001	0.05
N2	K2	C	N3	K2	A	-1.2813	0.3363	42.43	-3.81	0.0004	0.0558	0.05
N2	K2	C	N3	K2	B	-0.07084	0.2625	5.564	-0.27	0.7970	1.0000	0.05
N2	K2	C	N3	K2	C	0.3628	0.2579	5.204	1.41	0.2164	1.0000	0.05
N2	K2	C	N3	K2	D	-1.5944	0.2613	6.432	-6.10	0.0007	<.0001	0.05
N2	K2	C	N3	K3	A	-0.8952	0.3892	82.29	-2.30	0.0240	0.9406	0.05
N2	K2	C	N3	K3	B	-0.04665	0.2594	5.875	-0.18	0.8633	1.0000	0.05
N2	K2	C	N3	K3	C	0.2495	0.2669	8.39	0.93	0.3760	1.0000	0.05
N2	K2	C	N3	K3	D	-1.2375	0.2738	8.033	-4.52	0.0019	0.0034	0.05
N2	K2	D	N2	K3	A	0.4365	0.3258	1499	1.34	0.1805	1.0000	0.05
N2	K2	D	N2	K3	B	1.4951	0.1663	206.2	8.99	<.0001	<.0001	0.05
N2	K2	D	N2	K3	C	1.7836	0.1679	209.4	10.62	<.0001	<.0001	0.05
N2	K2	D	N2	K3	D	0.02557	0.1781	264.6	0.14	0.8860	1.0000	0.05
N2	K2	D	N3	K1	A	0.2657	0.3562	38.82	0.75	0.4602	1.0000	0.05
N2	K2	D	N3	K1	B	1.7554	0.2661	5.528	6.60	0.0008	<.0001	0.05
N2	K2	D	N3	K1	C	1.9101	0.2713	5.842	7.04	0.0005	<.0001	0.05
N2	K2	D	N3	K1	D	0.05973	0.2639	5.355	0.23	0.8293	1.0000	0.05
N2	K2	D	N3	K2	A	0.2594	0.3394	38.23	0.76	0.4494	1.0000	0.05
N2	K2	D	N3	K2	B	1.4699	0.2677	5.254	5.49	0.0023	<.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	*Potassium*	*HARVEST*	*Nitrogen*	*Potassium*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
N2	K2	B	N3	K1	D	-1.9616	-0.5920	-2.2658	-0.2878
N2	K2	B	N3	K2	A	-1.7576	-0.3967	-2.3675	0.2132
N2	K2	B	N3	K2	B	-0.5663	0.8330	-0.8701	1.1367
N2	K2	B	N3	K2	C	-0.1231	1.2571	-0.4280	1.5620
N2	K2	B	N3	K2	D	-2.0501	-0.7303	-2.3926	-0.3878
N2	K2	B	N3	K3	A	-1.4664	0.08435	-2.1859	0.8039
N2	K2	B	N3	K3	B	-0.5176	0.8327	-0.8366	1.1516
N2	K2	B	N3	K3	C	-0.1802	1.0876	-0.5647	1.4721
N2	K2	B	N3	K3	D	-1.6855	-0.3812	-2.0835	0.01685
N2	K2	C	N2	K2	D	-1.8405	-1.2410	-2.1280	-0.9534
N2	K2	C	N2	K3	A	-1.7444	-0.4640	-2.3580	0.1496
N2	K2	C	N2	K3	B	-0.3723	0.2811	-0.6821	0.5909
N2	K2	C	N2	K3	C	-0.07880	0.5646	-0.3836	0.8694
N2	K2	C	N2	K3	D	-1.8708	-1.1596	-2.2091	-0.8212
N2	K2	C	N3	K1	A	-1.9860	-0.5641	-2.6286	0.07857
N2	K2	C	N3	K1	B	-0.4291	0.8585	-0.7859	1.2153
N2	K2	C	N3	K1	C	-0.2768	1.0155	-0.6537	1.3924
N2	K2	C	N3	K1	D	-2.1247	-0.8373	-2.4725	-0.4895
N2	K2	C	N3	K2	A	-1.9599	-0.6027	-2.5735	0.01085
N2	K2	C	N3	K2	B	-0.7256	0.5839	-1.0794	0.9377
N2	K2	C	N3	K2	C	-0.2925	1.0181	-0.6281	1.3538
N2	K2	C	N3	K2	D	-2.2234	-0.9654	-2.5981	-0.5907
N2	K2	C	N3	K3	A	-1.6695	-0.1209	-2.3905	0.6002
N2	K2	C	N3	K3	B	-0.6845	0.5913	-1.0430	0.9497
N2	K2	C	N3	K3	C	-0.3611	0.8602	-0.7760	1.2751
N2	K2	C	N3	K3	D	-1.8683	-0.6067	-2.2892	-0.1858
N2	K2	D	N2	K3	A	-0.2026	1.0757	-0.8152	1.6883
N2	K2	D	N2	K3	B	1.1673	1.8229	0.8564	2.1339
N2	K2	D	N2	K3	C	1.4527	2.1145	1.1387	2.4285
N2	K2	D	N2	K3	D	-0.3252	0.3763	-0.6588	0.7099
N2	K2	D	N3	K1	A	-0.4548	0.9862	-1.1026	1.6340
N2	K2	D	N3	K1	B	1.0905	2.4204	0.7330	2.7779
N2	K2	D	N3	K1	C	1.2418	2.5784	0.8677	2.9525
N2	K2	D	N3	K1	D	-0.6052	0.7247	-0.9539	1.0734
N2	K2	D	N3	K2	A	-0.4276	0.9464	-1.0446	1.5634
N2	K2	D	N3	K2	B	0.7917	2.1481	0.4415	2.4982

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
N2	K2	D	N3	K2	C	1.9036	0.2646	5.183	7.19	0.0007	<.0001	0.05
N2	K2	D	N3	K2	D	-0.05366	0.2644	5.65	-0.20	0.8463	1.0000	0.05
N2	K2	D	N3	K3	A	0.6455	0.3929	75.16	1.64	0.1046	0.9998	0.05
N2	K2	D	N3	K3	B	1.4941	0.2651	5.646	5.64	0.0016	<.0001	0.05
N2	K2	D	N3	K3	C	1.7903	0.2719	7.813	6.58	0.0002	<.0001	0.05
N2	K2	D	N3	K3	D	0.3032	0.2785	7.477	1.09	0.3101	1.0000	0.05
N2	K3	A	N2	K3	B	1.0586	0.3168	2656	3.34	0.0008	0.2242	0.05
N2	K3	A	N2	K3	C	1.3471	0.3171	2656	4.25	<.0001	0.0109	0.05
N2	K3	A	N2	K3	D	-0.4110	0.3265	2652	-1.26	0.2082	1.0000	0.05
N2	K3	A	N3	K1	A	-0.1709	0.4421	137.4	-0.39	0.6997	1.0000	0.05
N2	K3	A	N3	K1	B	1.3189	0.3831	73.12	3.44	0.0010	0.1720	0.05
N2	K3	A	N3	K1	C	1.4735	0.3870	71.87	3.81	0.0003	0.0562	0.05
N2	K3	A	N3	K1	D	-0.3768	0.3814	73.49	-0.99	0.3264	1.0000	0.05
N2	K3	A	N3	K2	A	-0.1771	0.4366	161.8	-0.41	0.6855	1.0000	0.05
N2	K3	A	N3	K2	B	1.0333	0.3848	70.4	2.69	0.0090	0.7294	0.05
N2	K3	A	N3	K2	C	1.4670	0.3824	71.94	3.84	0.0003	0.0510	0.05
N2	K3	A	N3	K2	D	-0.4902	0.3842	78.06	-1.28	0.2058	1.0000	0.05
N2	K3	A	N3	K3	A	0.2090	0.4355	142.5	0.48	0.6321	1.0000	0.05
N2	K3	A	N3	K3	B	1.0575	0.3826	75.13	2.76	0.0072	0.6667	0.05
N2	K3	A	N3	K3	C	1.3537	0.3879	86.43	3.49	0.0008	0.1511	0.05
N2	K3	A	N3	K3	D	-0.1333	0.3918	77.66	-0.34	0.7346	1.0000	0.05
N2	K3	B	N2	K3	C	0.2885	0.1480	2657	1.95	0.0513	0.9945	0.05
N2	K3	B	N2	K3	D	-1.4696	0.1681	2641	-8.74	<.0001	<.0001	0.05
N2	K3	B	N3	K1	A	-1.2295	0.3544	37.78	-3.47	0.0013	0.1599	0.05
N2	K3	B	N3	K1	B	0.2603	0.2638	5.128	0.99	0.3681	1.0000	0.05
N2	K3	B	N3	K1	C	0.4149	0.2687	5.386	1.54	0.1791	0.9999	0.05
N2	K3	B	N3	K1	D	-1.4354	0.2616	4.976	-5.49	0.0028	<.0001	0.05
N2	K3	B	N3	K2	A	-1.2357	0.3379	37.3	-3.66	0.0008	0.0917	0.05
N2	K3	B	N3	K2	B	-0.02526	0.2662	5.019	-0.09	0.9281	1.0000	0.05
N2	K3	B	N3	K2	C	0.4084	0.2628	4.886	1.55	0.1822	0.9999	0.05
N2	K3	B	N3	K2	D	-1.5488	0.2663	6.04	-5.82	0.0011	<.0001	0.05
N2	K3	B	N3	K3	A	-0.8496	0.3917	74.12	-2.17	0.0333	0.9721	0.05
N2	K3	B	N3	K3	B	-0.00106	0.2621	5.103	-0.00	0.9969	1.0000	0.05
N2	K3	B	N3	K3	C	0.2951	0.2705	7.51	1.09	0.3090	1.0000	0.05
N2	K3	B	N3	K3	D	-1.1919	0.2751	6.774	-4.33	0.0037	0.0077	0.05
N2	K3	C	N2	K3	D	-1.7580	0.1691	2659	-10.40	<.0001	<.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	*Potassium*	*HARVEST*	*Nitrogen*	*Potassium*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
N2	K2	D	N3	K2	C	1.2304	2.5767	0.8869	2.9202
N2	K2	D	N3	K2	D	-0.7105	0.6032	-1.0695	0.9622
N2	K2	D	N3	K3	A	-0.1371	1.4282	-0.8639	2.1549
N2	K2	D	N3	K3	B	0.8353	2.1528	0.4755	2.5127
N2	K2	D	N3	K3	C	1.1606	2.4200	0.7455	2.8350
N2	K2	D	N3	K3	D	-0.3469	0.9534	-0.7668	1.3732
N2	K3	A	N2	K3	B	0.4375	1.6797	-0.1583	2.2755
N2	K3	A	N2	K3	C	0.7252	1.9689	0.1287	2.5654
N2	K3	A	N2	K3	D	-1.0511	0.2292	-1.6651	0.8432
N2	K3	A	N3	K1	A	-1.0450	0.7033	-1.8692	1.5274
N2	K3	A	N3	K1	B	0.5555	2.0823	-0.1528	2.7905
N2	K3	A	N3	K1	C	0.7020	2.2451	-0.01329	2.9604
N2	K3	A	N3	K1	D	-1.1368	0.3832	-1.8420	1.0884
N2	K3	A	N3	K2	A	-1.0394	0.6851	-1.8545	1.5003
N2	K3	A	N3	K2	B	0.2659	1.8008	-0.4452	2.5118
N2	K3	A	N3	K2	C	0.7046	2.2294	-0.00221	2.9362
N2	K3	A	N3	K2	D	-1.2551	0.2747	-1.9662	0.9858
N2	K3	A	N3	K3	A	-0.6520	1.0700	-1.4643	1.8823
N2	K3	A	N3	K3	B	0.2954	1.8197	-0.4123	2.5273
N2	K3	A	N3	K3	C	0.5826	2.1248	-0.1366	2.8440
N2	K3	A	N3	K3	D	-0.9135	0.6468	-1.6387	1.3721
N2	K3	B	N2	K3	C	-0.00166	0.5786	-0.2800	0.8569
N2	K3	B	N2	K3	D	-1.7992	-1.1400	-2.1153	-0.8238
N2	K3	B	N3	K1	A	-1.9470	-0.5119	-2.5908	0.1319
N2	K3	B	N3	K1	B	-0.4128	0.9334	-0.7532	1.2738
N2	K3	B	N3	K1	C	-0.2613	1.0911	-0.6175	1.4474
N2	K3	B	N3	K1	D	-2.1089	-0.7619	-2.4405	-0.4303
N2	K3	B	N3	K2	A	-1.9201	-0.5513	-2.5337	0.06225
N2	K3	B	N3	K2	B	-0.7088	0.6583	-1.0480	0.9975
N2	K3	B	N3	K2	C	-0.2719	1.0888	-0.6013	1.4181
N2	K3	B	N3	K2	D	-2.1993	-0.8983	-2.5717	-0.5258
N2	K3	B	N3	K3	A	-1.6301	-0.06915	-2.3544	0.6552
N2	K3	B	N3	K3	B	-0.6707	0.6686	-1.0079	1.0058
N2	K3	B	N3	K3	C	-0.3358	0.9261	-0.7441	1.3344
N2	K3	B	N3	K3	D	-1.8469	-0.5369	-2.2489	-0.1349
N2	K3	C	N2	K3	D	-2.0895	-1.4265	-2.4075	-1.1085

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
N2	K3	C	N3	K1	A	-1.5179	0.3545	39.77	-4.28	0.0001	0.0094	0.05
N2	K3	C	N3	K1	B	-0.02818	0.2636	5.515	-0.11	0.9186	1.0000	0.05
N2	K3	C	N3	K1	C	0.1265	0.2688	5.84	0.47	0.6551	1.0000	0.05
N2	K3	C	N3	K1	D	-1.7239	0.2613	5.344	-6.60	0.0009	<.0001	0.05
N2	K3	C	N3	K2	A	-1.5242	0.3381	39.53	-4.51	<.0001	0.0036	0.05
N2	K3	C	N3	K2	B	-0.3137	0.2656	5.316	-1.18	0.2876	1.0000	0.05
N2	K3	C	N3	K2	C	0.1199	0.2631	5.359	0.46	0.6664	1.0000	0.05
N2	K3	C	N3	K2	D	-1.8373	0.2657	6.421	-6.91	0.0003	<.0001	0.05
N2	K3	C	N3	K3	A	-1.1381	0.3915	77.48	-2.91	0.0048	0.5467	0.05
N2	K3	C	N3	K3	B	-0.2895	0.2630	5.71	-1.10	0.3151	1.0000	0.05
N2	K3	C	N3	K3	C	0.006656	0.2665	7.153	0.02	0.9808	1.0000	0.05
N2	K3	C	N3	K3	D	-1.4804	0.2750	7.264	-5.38	0.0009	<.0001	0.05
N2	K3	D	N3	K1	A	0.2401	0.3653	41.8	0.66	0.5146	1.0000	0.05
N2	K3	D	N3	K1	B	1.7299	0.2767	6.945	6.25	0.0004	<.0001	0.05
N2	K3	D	N3	K1	C	1.8845	0.2820	7.295	6.68	0.0002	<.0001	0.05
N2	K3	D	N3	K1	D	0.03416	0.2745	6.767	0.12	0.9046	1.0000	0.05
N2	K3	D	N3	K2	A	0.2338	0.3491	41.64	0.67	0.5067	1.0000	0.05
N2	K3	D	N3	K2	B	1.4443	0.2792	6.812	5.17	0.0014	0.0001	0.05
N2	K3	D	N3	K2	C	1.8780	0.2765	6.819	6.79	0.0003	<.0001	0.05
N2	K3	D	N3	K2	D	-0.07923	0.2783	7.847	-0.28	0.7833	1.0000	0.05
N2	K3	D	N3	K3	A	0.6200	0.4005	77.57	1.55	0.1257	0.9999	0.05
N2	K3	D	N3	K3	B	1.4685	0.2754	7.027	5.33	0.0011	<.0001	0.05
N2	K3	D	N3	K3	C	1.7647	0.2804	8.986	6.29	0.0001	<.0001	0.05
N2	K3	D	N3	K3	D	0.2777	0.2814	7.321	0.99	0.3553	1.0000	0.05
N3	K1	A	N3	K1	B	1.4897	0.2782	2655	5.35	<.0001	<.0001	0.05
N3	K1	A	N3	K1	C	1.6444	0.2810	2659	5.85	<.0001	<.0001	0.05
N3	K1	A	N3	K1	D	-0.2060	0.2769	2652	-0.74	0.4570	1.0000	0.05
N3	K1	A	N3	K2	A	-0.00628	0.2900	1149	-0.02	0.9827	1.0000	0.05
N3	K1	A	N3	K2	B	1.2042	0.2862	1152	4.21	<.0001	0.0128	0.05
N3	K1	A	N3	K2	C	1.6379	0.2851	1152	5.74	<.0001	<.0001	0.05
N3	K1	A	N3	K2	D	-0.3193	0.2897	1198	-1.10	0.2705	1.0000	0.05
N3	K1	A	N3	K3	A	0.3799	0.3364	1581	1.13	0.2590	1.0000	0.05
N3	K1	A	N3	K3	B	1.2284	0.2869	1165	4.28	<.0001	0.0094	0.05
N3	K1	A	N3	K3	C	1.5246	0.2951	1220	5.17	<.0001	0.0002	0.05
N3	K1	A	N3	K3	D	0.03754	0.2968	1246	0.13	0.8993	1.0000	0.05
N3	K1	B	N3	K1	C	0.1546	0.1523	2657	1.02	0.3099	1.0000	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	*Potassium*	*HARVEST*	*Nitrogen*	*Potassium*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
N2	K3	C	N3	K1	A	-2.2345	-0.8014	-2.8798	-0.1561
N2	K3	C	N3	K1	B	-0.6872	0.6308	-1.0408	0.9845
N2	K3	C	N3	K1	C	-0.5357	0.7887	-0.9063	1.1592
N2	K3	C	N3	K1	D	-2.3828	-1.0649	-2.7278	-0.7200
N2	K3	C	N3	K2	A	-2.2079	-0.8405	-2.8232	-0.2252
N2	K3	C	N3	K2	B	-0.9843	0.3569	-1.3339	0.7065
N2	K3	C	N3	K2	C	-0.5431	0.7830	-0.8909	1.1308
N2	K3	C	N3	K2	D	-2.4773	-1.1973	-2.8581	-0.8164
N2	K3	C	N3	K3	A	-1.9176	-0.3586	-2.6421	0.3660
N2	K3	C	N3	K3	B	-0.9410	0.3620	-1.2998	0.7208
N2	K3	C	N3	K3	C	-0.6207	0.6340	-1.0170	1.0303
N2	K3	C	N3	K3	D	-2.1259	-0.8348	-2.5369	-0.4239
N2	K3	D	N3	K1	A	-0.4972	0.9775	-1.1634	1.6436
N2	K3	D	N3	K1	B	1.0745	2.3852	0.6668	2.7929
N2	K3	D	N3	K1	C	1.2232	2.5458	0.8013	2.9677
N2	K3	D	N3	K1	D	-0.6195	0.6878	-1.0203	1.0887
N2	K3	D	N3	K2	A	-0.4709	0.9385	-1.1074	1.5750
N2	K3	D	N3	K2	B	0.7804	2.1082	0.3718	2.5169
N2	K3	D	N3	K2	C	1.2207	2.5353	0.8158	2.9402
N2	K3	D	N3	K2	D	-0.7232	0.5648	-1.1485	0.9900
N2	K3	D	N3	K3	A	-0.1775	1.4174	-0.9188	2.1587
N2	K3	D	N3	K3	B	0.8177	2.1193	0.4103	2.5267
N2	K3	D	N3	K3	C	1.1303	2.3991	0.6875	2.8419
N2	K3	D	N3	K3	D	-0.3819	0.9372	-0.8034	1.3587
N3	K1	A	N3	K1	B	0.9442	2.0353	0.4210	2.5585
N3	K1	A	N3	K1	C	1.0934	2.1954	0.5649	2.7239
N3	K1	A	N3	K1	D	-0.7489	0.3369	-1.2696	0.8577
N3	K1	A	N3	K2	A	-0.5753	0.5628	-1.1205	1.1079
N3	K1	A	N3	K2	B	0.6427	1.7657	0.1047	2.3036
N3	K1	A	N3	K2	C	1.0785	2.1973	0.5425	2.7332
N3	K1	A	N3	K2	D	-0.8876	0.2490	-1.4322	0.7935
N3	K1	A	N3	K3	A	-0.2800	1.0397	-0.9126	1.6723
N3	K1	A	N3	K3	B	0.6656	1.7912	0.1264	2.3304
N3	K1	A	N3	K3	C	0.9457	2.1035	0.3910	2.6582
N3	K1	A	N3	K3	D	-0.5447	0.6197	-1.1025	1.1776
N3	K1	B	N3	K1	C	-0.1439	0.4532	-0.4303	0.7396

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
N3	K1	B	N3	K1	D	-1.6957	0.1458	2640	-11.63	<.0001	<.0001	0.05
N3	K1	B	N3	K2	A	-1.4960	0.2731	1004	-5.48	<.0001	<.0001	0.05
N3	K1	B	N3	K2	B	-0.2855	0.1647	197	-1.73	0.0846	0.9994	0.05
N3	K1	B	N3	K2	C	0.1481	0.1624	187.7	0.91	0.3628	1.0000	0.05
N3	K1	B	N3	K2	D	-1.8091	0.1690	215.5	-10.71	<.0001	<.0001	0.05
N3	K1	B	N3	K3	A	-1.1099	0.3340	1565	-3.32	0.0009	0.2352	0.05
N3	K1	B	N3	K3	B	-0.2613	0.1639	193	-1.59	0.1125	0.9999	0.05
N3	K1	B	N3	K3	C	0.03484	0.1772	249.2	0.20	0.8443	1.0000	0.05
N3	K1	B	N3	K3	D	-1.4522	0.1813	277.8	-8.01	<.0001	<.0001	0.05
N3	K1	C	N3	K1	D	-1.8503	0.1518	2641	-12.19	<.0001	<.0001	0.05
N3	K1	C	N3	K2	A	-1.6507	0.2763	980.8	-5.97	<.0001	<.0001	0.05
N3	K1	C	N3	K2	B	-0.4402	0.1698	203.7	-2.59	0.0102	0.7964	0.05
N3	K1	C	N3	K2	C	-0.00652	0.1645	182.1	-0.04	0.9684	1.0000	0.05
N3	K1	C	N3	K2	D	-1.9637	0.1726	217.2	-11.38	<.0001	<.0001	0.05
N3	K1	C	N3	K3	A	-1.2645	0.3356	1525	-3.77	0.0002	0.0642	0.05
N3	K1	C	N3	K3	B	-0.4160	0.1692	200.3	-2.46	0.0148	0.8757	0.05
N3	K1	C	N3	K3	C	-0.1198	0.1750	221.2	-0.68	0.4942	1.0000	0.05
N3	K1	C	N3	K3	D	-1.6068	0.1845	275.7	-8.71	<.0001	<.0001	0.05
N3	K1	D	N3	K2	A	0.1997	0.2711	1001	0.74	0.4616	1.0000	0.05
N3	K1	D	N3	K2	B	1.4102	0.1616	185.1	8.73	<.0001	<.0001	0.05
N3	K1	D	N3	K2	C	1.8438	0.1593	175.8	11.57	<.0001	<.0001	0.05
N3	K1	D	N3	K2	D	-0.1134	0.1613	182.1	-0.70	0.4831	1.0000	0.05
N3	K1	D	N3	K3	A	0.5858	0.3321	1562	1.76	0.0779	0.9991	0.05
N3	K1	D	N3	K3	B	1.4343	0.1613	183.4	8.89	<.0001	<.0001	0.05
N3	K1	D	N3	K3	C	1.7305	0.1740	234.4	9.94	<.0001	<.0001	0.05
N3	K1	D	N3	K3	D	0.2435	0.1723	230.3	1.41	0.1588	1.0000	0.05
N3	K2	A	N3	K2	B	1.2105	0.2623	2652	4.61	<.0001	0.0022	0.05
N3	K2	A	N3	K2	C	1.6442	0.2616	2657	6.28	<.0001	<.0001	0.05
N3	K2	A	N3	K2	D	-0.3131	0.2674	2646	-1.17	0.2418	1.0000	0.05
N3	K2	A	N3	K3	A	0.3861	0.2919	1190	1.32	0.1862	1.0000	0.05
N3	K2	A	N3	K3	B	1.2347	0.2729	1020	4.52	<.0001	0.0033	0.05
N3	K2	A	N3	K3	C	1.5309	0.2825	1061	5.42	<.0001	<.0001	0.05
N3	K2	A	N3	K3	D	0.04383	0.2829	1091	0.15	0.8769	1.0000	0.05
N3	K2	B	N3	K2	C	0.4337	0.1459	2633	2.97	0.0030	0.4920	0.05
N3	K2	B	N3	K2	D	-1.5235	0.1565	2650	-9.74	<.0001	<.0001	0.05
N3	K2	B	N3	K3	A	-0.8243	0.3335	1581	-2.47	0.0135	0.8687	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	*Potassium*	*HARVEST*	*Nitrogen*	*Potassium*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
N3	K1	B	N3	K1	D	-1.9816	-1.4098	-2.2559	-1.1355
N3	K1	B	N3	K2	A	-2.0319	-0.9602	-2.5450	-0.4470
N3	K1	B	N3	K2	B	-0.6104	0.03931	-0.9184	0.3473
N3	K1	B	N3	K2	C	-0.1722	0.4685	-0.4757	0.7720
N3	K1	B	N3	K2	D	-2.1422	-1.4760	-2.4583	-1.1599
N3	K1	B	N3	K3	A	-1.7651	-0.4547	-2.3931	0.1733
N3	K1	B	N3	K3	B	-0.5846	0.06195	-0.8911	0.3684
N3	K1	B	N3	K3	C	-0.3142	0.3838	-0.6459	0.7156
N3	K1	B	N3	K3	D	-1.8090	-1.0954	-2.1485	-0.7558
N3	K1	C	N3	K1	D	-2.1479	-1.5528	-2.4334	-1.2673
N3	K1	C	N3	K2	A	-2.1928	-1.1085	-2.7120	-0.5893
N3	K1	C	N3	K2	B	-0.7750	-0.1054	-1.0926	0.2122
N3	K1	C	N3	K2	C	-0.3311	0.3181	-0.6385	0.6255
N3	K1	C	N3	K2	D	-2.3039	-1.6236	-2.6267	-1.3007
N3	K1	C	N3	K3	A	-1.9228	-0.6062	-2.5538	0.02476
N3	K1	C	N3	K3	B	-0.7496	-0.08234	-1.0660	0.2341
N3	K1	C	N3	K3	C	-0.4646	0.2250	-0.7919	0.5523
N3	K1	C	N3	K3	D	-1.9701	-1.2436	-2.3157	-0.8980
N3	K1	D	N3	K2	A	-0.3324	0.7317	-0.8419	1.2413
N3	K1	D	N3	K2	B	1.0914	1.7289	0.7895	2.0308
N3	K1	D	N3	K2	C	1.5294	2.1582	1.2318	2.4559
N3	K1	D	N3	K2	D	-0.4317	0.2050	-0.7333	0.5065
N3	K1	D	N3	K3	A	-0.06558	1.2372	-0.6900	1.8616
N3	K1	D	N3	K3	B	1.1160	1.7527	0.8146	2.0541
N3	K1	D	N3	K3	C	1.3877	2.0734	1.0620	2.3990
N3	K1	D	N3	K3	D	-0.09591	0.5829	-0.4183	0.9053
N3	K2	A	N3	K2	B	0.6961	1.7248	0.2027	2.2182
N3	K2	A	N3	K2	C	1.1312	2.1571	0.6391	2.6492
N3	K2	A	N3	K2	D	-0.8374	0.2112	-1.3403	0.7142
N3	K2	A	N3	K3	A	-0.1866	0.9589	-0.7354	1.5077
N3	K2	A	N3	K3	B	0.6992	1.7701	0.1864	2.2830
N3	K2	A	N3	K3	C	0.9766	2.0851	0.4457	2.6160
N3	K2	A	N3	K3	D	-0.5113	0.5989	-1.0430	1.1306
N3	K2	B	N3	K2	C	0.1475	0.7198	-0.1270	0.9943
N3	K2	B	N3	K2	D	-1.8304	-1.2167	-2.1248	-0.9223
N3	K2	B	N3	K3	A	-1.4784	-0.1703	-2.1054	0.4567

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	*Potassium*	*HARVEST*	*Nitrogen*	*Potassium*	*HARVEST*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Adj P*	*Alpha*
N3	K2	B	N3	K3	B	0.02420	0.1640	194.8	0.15	0.8828	1.0000	0.05
N3	K2	B	N3	K3	C	0.3204	0.1785	257	1.79	0.0739	0.9987	0.05
N3	K2	B	N3	K3	D	-1.1667	0.1814	277.5	-6.43	<.0001	<.0001	0.05
N3	K2	C	N3	K2	D	-1.9572	0.1538	2649	-12.72	<.0001	<.0001	0.05
N3	K2	C	N3	K3	A	-1.2580	0.3332	1567	-3.78	0.0002	0.0625	0.05
N3	K2	C	N3	K3	B	-0.4095	0.1630	190.3	-2.51	0.0128	0.8464	0.05
N3	K2	C	N3	K3	C	-0.1133	0.1722	226.8	-0.66	0.5113	1.0000	0.05
N3	K2	C	N3	K3	D	-1.6003	0.1792	267.3	-8.93	<.0001	<.0001	0.05
N3	K2	D	N3	K3	A	0.6992	0.3349	1586	2.09	0.0370	0.9838	0.05
N3	K2	D	N3	K3	B	1.5477	0.1692	216	9.14	<.0001	<.0001	0.05
N3	K2	D	N3	K3	C	1.8439	0.1805	266.2	10.22	<.0001	<.0001	0.05
N3	K2	D	N3	K3	D	0.3569	0.1743	238	2.05	0.0417	0.9879	0.05
N3	K3	A	N3	K3	B	0.8485	0.3250	2647	2.61	0.0091	0.7837	0.05
N3	K3	A	N3	K3	C	1.1447	0.3308	2657	3.46	0.0005	0.1639	0.05
N3	K3	A	N3	K3	D	-0.3423	0.3379	2659	-1.01	0.3112	1.0000	0.05
N3	K3	B	N3	K3	C	0.2962	0.1621	2638	1.83	0.0677	0.9982	0.05
N3	K3	B	N3	K3	D	-1.1909	0.1696	2659	-7.02	<.0001	<.0001	0.05
N3	K3	C	N3	K3	D	-1.4870	0.1835	2649	-8.10	<.0001	<.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Nitrog*Potass*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Nitrogen	Potassium	HARVEST	Nitrogen	Potassium	HARVEST	Lower	Upper	Adj Lower	Adj Upper
N3	K2	B	N3	K3	B	-0.2992	0.3476	-0.6058	0.6542
N3	K2	B	N3	K3	C	-0.03117	0.6719	-0.3655	1.0062
N3	K2	B	N3	K3	D	-1.5237	-0.8096	-1.8635	-0.4698
N3	K2	C	N3	K2	D	-2.2589	-1.6555	-2.5483	-1.3662
N3	K2	C	N3	K3	A	-1.9115	-0.6045	-2.5379	0.02189
N3	K2	C	N3	K3	B	-0.7310	-0.08798	-1.0356	0.2167
N3	K2	C	N3	K3	C	-0.4526	0.2260	-0.7748	0.5483
N3	K2	C	N3	K3	D	-1.9532	-1.2475	-2.2888	-0.9118
N3	K2	D	N3	K3	A	0.04233	1.3561	-0.5874	1.9858
N3	K2	D	N3	K3	B	1.2142	1.8813	0.8975	2.1979
N3	K2	D	N3	K3	C	1.4886	2.1993	1.1506	2.5373
N3	K2	D	N3	K3	D	0.01355	0.7002	-0.3127	1.0264
N3	K3	A	N3	K3	B	0.2112	1.4859	-0.4002	2.0972
N3	K3	A	N3	K3	C	0.4961	1.7934	-0.1261	2.4156
N3	K3	A	N3	K3	D	-1.0049	0.3203	-1.6405	0.9559
N3	K3	B	N3	K3	C	-0.02161	0.6140	-0.3264	0.9188
N3	K3	B	N3	K3	D	-1.5235	-0.8583	-1.8425	-0.5392
N3	K3	C	N3	K3	D	-1.8468	-1.1272	-2.1920	-0.7821

*Conservative Tukey-Kramer Grouping for Nitrog*Potass*HARVES*
Least Squares Means (Alpha=0.05)

LS-means with the same letter are not significantly different.

Nitrogen	Potassium	HARVEST	Estimate		
N3	K2	D	4.9087		A
					A
N2	K2	D	4.8551		A
					A
N1	K3	D	4.8398		A
					A
N2	K3	D	4.8295		A
					A
N2	K1	A	4.8233	B	A
				B	A
N3	K1	D	4.7953	B	A
				B	A
N1	K1	A	4.7794	B	A
				B	A

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Conservative Tukey-Kramer Grouping for Nitrog*Potass*HARVES*
Least Squares Means (Alpha=0.05)

LS-means with the same letter are not significantly different.

Nitrogen	*Potassium*	*HARVEST*	*Estimate*						
N2	K1	D	4.7585		B		A		
					B		A		
N1	K1	D	4.7533		B		A		
					B		A		
N1	K2	A	4.6427		B		A		
					B		A		
N3	K2	A	4.5957		B		A		
					B		A		
N3	K1	A	4.5894		B		A		
					B		A		
N3	K3	D	4.5518		B		A		
					B		A		
N1	K2	D	4.5209		B		A		
					B		A		
N1	K3	A	4.4596		B		A	C	
					B		A	C	
N2	K3	A	4.4185		B	D	A	C	
					B	D	A	C	
N2	K2	A	4.4004	E	B	D	A	C	
				E	B	D	A	C	
N3	K3	A	4.2095	E	B	D	A	C	F
				E	B	D		C	F
N2	K2	B	3.5185	E	B	D		C	F
				E	B	D		C	F
N1	K3	B	3.4547	E	B	D		C	F
				E	B	D		C	F
N3	K2	B	3.3852	E	B	D		C	F
				E	B	D		C	F
N3	K3	B	3.3610	E	B	D		C	F
				E	B	D		C	F
N2	K3	B	3.3599	E	B	D		C	F
				E	B	D		C	F
N2	K2	C	3.3143	E	B	D		C	F
				E	B	D		C	F
N1	K1	B	3.1133	E	B	D		C	F

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Conservative Tukey-Kramer Grouping for Nitrog*Potass*HARVES Least Squares Means (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Nitrogen	*Potassium*	*HARVEST*	*Estimate*					
				E	B	D	C	F
N3	K1	B	3.0996	E	B	D	C	F
				E	B	D	C	F
N1	K2	B	3.0951	E	B	D	C	F
				E	B	D	C	F
N1	K2	C	3.0780	E	B	D	C	F
				E		D	C	F
N2	K3	C	3.0715	E		D	C	F
				E		D	C	F
N3	K3	C	3.0648	E		D	C	F
				E		D		F
N3	K2	C	2.9515	E		D		F
				E		D		F
N3	K1	C	2.9450	E		D		F
				E				F
N1	K3	C	2.9059	E				F
								F
N2	K1	C	2.8624					F
								F
N2	K1	B	2.8522					F
								F
N1	K1	C	2.7878					F

*Cultiv*Nitrog*HARVES Least Squares Means*

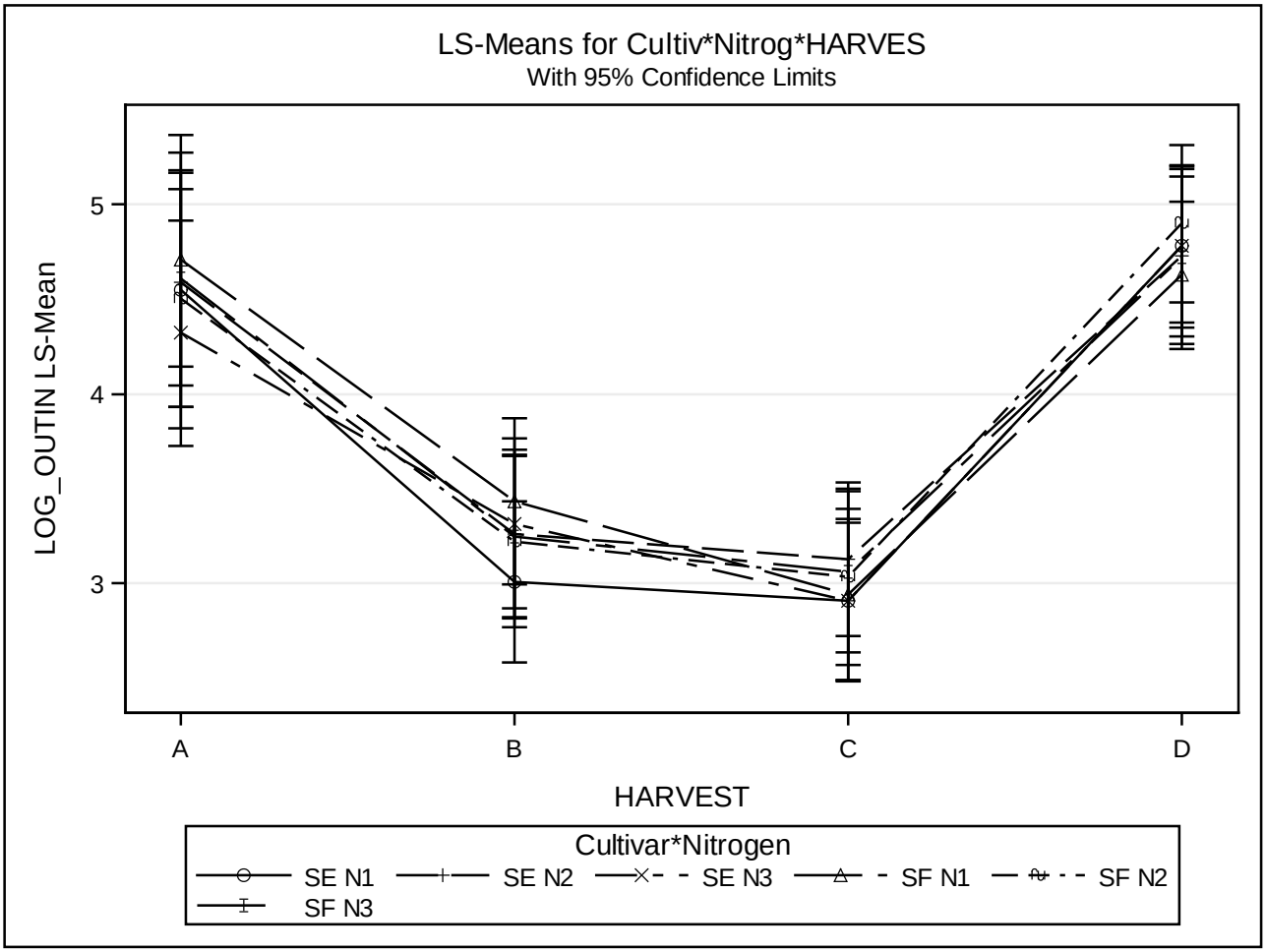
Cultivar	*Nitrogen*	*HARVEST*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Alpha*	*Lower*	*Upper*
SE	N1	A	4.5459	0.3136	300.2	14.49	<.0001	0.05	3.9287	5.1631
SE	N1	B	3.0091	0.1836	7.728	16.39	<.0001	0.05	2.5830	3.4352
SE	N1	C	2.9071	0.1778	7.62	16.35	<.0001	0.05	2.4935	3.3206
SE	N1	D	4.7833	0.1809	9.518	26.44	<.0001	0.05	4.3774	5.1891
SE	N2	A	4.5917	0.3942	582.7	11.65	<.0001	0.05	3.8175	5.3658
SE	N2	B	3.2649	0.1812	6.173	18.02	<.0001	0.05	2.8247	3.7052
SE	N2	C	3.1270	0.1813	9.698	17.24	<.0001	0.05	2.7212	3.5327
SE	N2	D	4.7309	0.1813	4.941	26.10	<.0001	0.05	4.2632	5.1986
SE	N3	A	4.3203	0.2992	157.4	14.44	<.0001	0.05	3.7294	4.9112
SE	N3	B	3.3167	0.1846	6.207	17.97	<.0001	0.05	2.8686	3.7649

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Cultiv*Nitrog*HARVES Least Squares Means*

Cultivar	*Nitrogen*	*HARVEST*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Alpha*	*Lower*	*Upper*
SE	N3	C	2.9113	0.1902	9.41	15.30	<.0001	0.05	2.4838	3.3388
SE	N3	D	4.7804	0.1825	7.356	26.19	<.0001	0.05	4.3530	5.2079
SF	N1	A	4.7086	0.2859	149.8	16.47	<.0001	0.05	4.1436	5.2736
SF	N1	B	3.4330	0.1761	5.554	19.50	<.0001	0.05	2.9935	3.8724
SF	N1	C	2.9408	0.1808	5.571	16.26	<.0001	0.05	2.4899	3.3917
SF	N1	D	4.6261	0.1826	16.15	25.34	<.0001	0.05	4.2394	5.0128
SF	N2	A	4.5032	0.2909	191.2	15.48	<.0001	0.05	3.9294	5.0769
SF	N2	B	3.2221	0.1804	5.457	17.86	<.0001	0.05	2.7699	3.6744
SF	N2	C	3.0385	0.1786	4.841	17.01	<.0001	0.05	2.5747	3.5023
SF	N2	D	4.8978	0.1978	18.9	24.76	<.0001	0.05	4.4836	5.3120
SF	N3	A	4.6094	0.2874	172.4	16.04	<.0001	0.05	4.0421	5.1767
SF	N3	B	3.2471	0.1784	6.306	18.20	<.0001	0.05	2.8156	3.6787
SF	N3	C	3.0629	0.1778	6.52	17.23	<.0001	0.05	2.6361	3.4896
SF	N3	D	4.7235	0.1896	10.39	24.92	<.0001	0.05	4.3033	5.1437



*Differences of Cultiv*Nitrog*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Cultivar	Nitrogen	HARVEST	Cultivar	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
SE	N1	A	SE	N1	B	1.5368	0.2899	2657	5.30	<.0001	<.0001	0.05
SE	N1	A	SE	N1	C	1.6388	0.2877	2658	5.70	<.0001	<.0001	0.05
SE	N1	A	SE	N1	D	-0.2374	0.2916	2658	-0.81	0.4157	1.0000	0.05
SE	N1	A	SE	N2	A	-0.04579	0.4081	89.39	-0.11	0.9109	1.0000	0.05
SE	N1	A	SE	N2	B	1.2809	0.3562	47.44	3.60	0.0008	0.0579	0.05
SE	N1	A	SE	N2	C	1.4189	0.3568	54.47	3.98	0.0002	0.0151	0.05
SE	N1	A	SE	N2	D	-0.1851	0.3562	44.93	-0.52	0.6059	1.0000	0.05
SE	N1	A	SE	N3	A	0.2256	0.4149	91.43	0.54	0.5879	1.0000	0.05
SE	N1	A	SE	N3	B	1.2291	0.3585	47.64	3.43	0.0013	0.0975	0.05
SE	N1	A	SE	N3	C	1.6346	0.3636	53.08	4.50	<.0001	0.0018	0.05
SE	N1	A	SE	N3	D	-0.2346	0.3564	50.45	-0.66	0.5135	1.0000	0.05
SE	N1	A	SF	N1	A	-0.1627	0.2826	1706	-0.58	0.5649	1.0000	0.05
SE	N1	A	SF	N1	B	1.1129	0.2914	1759	3.82	0.0001	0.0271	0.05
SE	N1	A	SF	N1	C	1.6051	0.2940	1699	5.46	<.0001	<.0001	0.05
SE	N1	A	SF	N1	D	-0.08024	0.2995	1724	-0.27	0.7888	1.0000	0.05
SE	N1	A	SF	N2	A	0.04272	0.4082	104.6	0.10	0.9169	1.0000	0.05
SE	N1	A	SF	N2	B	1.3237	0.3563	45.9	3.72	0.0005	0.0389	0.05
SE	N1	A	SF	N2	C	1.5074	0.3548	45.51	4.25	0.0001	0.0051	0.05
SE	N1	A	SF	N2	D	-0.3519	0.3665	57.77	-0.96	0.3409	1.0000	0.05
SE	N1	A	SF	N3	A	-0.06355	0.4749	206.5	-0.13	0.8937	1.0000	0.05
SE	N1	A	SF	N3	B	1.2987	0.3554	50.39	3.65	0.0006	0.0479	0.05
SE	N1	A	SF	N3	C	1.4830	0.3539	49.61	4.19	0.0001	0.0065	0.05
SE	N1	A	SF	N3	D	-0.1776	0.3638	53.56	-0.49	0.6273	1.0000	0.05
SE	N1	B	SE	N1	C	0.1020	0.1285	2648	0.79	0.4272	1.0000	0.05
SE	N1	B	SE	N1	D	-1.7742	0.1351	2660	-13.13	<.0001	<.0001	0.05
SE	N1	B	SE	N2	A	-1.5826	0.4301	109.5	-3.68	0.0004	0.0440	0.05
SE	N1	B	SE	N2	B	-0.2558	0.2462	2.779	-1.04	0.3806	1.0000	0.05
SE	N1	B	SE	N2	C	-0.1179	0.2486	3.874	-0.47	0.6610	1.0000	0.05
SE	N1	B	SE	N2	D	-1.7219	0.2472	2.622	-6.96	0.0093	<.0001	0.05
SE	N1	B	SE	N3	A	-1.3112	0.3465	29.6	-3.78	0.0007	0.0306	0.05
SE	N1	B	SE	N3	B	-0.3077	0.2510	2.722	-1.23	0.3157	0.9999	0.05
SE	N1	B	SE	N3	C	0.09777	0.2567	3.659	0.38	0.7244	1.0000	0.05
SE	N1	B	SE	N3	D	-1.7713	0.2505	3.149	-7.07	0.0050	<.0001	0.05
SE	N1	B	SF	N1	A	-1.6995	0.2623	1445	-6.48	<.0001	<.0001	0.05
SE	N1	B	SF	N1	B	-0.4239	0.1372	221.3	-3.09	0.0023	0.2402	0.05
SE	N1	B	SF	N1	C	0.06832	0.1385	220.9	0.49	0.6223	1.0000	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Cultiv*Nitrog*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Cultivar	*Nitrogen*	*HARVEST*	*Cultivar*	*Nitrogen*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
SE	N1	A	SE	N1	B	0.9683	2.1053	0.4812	2.5924
SE	N1	A	SE	N1	C	1.0746	2.2030	0.5911	2.6865
SE	N1	A	SE	N1	D	-0.8093	0.3345	-1.2993	0.8245
SE	N1	A	SE	N2	A	-0.8566	0.7651	-1.5318	1.4402
SE	N1	A	SE	N2	B	0.5646	1.9973	-0.01589	2.5778
SE	N1	A	SE	N2	C	0.7038	2.1341	0.1199	2.7180
SE	N1	A	SE	N2	D	-0.9025	0.5324	-1.4820	1.1119
SE	N1	A	SE	N3	A	-0.5984	1.0496	-1.2850	1.7362
SE	N1	A	SE	N3	B	0.5082	1.9500	-0.07615	2.5344
SE	N1	A	SE	N3	C	0.9053	2.3638	0.3107	2.9584
SE	N1	A	SE	N3	D	-0.9503	0.4812	-1.5324	1.0633
SE	N1	A	SF	N1	A	-0.7171	0.3916	-1.1919	0.8664
SE	N1	A	SF	N1	B	0.5414	1.6845	0.05187	2.1740
SE	N1	A	SF	N1	C	1.0284	2.1818	0.5345	2.6757
SE	N1	A	SF	N1	D	-0.6676	0.5072	-1.1707	1.0103
SE	N1	A	SF	N2	A	-0.7668	0.8522	-1.4437	1.5292
SE	N1	A	SF	N2	B	0.6066	2.0409	0.02648	2.6210
SE	N1	A	SF	N2	C	0.7929	2.2218	0.2153	2.7994
SE	N1	A	SF	N2	D	-1.0855	0.3817	-1.6862	0.9824
SE	N1	A	SF	N3	A	-0.9999	0.8727	-1.7928	1.6657
SE	N1	A	SF	N3	B	0.5850	2.0125	0.004596	2.5929
SE	N1	A	SF	N3	C	0.7720	2.1940	0.1943	2.7717
SE	N1	A	SF	N3	D	-0.9070	0.5518	-1.5021	1.1468
SE	N1	B	SE	N1	C	-0.1499	0.3540	-0.3658	0.5699
SE	N1	B	SE	N1	D	-2.0392	-1.5092	-2.2663	-1.2821
SE	N1	B	SE	N2	A	-2.4349	-0.7302	-3.1486	-0.01657
SE	N1	B	SE	N2	B	-1.0759	0.5642	-1.1524	0.6407
SE	N1	B	SE	N2	C	-0.8172	0.5815	-1.0232	0.7875
SE	N1	B	SE	N2	D	-2.5768	-0.8669	-2.6220	-0.8217
SE	N1	B	SE	N3	A	-2.0192	-0.6032	-2.5728	-0.04963
SE	N1	B	SE	N3	B	-1.1547	0.5394	-1.2215	0.6062
SE	N1	B	SE	N3	C	-0.6421	0.8376	-0.8371	1.0326
SE	N1	B	SE	N3	D	-2.5477	-0.9950	-2.6834	-0.8593
SE	N1	B	SF	N1	A	-2.2141	-1.1850	-2.6547	-0.7444
SE	N1	B	SF	N1	B	-0.6942	-0.1536	-0.9233	0.07554
SE	N1	B	SF	N1	C	-0.2046	0.3412	-0.4359	0.5725

*Differences of Cultiv*Nitrog*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Cultivar	Nitrogen	HARVEST	Cultivar	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
SE	N1	B	SF	N1	D	-1.6170	0.1538	316.6	-10.51	<.0001	<.0001	0.05
SE	N1	B	SF	N2	A	-1.4941	0.3366	34.54	-4.44	<.0001	0.0023	0.05
SE	N1	B	SF	N2	B	-0.2130	0.2475	2.754	-0.86	0.4578	1.0000	0.05
SE	N1	B	SF	N2	C	-0.02941	0.2456	2.589	-0.12	0.9133	1.0000	0.05
SE	N1	B	SF	N2	D	-1.8887	0.2629	5.649	-7.18	0.0005	<.0001	0.05
SE	N1	B	SF	N3	A	-1.6003	0.3357	30.1	-4.77	<.0001	0.0005	0.05
SE	N1	B	SF	N3	B	-0.2380	0.2485	2.969	-0.96	0.4095	1.0000	0.05
SE	N1	B	SF	N3	C	-0.05380	0.2482	2.973	-0.22	0.8424	1.0000	0.05
SE	N1	B	SF	N3	D	-1.7144	0.2581	3.899	-6.64	0.0029	<.0001	0.05
SE	N1	C	SE	N1	D	-1.8762	0.1332	2658	-14.09	<.0001	<.0001	0.05
SE	N1	C	SE	N2	A	-1.6846	0.4282	115	-3.93	0.0001	0.0177	0.05
SE	N1	C	SE	N2	B	-0.3579	0.2444	2.985	-1.46	0.2398	0.9990	0.05
SE	N1	C	SE	N2	C	-0.2199	0.2425	3.484	-0.91	0.4228	1.0000	0.05
SE	N1	C	SE	N2	D	-1.8239	0.2434	2.571	-7.49	0.0082	<.0001	0.05
SE	N1	C	SE	N3	A	-1.4132	0.3436	31.15	-4.11	0.0003	0.0089	0.05
SE	N1	C	SE	N3	B	-0.4097	0.2482	2.88	-1.65	0.2011	0.9946	0.05
SE	N1	C	SE	N3	C	-0.00427	0.2510	3.44	-0.02	0.9874	1.0000	0.05
SE	N1	C	SE	N3	D	-1.8734	0.2459	3.095	-7.62	0.0042	<.0001	0.05
SE	N1	C	SF	N1	A	-1.8016	0.2629	1437	-6.85	<.0001	<.0001	0.05
SE	N1	C	SF	N1	B	-0.5259	0.1337	195.2	-3.93	0.0001	0.0178	0.05
SE	N1	C	SF	N1	C	-0.03372	0.1332	187.7	-0.25	0.8004	1.0000	0.05
SE	N1	C	SF	N1	D	-1.7191	0.1502	284.3	-11.45	<.0001	<.0001	0.05
SE	N1	C	SF	N2	A	-1.5961	0.3338	35.87	-4.78	<.0001	0.0005	0.05
SE	N1	C	SF	N2	B	-0.3151	0.2438	2.725	-1.29	0.2950	0.9999	0.05
SE	N1	C	SF	N2	C	-0.1315	0.2420	2.572	-0.54	0.6305	1.0000	0.05
SE	N1	C	SF	N2	D	-1.9908	0.2594	5.718	-7.67	0.0003	<.0001	0.05
SE	N1	C	SF	N3	A	-1.7024	0.3325	31.57	-5.12	<.0001	<.0001	0.05
SE	N1	C	SF	N3	B	-0.3401	0.2438	2.889	-1.40	0.2606	0.9995	0.05
SE	N1	C	SF	N3	C	-0.1558	0.2447	3.053	-0.64	0.5687	1.0000	0.05
SE	N1	C	SF	N3	D	-1.8165	0.2535	3.862	-7.16	0.0023	<.0001	0.05
SE	N1	D	SE	N2	A	0.1916	0.4286	116.3	0.45	0.6557	1.0000	0.05
SE	N1	D	SE	N2	B	1.5183	0.2464	3.289	6.16	0.0065	<.0001	0.05
SE	N1	D	SE	N2	C	1.6563	0.2466	4.176	6.72	0.0022	<.0001	0.05
SE	N1	D	SE	N2	D	0.05234	0.2464	2.968	0.21	0.8455	1.0000	0.05
SE	N1	D	SE	N3	A	0.4630	0.3440	31.91	1.35	0.1878	0.9997	0.05
SE	N1	D	SE	N3	B	1.4665	0.2503	3.262	5.86	0.0078	<.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Cultiv*Nitrog*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Cultivar	*Nitrogen*	*HARVEST*	*Cultivar*	*Nitrogen*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
SE	N1	B	SF	N1	D	-1.9196	-1.3144	-2.1770	-1.0570
SE	N1	B	SF	N2	A	-2.1777	-0.8104	-2.7197	-0.2685
SE	N1	B	SF	N2	B	-1.0421	0.6160	-1.1143	0.6882
SE	N1	B	SF	N2	C	-0.8861	0.8272	-0.9235	0.8647
SE	N1	B	SF	N2	D	-2.5417	-1.2357	-2.8459	-0.9315
SE	N1	B	SF	N3	A	-2.2858	-0.9148	-2.8227	-0.3780
SE	N1	B	SF	N3	B	-1.0337	0.5576	-1.1430	0.6670
SE	N1	B	SF	N3	C	-0.8479	0.7403	-0.9577	0.8501
SE	N1	B	SF	N3	D	-2.4383	-0.9905	-2.6541	-0.7748
SE	N1	C	SE	N1	D	-2.1373	-1.6151	-2.3611	-1.3914
SE	N1	C	SE	N2	A	-2.5328	-0.8365	-3.2437	-0.1255
SE	N1	C	SE	N2	B	-1.1379	0.4221	-1.2478	0.5320
SE	N1	C	SE	N2	C	-0.9343	0.4945	-1.1028	0.6630
SE	N1	C	SE	N2	D	-2.6771	-0.9706	-2.7103	-0.9375
SE	N1	C	SE	N3	A	-2.1140	-0.7125	-2.6645	-0.1620
SE	N1	C	SE	N3	B	-1.2183	0.3989	-1.3133	0.4939
SE	N1	C	SE	N3	C	-0.7484	0.7399	-0.9183	0.9098
SE	N1	C	SE	N3	D	-2.6426	-1.1042	-2.7689	-0.9779
SE	N1	C	SF	N1	A	-2.3173	-1.2858	-2.7588	-0.8443
SE	N1	C	SF	N1	B	-0.7896	-0.2622	-1.0127	-0.03905
SE	N1	C	SF	N1	C	-0.2965	0.2291	-0.5188	0.4513
SE	N1	C	SF	N1	D	-2.0147	-1.4234	-2.2659	-1.1722
SE	N1	C	SF	N2	A	-2.2731	-0.9191	-2.8114	-0.3808
SE	N1	C	SF	N2	B	-1.1374	0.5072	-1.2030	0.5728
SE	N1	C	SF	N2	C	-0.9795	0.7166	-1.0127	0.7498
SE	N1	C	SF	N2	D	-2.6332	-1.3483	-2.9353	-1.0462
SE	N1	C	SF	N3	A	-2.3801	-1.0247	-2.9132	-0.4915
SE	N1	C	SF	N3	B	-1.1330	0.4528	-1.2277	0.5476
SE	N1	C	SF	N3	C	-0.9269	0.6152	-1.0467	0.7350
SE	N1	C	SF	N3	D	-2.5304	-1.1025	-2.7396	-0.8933
SE	N1	D	SE	N2	A	-0.6573	1.0405	-1.3690	1.7523
SE	N1	D	SE	N2	B	0.7717	2.2650	0.6212	2.4155
SE	N1	D	SE	N2	C	0.9828	2.3298	0.7583	2.5543
SE	N1	D	SE	N2	D	-0.7366	0.8412	-0.8448	0.9495
SE	N1	D	SE	N3	A	-0.2377	1.1637	-0.7894	1.7154
SE	N1	D	SE	N3	B	0.7051	2.2280	0.5552	2.3779

*Differences of Cultiv*Nitrog*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Cultivar	Nitrogen	HARVEST	Cultivar	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
SE	N1	D	SE	N3	C	1.8720	0.2542	4.034	7.36	0.0018	<.0001	0.05
SE	N1	D	SE	N3	D	0.002854	0.2488	3.617	0.01	0.9915	1.0000	0.05
SE	N1	D	SF	N1	A	0.07468	0.2620	1402	0.29	0.7757	1.0000	0.05
SE	N1	D	SF	N1	B	1.3503	0.1383	211.1	9.76	<.0001	<.0001	0.05
SE	N1	D	SF	N1	C	1.8425	0.1403	215.9	13.13	<.0001	<.0001	0.05
SE	N1	D	SF	N1	D	0.1572	0.1588	328.8	0.99	0.3229	1.0000	0.05
SE	N1	D	SF	N2	A	0.2801	0.3359	37.49	0.83	0.4096	1.0000	0.05
SE	N1	D	SF	N2	B	1.5611	0.2462	3.052	6.34	0.0075	<.0001	0.05
SE	N1	D	SF	N2	C	1.7448	0.2448	2.949	7.13	0.0060	<.0001	0.05
SE	N1	D	SF	N2	D	-0.1145	0.2617	6.244	-0.44	0.6764	1.0000	0.05
SE	N1	D	SF	N3	A	0.1739	0.3340	33.04	0.52	0.6061	1.0000	0.05
SE	N1	D	SF	N3	B	1.5361	0.2463	3.331	6.24	0.0061	<.0001	0.05
SE	N1	D	SF	N3	C	1.7204	0.2462	3.379	6.99	0.0040	<.0001	0.05
SE	N1	D	SF	N3	D	0.05978	0.2565	4.459	0.23	0.8260	1.0000	0.05
SE	N2	A	SE	N2	B	1.3267	0.3688	2651	3.60	0.0003	0.0577	0.05
SE	N2	A	SE	N2	C	1.4647	0.3700	2651	3.96	<.0001	0.0162	0.05
SE	N2	A	SE	N2	D	-0.1393	0.3697	2651	-0.38	0.7064	1.0000	0.05
SE	N2	A	SE	N3	A	0.2714	0.4396	122.5	0.62	0.5381	1.0000	0.05
SE	N2	A	SE	N3	B	1.2749	0.4302	108.4	2.96	0.0037	0.3187	0.05
SE	N2	A	SE	N3	C	1.6803	0.4348	115.7	3.86	0.0002	0.0230	0.05
SE	N2	A	SE	N3	D	-0.1888	0.4281	112.8	-0.44	0.6601	1.0000	0.05
SE	N2	A	SF	N1	A	-0.1169	0.5082	220.7	-0.23	0.8182	1.0000	0.05
SE	N2	A	SF	N1	B	1.1587	0.4270	107.8	2.71	0.0078	0.5057	0.05
SE	N2	A	SF	N1	C	1.6509	0.4279	103.1	3.86	0.0002	0.0235	0.05
SE	N2	A	SF	N1	D	-0.03446	0.4304	132.2	-0.08	0.9363	1.0000	0.05
SE	N2	A	SF	N2	A	0.08850	0.2966	1822	0.30	0.7655	1.0000	0.05
SE	N2	A	SF	N2	B	1.3695	0.3750	2277	3.65	0.0003	0.0482	0.05
SE	N2	A	SF	N2	C	1.5532	0.3737	2263	4.16	<.0001	0.0075	0.05
SE	N2	A	SF	N2	D	-0.3061	0.3804	2307	-0.80	0.4210	1.0000	0.05
SE	N2	A	SF	N3	A	-0.01777	0.5316	322	-0.03	0.9734	1.0000	0.05
SE	N2	A	SF	N3	B	1.3445	0.4273	114.1	3.15	0.0021	0.2099	0.05
SE	N2	A	SF	N3	C	1.5288	0.4253	113.7	3.59	0.0005	0.0583	0.05
SE	N2	A	SF	N3	D	-0.1318	0.4336	118.2	-0.30	0.7616	1.0000	0.05
SE	N2	B	SE	N2	C	0.1380	0.1293	2658	1.07	0.2859	1.0000	0.05
SE	N2	B	SE	N2	D	-1.4660	0.1199	2657	-12.23	<.0001	<.0001	0.05
SE	N2	B	SE	N3	A	-1.0554	0.3412	31.11	-3.09	0.0042	0.2385	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Cultiv*Nitrog*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Cultivar	*Nitrogen*	*HARVEST*	*Cultivar*	*Nitrogen*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
SE	N1	D	SE	N3	C	1.1685	2.5754	0.9463	2.7976
SE	N1	D	SE	N3	D	-0.7178	0.7235	-0.9032	0.9089
SE	N1	D	SF	N1	A	-0.4393	0.5886	-0.8793	1.0286
SE	N1	D	SF	N1	B	1.0777	1.6230	0.8467	1.8540
SE	N1	D	SF	N1	C	1.5659	2.1191	1.3315	2.3535
SE	N1	D	SF	N1	D	-0.1551	0.4695	-0.4209	0.7352
SE	N1	D	SF	N2	A	-0.4002	0.9604	-0.9430	1.5032
SE	N1	D	SF	N2	B	0.7853	2.3370	0.6648	2.4575
SE	N1	D	SF	N2	C	0.9581	2.5315	0.8534	2.6361
SE	N1	D	SF	N2	D	-0.7489	0.5199	-1.0675	0.8385
SE	N1	D	SF	N3	A	-0.5056	0.8533	-1.0422	1.3899
SE	N1	D	SF	N3	B	0.7947	2.2776	0.6395	2.4328
SE	N1	D	SF	N3	C	0.9842	2.4566	0.8238	2.6170
SE	N1	D	SF	N3	D	-0.6243	0.7439	-0.8741	0.9936
SE	N2	A	SE	N2	B	0.6036	2.0499	-0.01613	2.6696
SE	N2	A	SE	N2	C	0.7391	2.1903	0.1174	2.8120
SE	N2	A	SE	N2	D	-0.8643	0.5857	-1.4856	1.2070
SE	N2	A	SE	N3	A	-0.5987	1.1415	-1.3291	1.8719
SE	N2	A	SE	N3	B	0.4222	2.1276	-0.2915	2.8413
SE	N2	A	SE	N3	C	0.8192	2.5415	0.09719	3.2635
SE	N2	A	SE	N3	D	-1.0369	0.6593	-1.7474	1.3699
SE	N2	A	SF	N1	A	-1.1184	0.8845	-1.9672	1.7333
SE	N2	A	SF	N1	B	0.3122	2.0052	-0.3962	2.7136
SE	N2	A	SF	N1	C	0.8023	2.4995	0.09288	3.2089
SE	N2	A	SF	N1	D	-0.8858	0.8169	-1.6016	1.5327
SE	N2	A	SF	N2	A	-0.4933	0.6703	-0.9916	1.1686
SE	N2	A	SF	N2	B	0.6342	2.1049	0.004102	2.7349
SE	N2	A	SF	N2	C	0.8204	2.2859	0.1925	2.9138
SE	N2	A	SF	N2	D	-1.0520	0.4397	-1.6911	1.0788
SE	N2	A	SF	N3	A	-1.0636	1.0280	-1.9533	1.9178
SE	N2	A	SF	N3	B	0.4980	2.1910	-0.2114	2.9004
SE	N2	A	SF	N3	C	0.6862	2.3714	-0.01993	3.0775
SE	N2	A	SF	N3	D	-0.9905	0.7268	-1.7106	1.4469
SE	N2	B	SE	N2	C	-0.1155	0.3915	-0.3327	0.6087
SE	N2	B	SE	N2	D	-1.7011	-1.2309	-1.9025	-1.0295
SE	N2	B	SE	N3	A	-1.7511	-0.3596	-2.2976	0.1869

*Differences of Cultiv*Nitrog*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Cultivar	Nitrogen	HARVEST	Cultivar	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
SE	N2	B	SE	N3	B	-0.05180	0.2486	2.41	-0.21	0.8512	1.0000	0.05
SE	N2	B	SE	N3	C	0.3536	0.2552	3.314	1.39	0.2518	0.9996	0.05
SE	N2	B	SE	N3	D	-1.5155	0.2483	2.768	-6.10	0.0111	<.0001	0.05
SE	N2	B	SF	N1	A	-1.4437	0.3321	26.62	-4.35	0.0002	0.0034	0.05
SE	N2	B	SF	N1	B	-0.1680	0.2423	2.421	-0.69	0.5487	1.0000	0.05
SE	N2	B	SF	N1	C	0.3242	0.2454	2.466	1.32	0.2957	0.9998	0.05
SE	N2	B	SF	N1	D	-1.3612	0.2490	4.552	-5.47	0.0037	<.0001	0.05
SE	N2	B	SF	N2	A	-1.2382	0.2679	1516	-4.62	<.0001	0.0010	0.05
SE	N2	B	SF	N2	B	0.04280	0.1313	179.3	0.33	0.7449	1.0000	0.05
SE	N2	B	SF	N2	C	0.2264	0.1315	177.8	1.72	0.0867	0.9905	0.05
SE	N2	B	SF	N2	D	-1.6329	0.1603	369	-10.18	<.0001	<.0001	0.05
SE	N2	B	SF	N3	A	-1.3445	0.3314	30.57	-4.06	0.0003	0.0111	0.05
SE	N2	B	SF	N3	B	0.01780	0.2461	2.613	0.07	0.9475	1.0000	0.05
SE	N2	B	SF	N3	C	0.2020	0.2451	2.607	0.82	0.4784	1.0000	0.05
SE	N2	B	SF	N3	D	-1.4586	0.2550	3.532	-5.72	0.0067	<.0001	0.05
SE	N2	C	SE	N2	D	-1.6040	0.1283	2653	-12.50	<.0001	<.0001	0.05
SE	N2	C	SE	N3	A	-1.1933	0.3412	35.62	-3.50	0.0013	0.0791	0.05
SE	N2	C	SE	N3	B	-0.1898	0.2505	3.355	-0.76	0.4983	1.0000	0.05
SE	N2	C	SE	N3	C	0.2156	0.2532	3.858	0.85	0.4440	1.0000	0.05
SE	N2	C	SE	N3	D	-1.6535	0.2483	3.536	-6.66	0.0040	<.0001	0.05
SE	N2	C	SF	N1	A	-1.5817	0.3326	30.75	-4.76	<.0001	0.0005	0.05
SE	N2	C	SF	N1	B	-0.3060	0.2430	3.184	-1.26	0.2923	0.9999	0.05
SE	N2	C	SF	N1	C	0.1862	0.2461	3.223	0.76	0.5008	1.0000	0.05
SE	N2	C	SF	N1	D	-1.4992	0.2494	5.741	-6.01	0.0011	<.0001	0.05
SE	N2	C	SF	N2	A	-1.3762	0.2708	1540	-5.08	<.0001	0.0001	0.05
SE	N2	C	SF	N2	B	-0.09519	0.1421	240.5	-0.67	0.5035	1.0000	0.05
SE	N2	C	SF	N2	C	0.08845	0.1383	215.4	0.64	0.5231	1.0000	0.05
SE	N2	C	SF	N2	D	-1.7708	0.1650	398.6	-10.73	<.0001	<.0001	0.05
SE	N2	C	SF	N3	A	-1.4825	0.3315	35.34	-4.47	<.0001	0.0020	0.05
SE	N2	C	SF	N3	B	-0.1202	0.2459	3.337	-0.49	0.6554	1.0000	0.05
SE	N2	C	SF	N3	C	0.06406	0.2462	3.524	0.26	0.8092	1.0000	0.05
SE	N2	C	SF	N3	D	-1.5966	0.2549	4.43	-6.26	0.0023	<.0001	0.05
SE	N2	D	SE	N3	A	0.4106	0.3407	29.21	1.21	0.2378	1.0000	0.05
SE	N2	D	SE	N3	B	1.4142	0.2494	2.253	5.67	0.0225	<.0001	0.05
SE	N2	D	SE	N3	C	1.8196	0.2542	2.88	7.16	0.0064	<.0001	0.05
SE	N2	D	SE	N3	D	-0.04949	0.2479	2.436	-0.20	0.8572	1.0000	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Cultiv*Nitrog*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Cultivar	*Nitrogen*	*HARVEST*	*Cultivar*	*Nitrogen*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
SE	N2	B	SE	N3	B	-0.9646	0.8610	-0.9569	0.8533
SE	N2	B	SE	N3	C	-0.4168	1.1240	-0.5756	1.2829
SE	N2	B	SE	N3	D	-2.3446	-0.6864	-2.4197	-0.6113
SE	N2	B	SF	N1	A	-2.1256	-0.7617	-2.6531	-0.2343
SE	N2	B	SF	N1	B	-1.0550	0.7189	-1.0504	0.7144
SE	N2	B	SF	N1	C	-0.5618	1.2101	-0.5693	1.2176
SE	N2	B	SF	N1	D	-2.0207	-0.7016	-2.2679	-0.4545
SE	N2	B	SF	N2	A	-1.7638	-0.7126	-2.2138	-0.2626
SE	N2	B	SF	N2	B	-0.2163	0.3019	-0.4353	0.5209
SE	N2	B	SF	N2	C	-0.03299	0.4859	-0.2522	0.7051
SE	N2	B	SF	N2	D	-1.9481	-1.3176	-2.2166	-1.0491
SE	N2	B	SF	N3	A	-2.0207	-0.6683	-2.5511	-0.1379
SE	N2	B	SF	N3	B	-0.8352	0.8708	-0.8783	0.9139
SE	N2	B	SF	N3	C	-0.6489	1.0530	-0.6905	1.0946
SE	N2	B	SF	N3	D	-2.2050	-0.7122	-2.3869	-0.5302
SE	N2	C	SE	N2	D	-1.8556	-1.3524	-2.0712	-1.1368
SE	N2	C	SE	N3	A	-1.8855	-0.5012	-2.4355	0.04886
SE	N2	C	SE	N3	B	-0.9411	0.5616	-1.1017	0.7221
SE	N2	C	SE	N3	C	-0.4977	0.9290	-0.7063	1.1376
SE	N2	C	SE	N3	D	-2.3801	-0.9269	-2.5576	-0.7494
SE	N2	C	SF	N1	A	-2.2602	-0.9031	-2.7927	-0.3706
SE	N2	C	SF	N1	B	-1.0546	0.4426	-1.1908	0.5788
SE	N2	C	SF	N1	C	-0.5671	0.9395	-0.7098	1.0821
SE	N2	C	SF	N1	D	-2.1161	-0.8822	-2.4072	-0.5911
SE	N2	C	SF	N2	A	-1.9073	-0.8451	-2.3621	-0.3903
SE	N2	C	SF	N2	B	-0.3751	0.1847	-0.6125	0.4221
SE	N2	C	SF	N2	C	-0.1841	0.3610	-0.4151	0.5920
SE	N2	C	SF	N2	D	-2.0952	-1.4465	-2.3716	-1.1701
SE	N2	C	SF	N3	A	-2.1552	-0.8097	-2.6895	-0.2754
SE	N2	C	SF	N3	B	-0.8599	0.6196	-1.0156	0.7752
SE	N2	C	SF	N3	C	-0.6576	0.7858	-0.8325	0.9607
SE	N2	C	SF	N3	D	-2.2780	-0.9151	-2.5247	-0.6685
SE	N2	D	SE	N3	A	-0.2860	1.1073	-0.8301	1.6514
SE	N2	D	SE	N3	B	0.4488	2.3796	0.5061	2.3223
SE	N2	D	SE	N3	C	0.9911	2.6481	0.8940	2.7453
SE	N2	D	SE	N3	D	-0.9523	0.8533	-0.9520	0.8530

*Differences of Cultiv*Nitrog*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Cultivar	Nitrogen	HARVEST	Cultivar	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
SE	N2	D	SF	N1	A	0.02233	0.3325	25.26	0.07	0.9470	1.0000	0.05
SE	N2	D	SF	N1	B	1.2980	0.2422	2.157	5.36	0.0280	<.0001	0.05
SE	N2	D	SF	N1	C	1.7902	0.2450	2.177	7.31	0.0144	<.0001	0.05
SE	N2	D	SF	N1	D	0.1048	0.2487	4.08	0.42	0.6947	1.0000	0.05
SE	N2	D	SF	N2	A	0.2278	0.2662	1495	0.86	0.3923	1.0000	0.05
SE	N2	D	SF	N2	B	1.5088	0.1300	175.3	11.60	<.0001	<.0001	0.05
SE	N2	D	SF	N2	C	1.6924	0.1276	160.3	13.27	<.0001	<.0001	0.05
SE	N2	D	SF	N2	D	-0.1669	0.1576	343.9	-1.06	0.2904	1.0000	0.05
SE	N2	D	SF	N3	A	0.1215	0.3312	28.76	0.37	0.7164	1.0000	0.05
SE	N2	D	SF	N3	B	1.4838	0.2454	2.263	6.05	0.0194	<.0001	0.05
SE	N2	D	SF	N3	C	1.6680	0.2451	2.33	6.81	0.0138	<.0001	0.05
SE	N2	D	SF	N3	D	0.007432	0.2549	3.2	0.03	0.9785	1.0000	0.05
SE	N3	A	SE	N3	B	1.0035	0.2639	2654	3.80	0.0001	0.0287	0.05
SE	N3	A	SE	N3	C	1.4090	0.2678	2660	5.26	<.0001	<.0001	0.05
SE	N3	A	SE	N3	D	-0.4601	0.2667	2653	-1.73	0.0845	0.9903	0.05
SE	N3	A	SF	N1	A	-0.3883	0.4469	114.5	-0.87	0.3868	1.0000	0.05
SE	N3	A	SF	N1	B	0.8873	0.3424	28.68	2.59	0.0149	0.6038	0.05
SE	N3	A	SF	N1	C	1.3795	0.3432	26.69	4.02	0.0004	0.0128	0.05
SE	N3	A	SF	N1	D	-0.3058	0.3464	38.23	-0.88	0.3828	1.0000	0.05
SE	N3	A	SF	N2	A	-0.1829	0.4182	102	-0.44	0.6629	1.0000	0.05
SE	N3	A	SF	N2	B	1.0982	0.3406	30.32	3.22	0.0030	0.1723	0.05
SE	N3	A	SF	N2	C	1.2818	0.3394	29.69	3.78	0.0007	0.0315	0.05
SE	N3	A	SF	N2	D	-0.5775	0.3497	40.64	-1.65	0.1063	0.9945	0.05
SE	N3	A	SF	N3	A	-0.2891	0.2621	1484	-1.10	0.2702	1.0000	0.05
SE	N3	A	SF	N3	B	1.0732	0.2693	1574	3.99	<.0001	0.0146	0.05
SE	N3	A	SF	N3	C	1.2574	0.2701	1549	4.65	<.0001	0.0009	0.05
SE	N3	A	SF	N3	D	-0.4032	0.2751	1615	-1.47	0.1430	0.9990	0.05
SE	N3	B	SE	N3	C	0.4054	0.1335	2658	3.04	0.0024	0.2717	0.05
SE	N3	B	SE	N3	D	-1.4637	0.1277	2636	-11.46	<.0001	<.0001	0.05
SE	N3	B	SF	N1	A	-1.3919	0.3342	26.27	-4.17	0.0003	0.0072	0.05
SE	N3	B	SF	N1	B	-0.1162	0.2464	2.383	-0.47	0.6770	1.0000	0.05
SE	N3	B	SF	N1	C	0.3760	0.2501	2.411	1.50	0.2509	0.9986	0.05
SE	N3	B	SF	N1	D	-1.3094	0.2525	4.507	-5.19	0.0047	<.0001	0.05
SE	N3	B	SF	N2	A	-1.1864	0.3380	31.33	-3.51	0.0014	0.0762	0.05
SE	N3	B	SF	N2	B	0.09460	0.2490	2.387	0.38	0.7352	1.0000	0.05
SE	N3	B	SF	N2	C	0.2782	0.2476	2.229	1.12	0.3674	1.0000	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Cultiv*Nitrog*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Cultivar	*Nitrogen*	*HARVEST*	*Cultivar*	*Nitrogen*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
SE	N2	D	SF	N1	A	-0.6620	0.7067	-1.1882	1.2328
SE	N2	D	SF	N1	B	0.3252	2.2708	0.4160	2.1800
SE	N2	D	SF	N1	C	0.8140	2.7664	0.8981	2.6822
SE	N2	D	SF	N1	D	-0.5804	0.7900	-0.8007	1.0104
SE	N2	D	SF	N2	A	-0.2944	0.7499	-0.7415	1.1970
SE	N2	D	SF	N2	B	1.2522	1.7654	1.0353	1.9823
SE	N2	D	SF	N2	C	1.4405	1.9443	1.2280	2.1569
SE	N2	D	SF	N2	D	-0.4768	0.1431	-0.7406	0.4069
SE	N2	D	SF	N3	A	-0.5562	0.7992	-1.0846	1.3276
SE	N2	D	SF	N3	B	0.5374	2.4303	0.5904	2.3772
SE	N2	D	SF	N3	C	0.7446	2.5915	0.7757	2.5604
SE	N2	D	SF	N3	D	-0.7759	0.7908	-0.9208	0.9357
SE	N3	A	SE	N3	B	0.4861	1.5210	0.04271	1.9644
SE	N3	A	SE	N3	C	0.8839	1.9340	0.4340	2.3840
SE	N3	A	SE	N3	D	-0.9830	0.06275	-1.4311	0.5108
SE	N3	A	SF	N1	A	-1.2737	0.4970	-2.0157	1.2391
SE	N3	A	SF	N1	B	0.1868	1.5879	-0.3593	2.1340
SE	N3	A	SF	N1	C	0.6750	2.0840	0.1300	2.6290
SE	N3	A	SF	N1	D	-1.0069	0.3953	-1.5671	0.9554
SE	N3	A	SF	N2	A	-1.0124	0.6467	-1.7057	1.3400
SE	N3	A	SF	N2	B	0.4029	1.7934	-0.1419	2.3382
SE	N3	A	SF	N2	C	0.5883	1.9753	0.04595	2.5176
SE	N3	A	SF	N2	D	-1.2838	0.1288	-1.8506	0.6956
SE	N3	A	SF	N3	A	-0.8033	0.2250	-1.2436	0.6653
SE	N3	A	SF	N3	B	0.5449	1.6014	0.09262	2.0537
SE	N3	A	SF	N3	C	0.7275	1.7873	0.2738	2.2410
SE	N3	A	SF	N3	D	-0.9429	0.1365	-1.4051	0.5986
SE	N3	B	SE	N3	C	0.1437	0.6672	-0.08066	0.8915
SE	N3	B	SE	N3	D	-1.7142	-1.2132	-1.9288	-0.9986
SE	N3	B	SF	N1	A	-2.0784	-0.7053	-2.6086	-0.1751
SE	N3	B	SF	N1	B	-1.0289	0.7965	-1.0135	0.7811
SE	N3	B	SF	N1	C	-0.5422	1.2942	-0.5348	1.2868
SE	N3	B	SF	N1	D	-1.9803	-0.6384	-2.2286	-0.3901
SE	N3	B	SF	N2	A	-1.8755	-0.4973	-2.4172	0.04434
SE	N3	B	SF	N2	B	-0.8265	1.0157	-0.8120	1.0012
SE	N3	B	SF	N2	C	-0.6887	1.2452	-0.6231	1.1796

*Differences of Cultiv*Nitrog*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Cultivar	Nitrogen	HARVEST	Cultivar	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
SE	N3	B	SF	N2	D	-1.5811	0.2628	5.252	-6.02	0.0015	<.0001	0.05
SE	N3	B	SF	N3	A	-1.2927	0.2621	1503	-4.93	<.0001	0.0002	0.05
SE	N3	B	SF	N3	B	0.06961	0.1357	205.7	0.51	0.6084	1.0000	0.05
SE	N3	B	SF	N3	C	0.2539	0.1360	203.3	1.87	0.0635	0.9749	0.05
SE	N3	B	SF	N3	D	-1.4068	0.1472	273.4	-9.56	<.0001	<.0001	0.05
SE	N3	C	SE	N3	D	-1.8691	0.1384	2657	-13.50	<.0001	<.0001	0.05
SE	N3	C	SF	N1	A	-1.7973	0.3378	28.99	-5.32	<.0001	<.0001	0.05
SE	N3	C	SF	N1	B	-0.5216	0.2513	3.131	-2.08	0.1257	0.9230	0.05
SE	N3	C	SF	N1	C	-0.02945	0.2555	3.219	-0.12	0.9150	1.0000	0.05
SE	N3	C	SF	N1	D	-1.7148	0.2571	5.618	-6.67	0.0007	<.0001	0.05
SE	N3	C	SF	N2	A	-1.5918	0.3421	34.23	-4.65	<.0001	0.0009	0.05
SE	N3	C	SF	N2	B	-0.3108	0.2539	3.053	-1.22	0.3069	0.9999	0.05
SE	N3	C	SF	N2	C	-0.1272	0.2530	2.94	-0.50	0.6504	1.0000	0.05
SE	N3	C	SF	N2	D	-1.9865	0.2677	6.331	-7.42	0.0002	<.0001	0.05
SE	N3	C	SF	N3	A	-1.6981	0.2675	1495	-6.35	<.0001	<.0001	0.05
SE	N3	C	SF	N3	B	-0.3358	0.1449	243.2	-2.32	0.0213	0.8049	0.05
SE	N3	C	SF	N3	C	-0.1516	0.1402	215.4	-1.08	0.2809	1.0000	0.05
SE	N3	C	SF	N3	D	-1.8122	0.1547	315.4	-11.71	<.0001	<.0001	0.05
SE	N3	D	SF	N1	A	0.07182	0.3344	29.01	0.21	0.8314	1.0000	0.05
SE	N3	D	SF	N1	B	1.3475	0.2450	2.656	5.50	0.0162	<.0001	0.05
SE	N3	D	SF	N1	C	1.8397	0.2486	2.666	7.40	0.0075	<.0001	0.05
SE	N3	D	SF	N1	D	0.1543	0.2524	5.241	0.61	0.5664	1.0000	0.05
SE	N3	D	SF	N2	A	0.2773	0.3377	33.85	0.82	0.4174	1.0000	0.05
SE	N3	D	SF	N2	B	1.5583	0.2478	2.62	6.29	0.0120	<.0001	0.05
SE	N3	D	SF	N2	C	1.7419	0.2464	2.463	7.07	0.0108	<.0001	0.05
SE	N3	D	SF	N2	D	-0.1174	0.2636	6.092	-0.45	0.6715	1.0000	0.05
SE	N3	D	SF	N3	A	0.1710	0.2634	1527	0.65	0.5163	1.0000	0.05
SE	N3	D	SF	N3	B	1.5333	0.1369	216.2	11.20	<.0001	<.0001	0.05
SE	N3	D	SF	N3	C	1.7175	0.1368	211.3	12.56	<.0001	<.0001	0.05
SE	N3	D	SF	N3	D	0.05692	0.1416	240.5	0.40	0.6881	1.0000	0.05
SF	N1	A	SF	N1	B	1.2757	0.2511	2654	5.08	<.0001	0.0001	0.05
SF	N1	A	SF	N1	C	1.7678	0.2542	2658	6.95	<.0001	<.0001	0.05
SF	N1	A	SF	N1	D	0.08249	0.2649	2659	0.31	0.7555	1.0000	0.05
SF	N1	A	SF	N2	A	0.2054	0.3858	67.51	0.53	0.5961	1.0000	0.05
SF	N1	A	SF	N2	B	1.4865	0.3324	25.74	4.47	0.0001	0.0020	0.05
SF	N1	A	SF	N2	C	1.6701	0.3313	25.59	5.04	<.0001	0.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Cultiv*Nitrog*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Cultivar	*Nitrogen*	*HARVEST*	*Cultivar*	*Nitrogen*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
SE	N3	B	SF	N2	D	-2.2470	-0.9151	-2.5380	-0.6241
SE	N3	B	SF	N3	A	-1.8069	-0.7785	-2.2471	-0.3382
SE	N3	B	SF	N3	B	-0.1978	0.3371	-0.4243	0.5635
SE	N3	B	SF	N3	C	-0.01438	0.5221	-0.2415	0.7492
SE	N3	B	SF	N3	D	-1.6965	-1.1170	-1.9427	-0.8708
SE	N3	C	SE	N3	D	-2.1405	-1.5977	-2.3731	-1.3652
SE	N3	C	SF	N1	A	-2.4882	-1.1063	-3.0274	-0.5672
SE	N3	C	SF	N1	B	-1.3026	0.2594	-1.4365	0.3933
SE	N3	C	SF	N1	C	-0.8121	0.7532	-0.9597	0.9008
SE	N3	C	SF	N1	D	-2.3545	-1.0751	-2.6510	-0.7786
SE	N3	C	SF	N2	A	-2.2869	-0.8968	-2.8375	-0.3462
SE	N3	C	SF	N2	B	-1.1110	0.4894	-1.2353	0.6137
SE	N3	C	SF	N2	C	-0.9418	0.6874	-1.0485	0.7941
SE	N3	C	SF	N2	D	-2.6332	-1.3397	-2.9611	-1.0119
SE	N3	C	SF	N3	A	-2.2228	-1.1734	-2.6720	-0.7242
SE	N3	C	SF	N3	B	-0.6213	-0.05031	-0.8636	0.1920
SE	N3	C	SF	N3	C	-0.4280	0.1248	-0.6621	0.3590
SE	N3	C	SF	N3	D	-2.1167	-1.5077	-2.3756	-1.2487
SE	N3	D	SF	N1	A	-0.6121	0.7557	-1.1458	1.2894
SE	N3	D	SF	N1	B	0.5074	2.1875	0.4555	2.2395
SE	N3	D	SF	N1	C	0.9894	2.6899	0.9345	2.7448
SE	N3	D	SF	N1	D	-0.4855	0.7942	-0.7646	1.0732
SE	N3	D	SF	N2	A	-0.4092	0.9638	-0.9525	1.5070
SE	N3	D	SF	N2	B	0.7010	2.4156	0.6561	2.4605
SE	N3	D	SF	N2	C	0.8514	2.6324	0.8446	2.6393
SE	N3	D	SF	N2	D	-0.7600	0.5253	-1.0771	0.8424
SE	N3	D	SF	N3	A	-0.3457	0.6877	-0.7881	1.1302
SE	N3	D	SF	N3	B	1.2634	1.8032	1.0347	2.0319
SE	N3	D	SF	N3	C	1.4479	1.9871	1.2196	2.2155
SE	N3	D	SF	N3	D	-0.2220	0.3359	-0.4587	0.5726
SF	N1	A	SF	N1	B	0.7832	1.7681	0.3613	2.1901
SF	N1	A	SF	N1	C	1.2694	2.2663	0.8423	2.6934
SF	N1	A	SF	N1	D	-0.4369	0.6019	-0.8820	1.0470
SF	N1	A	SF	N2	A	-0.5644	0.9753	-1.1991	1.6100
SF	N1	A	SF	N2	B	0.8029	2.1700	0.2763	2.6967
SF	N1	A	SF	N2	C	0.9887	2.3515	0.4640	2.8762

*Differences of Cultiv*Nitrog*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Cultivar	Nitrogen	HARVEST	Cultivar	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
SF	N1	A	SF	N2	D	-0.1892	0.3444	34.51	-0.55	0.5863	1.0000	0.05
SF	N1	A	SF	N3	A	0.09918	0.4001	77.72	0.25	0.8049	1.0000	0.05
SF	N1	A	SF	N3	B	1.4615	0.3319	28.14	4.40	0.0001	0.0027	0.05
SF	N1	A	SF	N3	C	1.6457	0.3325	28.69	4.95	<.0001	0.0002	0.05
SF	N1	A	SF	N3	D	-0.01490	0.3390	29.82	-0.04	0.9652	1.0000	0.05
SF	N1	B	SF	N1	C	0.4922	0.1173	2659	4.20	<.0001	0.0063	0.05
SF	N1	B	SF	N1	D	-1.1932	0.1370	2657	-8.71	<.0001	<.0001	0.05
SF	N1	B	SF	N2	A	-1.0702	0.3330	33.16	-3.21	0.0029	0.1771	0.05
SF	N1	B	SF	N2	B	0.2108	0.2422	2.243	0.87	0.4672	1.0000	0.05
SF	N1	B	SF	N2	C	0.3944	0.2405	2.119	1.64	0.2357	0.9950	0.05
SF	N1	B	SF	N2	D	-1.4649	0.2577	4.876	-5.69	0.0025	<.0001	0.05
SF	N1	B	SF	N3	A	-1.1765	0.3315	29.08	-3.55	0.0013	0.0674	0.05
SF	N1	B	SF	N3	B	0.1858	0.2426	2.44	0.77	0.5109	1.0000	0.05
SF	N1	B	SF	N3	C	0.3701	0.2425	2.463	1.53	0.2433	0.9982	0.05
SF	N1	B	SF	N3	D	-1.2906	0.2522	3.3	-5.12	0.0114	<.0001	0.05
SF	N1	C	SF	N1	D	-1.6853	0.1388	2631	-12.14	<.0001	<.0001	0.05
SF	N1	C	SF	N2	A	-1.5624	0.3352	32.24	-4.66	<.0001	0.0008	0.05
SF	N1	C	SF	N2	B	-0.2814	0.2454	2.298	-1.15	0.3568	1.0000	0.05
SF	N1	C	SF	N2	C	-0.09773	0.2432	2.13	-0.40	0.7246	1.0000	0.05
SF	N1	C	SF	N2	D	-1.9570	0.2597	4.725	-7.54	0.0008	<.0001	0.05
SF	N1	C	SF	N3	A	-1.6687	0.3332	27.47	-5.01	<.0001	0.0002	0.05
SF	N1	C	SF	N3	B	-0.3064	0.2458	2.411	-1.25	0.3201	0.9999	0.05
SF	N1	C	SF	N3	C	-0.1221	0.2460	2.465	-0.50	0.6604	1.0000	0.05
SF	N1	C	SF	N3	D	-1.7827	0.2551	3.202	-6.99	0.0048	<.0001	0.05
SF	N1	D	SF	N2	A	0.1230	0.3374	43.94	0.36	0.7173	1.0000	0.05
SF	N1	D	SF	N2	B	1.4040	0.2483	4.169	5.65	0.0043	<.0001	0.05
SF	N1	D	SF	N2	C	1.5876	0.2464	3.952	6.44	0.0031	<.0001	0.05
SF	N1	D	SF	N2	D	-0.2717	0.2547	6.014	-1.07	0.3271	1.0000	0.05
SF	N1	D	SF	N3	A	0.01669	0.3356	39.32	0.05	0.9606	1.0000	0.05
SF	N1	D	SF	N3	B	1.3790	0.2477	4.5	5.57	0.0036	<.0001	0.05
SF	N1	D	SF	N3	C	1.5632	0.2473	4.5	6.32	0.0021	<.0001	0.05
SF	N1	D	SF	N3	D	-0.09739	0.2505	4.463	-0.39	0.7153	1.0000	0.05
SF	N2	A	SF	N2	B	1.2810	0.2613	2656	4.90	<.0001	0.0003	0.05
SF	N2	A	SF	N2	C	1.4647	0.2592	2658	5.65	<.0001	<.0001	0.05
SF	N2	A	SF	N2	D	-0.3946	0.2760	2649	-1.43	0.1528	0.9993	0.05
SF	N2	A	SF	N3	A	-0.1063	0.4079	103.1	-0.26	0.7950	1.0000	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Cultiv*Nitrog*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Cultivar	*Nitrogen*	*HARVEST*	*Cultivar*	*Nitrogen*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
SF	N1	A	SF	N2	D	-0.8888	0.5104	-1.4433	1.0649
SF	N1	A	SF	N3	A	-0.6974	0.8957	-1.3576	1.5559
SF	N1	A	SF	N3	B	0.7817	2.1413	0.2528	2.6701
SF	N1	A	SF	N3	C	0.9653	2.3261	0.4349	2.8565
SF	N1	A	SF	N3	D	-0.7075	0.6777	-1.2494	1.2196
SF	N1	B	SF	N1	C	0.2622	0.7221	0.06521	0.9191
SF	N1	B	SF	N1	D	-1.4617	-0.9246	-1.6918	-0.6945
SF	N1	B	SF	N2	A	-1.7476	-0.3928	-2.2827	0.1423
SF	N1	B	SF	N2	B	-0.7305	1.1521	-0.6712	1.0928
SF	N1	B	SF	N2	C	-0.5865	1.3754	-0.4813	1.2702
SF	N1	B	SF	N2	D	-2.1323	-0.7974	-2.4031	-0.5266
SF	N1	B	SF	N3	A	-1.8544	-0.4986	-2.3835	0.03053
SF	N1	B	SF	N3	B	-0.6969	1.0685	-0.6975	1.0691
SF	N1	B	SF	N3	C	-0.5060	1.2461	-0.5128	1.2529
SF	N1	B	SF	N3	D	-2.0534	-0.5277	-2.2089	-0.3722
SF	N1	C	SF	N1	D	-1.9575	-1.4132	-2.1908	-1.1799
SF	N1	C	SF	N2	A	-2.2450	-0.8798	-2.7829	-0.3419
SF	N1	C	SF	N2	B	-1.2160	0.6533	-1.1748	0.6121
SF	N1	C	SF	N2	C	-1.0854	0.8900	-0.9833	0.7879
SF	N1	C	SF	N2	D	-2.6365	-1.2775	-2.9027	-1.0113
SF	N1	C	SF	N3	A	-2.3519	-0.9854	-2.8820	-0.4553
SF	N1	C	SF	N3	B	-1.2087	0.5960	-1.2015	0.5888
SF	N1	C	SF	N3	C	-1.0104	0.7662	-1.0179	0.7736
SF	N1	C	SF	N3	D	-2.5664	-0.9991	-2.7115	-0.8539
SF	N1	D	SF	N2	A	-0.5571	0.8031	-1.1057	1.3516
SF	N1	D	SF	N2	B	0.7254	2.0825	0.4998	2.3081
SF	N1	D	SF	N2	C	0.9002	2.2750	0.6905	2.4847
SF	N1	D	SF	N2	D	-0.8947	0.3513	-1.1993	0.6559
SF	N1	D	SF	N3	A	-0.6620	0.6954	-1.2054	1.2387
SF	N1	D	SF	N3	B	0.7204	2.0375	0.4772	2.2808
SF	N1	D	SF	N3	C	0.9057	2.2207	0.6628	2.4636
SF	N1	D	SF	N3	D	-0.7653	0.5705	-1.0095	0.8147
SF	N2	A	SF	N2	B	0.7685	1.7935	0.3294	2.2326
SF	N2	A	SF	N2	C	0.9564	1.9729	0.5209	2.4084
SF	N2	A	SF	N2	D	-0.9358	0.1465	-1.3995	0.6102
SF	N2	A	SF	N3	A	-0.9152	0.7027	-1.5915	1.3790

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Cultiv*Nitrog*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Cultivar	Nitrogen	HARVEST	Cultivar	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
SF	N2	A	SF	N3	B	1.2560	0.3356	33.39	3.74	0.0007	0.0354	0.05
SF	N2	A	SF	N3	C	1.4403	0.3352	33.94	4.30	0.0001	0.0042	0.05
SF	N2	A	SF	N3	D	-0.2203	0.3419	35.63	-0.64	0.5234	1.0000	0.05
SF	N2	B	SF	N2	C	0.1836	0.1158	2637	1.59	0.1129	0.9969	0.05
SF	N2	B	SF	N2	D	-1.6757	0.1522	2660	-11.01	<.0001	<.0001	0.05
SF	N2	B	SF	N3	A	-1.3873	0.3308	29.76	-4.19	0.0002	0.0064	0.05
SF	N2	B	SF	N3	B	-0.02500	0.2454	2.452	-0.10	0.9266	1.0000	0.05
SF	N2	B	SF	N3	C	0.1592	0.2446	2.47	0.65	0.5705	1.0000	0.05
SF	N2	B	SF	N3	D	-1.5014	0.2537	3.265	-5.92	0.0076	<.0001	0.05
SF	N2	C	SF	N2	D	-1.8593	0.1487	2654	-12.50	<.0001	<.0001	0.05
SF	N2	C	SF	N3	A	-1.5709	0.3299	29.29	-4.76	<.0001	0.0005	0.05
SF	N2	C	SF	N3	B	-0.2086	0.2435	2.245	-0.86	0.4733	1.0000	0.05
SF	N2	C	SF	N3	C	-0.02439	0.2429	2.278	-0.10	0.9282	1.0000	0.05
SF	N2	C	SF	N3	D	-1.6850	0.2523	3.073	-6.68	0.0063	<.0001	0.05
SF	N2	D	SF	N3	A	0.2884	0.3414	41.33	0.84	0.4031	1.0000	0.05
SF	N2	D	SF	N3	B	1.6507	0.2582	5.257	6.39	0.0012	<.0001	0.05
SF	N2	D	SF	N3	C	1.8349	0.2573	5.268	7.13	0.0007	<.0001	0.05
SF	N2	D	SF	N3	D	0.1743	0.2589	5.008	0.67	0.5305	1.0000	0.05
SF	N3	A	SF	N3	B	1.3623	0.2547	2651	5.35	<.0001	<.0001	0.05
SF	N3	A	SF	N3	C	1.5465	0.2560	2658	6.04	<.0001	<.0001	0.05
SF	N3	A	SF	N3	D	-0.1141	0.2624	2657	-0.43	0.6638	1.0000	0.05
SF	N3	B	SF	N3	C	0.1842	0.1208	2657	1.53	0.1273	0.9982	0.05
SF	N3	B	SF	N3	D	-1.4764	0.1358	2659	-10.87	<.0001	<.0001	0.05
SF	N3	C	SF	N3	D	-1.6606	0.1357	2652	-12.24	<.0001	<.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Cultiv*Nitrog*HARVES Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Cultivar	*Nitrogen*	*HARVEST*	*Cultivar*	*Nitrogen*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
SF	N2	A	SF	N3	B	0.5736	1.9385	0.03415	2.4779
SF	N2	A	SF	N3	C	0.7591	2.1215	0.2199	2.6607
SF	N2	A	SF	N3	D	-0.9140	0.4733	-1.4652	1.0245
SF	N2	B	SF	N2	C	-0.04340	0.4107	-0.2380	0.6052
SF	N2	B	SF	N2	D	-1.9740	-1.3773	-2.2297	-1.1216
SF	N2	B	SF	N3	A	-2.0631	-0.7115	-2.5918	-0.1828
SF	N2	B	SF	N3	B	-0.9147	0.8647	-0.9185	0.8685
SF	N2	B	SF	N3	C	-0.7229	1.0414	-0.7315	1.0500
SF	N2	B	SF	N3	D	-2.2729	-0.7298	-2.4251	-0.5776
SF	N2	C	SF	N2	D	-2.1509	-1.5677	-2.4007	-1.3179
SF	N2	C	SF	N3	A	-2.2454	-0.8964	-2.7722	-0.3696
SF	N2	C	SF	N3	B	-1.1542	0.7369	-1.0954	0.6782
SF	N2	C	SF	N3	C	-0.9565	0.9077	-0.9090	0.8602
SF	N2	C	SF	N3	D	-2.4771	-0.8929	-2.6036	-0.7664
SF	N2	D	SF	N3	A	-0.4008	0.9776	-0.9545	1.5313
SF	N2	D	SF	N3	B	0.9965	2.3048	0.7104	2.5910
SF	N2	D	SF	N3	C	1.1835	2.4863	0.8981	2.7718
SF	N2	D	SF	N3	D	-0.4908	0.8394	-0.7682	1.1168
SF	N3	A	SF	N3	B	0.8629	1.8617	0.4349	2.2897
SF	N3	A	SF	N3	C	1.0446	2.0484	0.6145	2.4785
SF	N3	A	SF	N3	D	-0.6286	0.4005	-1.0696	0.8414
SF	N3	B	SF	N3	C	-0.05261	0.4211	-0.2556	0.6241
SF	N3	B	SF	N3	D	-1.7426	-1.2101	-1.9708	-0.9819
SF	N3	C	SF	N3	D	-1.9267	-1.3945	-2.1548	-1.1665

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Conservative Tukey-Kramer Grouping for Cultiv*Nitrog*HARVES Least Squares Means (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Cultivar	*Nitrogen*	*HARVEST*	*Estimate*			
SF	N2	D	4.8978		A	
					A	
SE	N1	D	4.7833		A	
					A	
SE	N3	D	4.7804		A	
					A	
SE	N2	D	4.7309		A	
					A	
SF	N3	D	4.7235		A	
					A	
SF	N1	A	4.7086		A	
					A	
SF	N1	D	4.6261		A	
					A	
SF	N3	A	4.6094	B	A	
				B	A	
SE	N2	A	4.5917	B	A	C
				B	A	C
SE	N1	A	4.5459	B	A	C
				B	A	C
SF	N2	A	4.5032	B	A	C
				B	A	C
SE	N3	A	4.3203	B	A	C
				B		C
SF	N1	B	3.4330	B	D	C
					D	C
SE	N3	B	3.3167	E	D	C

The LINES display does not reflect all significant comparisons.
The following additional pairs are significantly different: (SE N2 A,SF N2 B), (SE N2 A,SE N2 C), (SE N1 A,SF N1 B), (SE N1 A,SF N3 B), (SE N1 A,SF N2 B), (SE N1 A,SE N2 C), (SE N1 A,SF N3 C), (SF N2 A,SE N2 B), (SF N2 A,SF N3 B), (SF N2 A,SF N2 B), (SF N2 A,SE N2 C), (SF N2 A,SF N3 C), (SE N3 A,SE N3 B), (SE N3 A,SF N3 B), (SE N3 A,SF N3 C), (SF N1 B,SF N1 C).

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Conservative Tukey-Kramer Grouping for Cultiv*Nitrog*HARVES Least Squares Means (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Cultivar	*Nitrogen*	*HARVEST*	*Estimate*			
				E	D	C
SE	N2	B	3.2649	E	D	C
				E	D	C
SF	N3	B	3.2471	E	D	C
				E	D	C
SF	N2	B	3.2221	E	D	C
				E	D	C
SE	N2	C	3.1270	E	D	C
				E	D	C
SF	N3	C	3.0629	E	D	C
				E	D	
SF	N2	C	3.0385	E	D	
				E	D	
SE	N1	B	3.0091	E	D	
				E	D	
SF	N1	C	2.9408	E	D	
				E	D	
SE	N3	C	2.9113	E	D	
				E		
SE	N1	C	2.9071	E		

The LINES display does not reflect all significant comparisons.
The following additional pairs are significantly different: (SE N2 A,SF N2 B), (SE N2 A,SE N2 C), (SE N1 A,SF N1 B), (SE N1 A,SF N3 B), (SE N1 A,SF N2 B), (SE N1 A,SE N2 C), (SE N1 A,SF N3 C), (SF N2 A,SE N2 B), (SF N2 A,SF N3 B), (SF N2 A,SF N2 B), (SF N2 A,SE N2 C), (SF N2 A,SF N3 C), (SE N3 A,SE N3 B), (SE N3 A,SF N3 B), (SE N3 A,SF N3 C), (SF N1 B,SF N1 C).

*Strain*HARVEST Least Squares Means*

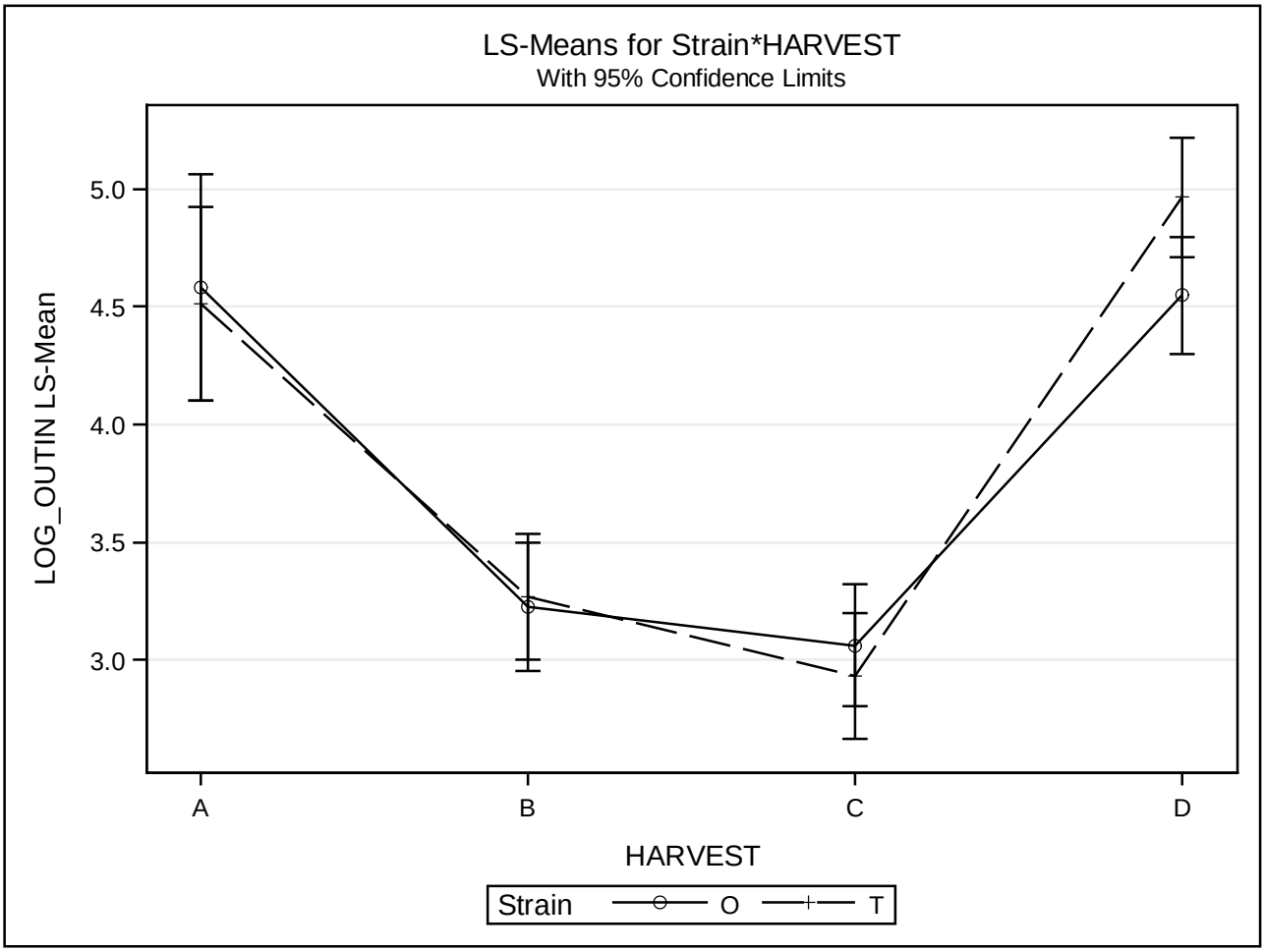
Strain	*HARVEST*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Alpha*	*Lower*	*Upper*
O	A	4.5806	0.2450	570.4	18.70	<.0001	0.05	4.0994	5.0617
O	B	3.2266	0.1100	5.844	29.34	<.0001	0.05	2.9558	3.4974
O	C	3.0635	0.1108	7.604	27.65	<.0001	0.05	2.8056	3.3213
O	D	4.5489	0.1135	11.3	40.09	<.0001	0.05	4.2999	4.7978

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Strain*HARVEST Least Squares Means*

Strain	*HARVEST*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Alpha*	*Lower*	*Upper*
T	A	4.5125	0.2100	419.4	21.49	<.0001	0.05	4.0997	4.9252
T	B	3.2711	0.1104	6.312	29.64	<.0001	0.05	3.0042	3.5380
T	C	2.9324	0.1099	6.159	26.68	<.0001	0.05	2.6651	3.1996
T	D	4.9652	0.1124	9.366	44.18	<.0001	0.05	4.7124	5.2179



Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Strain*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Strain	HARVEST	Strain	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha	Lower	Upper
O	A	O	B	1.3540	0.2287	2641	5.92	<.0001	<.0001	0.05	0.9055	1.8025
O	A	O	C	1.5171	0.2295	2643	6.61	<.0001	<.0001	0.05	1.0670	1.9672
O	A	O	D	0.03169	0.2319	2639	0.14	0.8913	1.0000	0.05	-0.4230	0.4864
O	A	T	A	0.06811	0.3113	2640	0.22	0.8268	1.0000	0.05	-0.5422	0.6784
O	A	T	B	1.3094	0.2291	2642	5.71	<.0001	<.0001	0.05	0.8601	1.7587
O	A	T	C	1.6482	0.2293	2644	7.19	<.0001	<.0001	0.05	1.1986	2.0978
O	A	T	D	-0.3846	0.2311	2643	-1.66	0.0962	0.7106	0.05	-0.8378	0.06861
O	B	O	C	0.1631	0.07331	2651	2.22	0.0262	0.3372	0.05	0.01933	0.3068
O	B	O	D	-1.3223	0.07942	2653	-16.65	<.0001	<.0001	0.05	-1.4780	-1.1666
O	B	T	A	-1.2859	0.1942	2650	-6.62	<.0001	<.0001	0.05	-1.6667	-0.9051
O	B	T	B	-0.04456	0.06952	2634	-0.64	0.5216	0.9983	0.05	-0.1809	0.09177
O	B	T	C	0.2942	0.07085	2651	4.15	<.0001	0.0009	0.05	0.1553	0.4331
O	B	T	D	-1.7386	0.07714	2655	-22.54	<.0001	<.0001	0.05	-1.8899	-1.5874
O	C	O	D	-1.4854	0.08152	2654	-18.22	<.0001	<.0001	0.05	-1.6452	-1.3256
O	C	T	A	-1.4490	0.1954	2654	-7.41	<.0001	<.0001	0.05	-1.8322	-1.0658
O	C	T	B	-0.2076	0.07498	2647	-2.77	0.0057	0.1032	0.05	-0.3547	-0.06061
O	C	T	C	0.1311	0.07230	2635	1.81	0.0699	0.6110	0.05	-0.01066	0.2729
O	C	T	D	-1.9017	0.08010	2656	-23.74	<.0001	<.0001	0.05	-2.0588	-1.7446
O	D	T	A	0.03641	0.1973	2650	0.18	0.8536	1.0000	0.05	-0.3504	0.4232
O	D	T	B	1.2778	0.08105	2651	15.76	<.0001	<.0001	0.05	1.1188	1.4367
O	D	T	C	1.6165	0.08040	2656	20.11	<.0001	<.0001	0.05	1.4588	1.7742
O	D	T	D	-0.4163	0.08052	2646	-5.17	<.0001	<.0001	0.05	-0.5742	-0.2584
T	A	T	B	1.2413	0.1945	2651	6.38	<.0001	<.0001	0.05	0.8599	1.6228
T	A	T	C	1.5801	0.1947	2653	8.11	<.0001	<.0001	0.05	1.1983	1.9619
T	A	T	D	-0.4527	0.1970	2652	-2.30	0.0216	0.2947	0.05	-0.8389	-0.06650
T	B	T	C	0.3387	0.07144	2649	4.74	<.0001	<.0001	0.05	0.1987	0.4788
T	B	T	D	-1.6941	0.07744	2656	-21.88	<.0001	<.0001	0.05	-1.8459	-1.5422
T	C	T	D	-2.0328	0.07705	2658	-26.38	<.0001	<.0001	0.05	-2.1839	-1.8817

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of Strain*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

Strain	*HARVEST*	*Strain*	*HARVEST*	*Adj Lower*	*Adj Upper*
O	A	O	B	0.6601	2.0479
O	A	O	C	0.8208	2.2133
O	A	O	D	-0.6717	0.7351
O	A	T	A	-0.8760	1.0122
O	A	T	B	0.6144	2.0045
O	A	T	C	0.9527	2.3437
O	A	T	D	-1.0857	0.3165
O	B	O	C	-0.05930	0.3855
O	B	O	D	-1.5632	-1.0814
O	B	T	A	-1.8749	-0.6969
O	B	T	B	-0.2554	0.1663
O	B	T	C	0.07929	0.5091
O	B	T	D	-1.9726	-1.5046
O	C	O	D	-1.7327	-1.2381
O	C	T	A	-2.0418	-0.8562
O	C	T	B	-0.4351	0.01980
O	C	T	C	-0.08820	0.3504
O	C	T	D	-2.1447	-1.6587
O	D	T	A	-0.5620	0.6348
O	D	T	B	1.0319	1.5236
O	D	T	C	1.3726	1.8604
O	D	T	D	-0.6605	-0.1721
T	A	T	B	0.6513	1.8314
T	A	T	C	0.9894	2.1707
T	A	T	D	-1.0502	0.1447
T	B	T	C	0.1220	0.5554
T	B	T	D	-1.9289	-1.4592
T	C	T	D	-2.2665	-1.7991

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Conservative Tukey-Kramer Grouping for Strain*HARVEST Least Squares Means (Alpha=0.05)*

LS-means with the same letter are not significantly different.

Strain	*HARVEST*	*Estimate*		
T	D	4.9652		A
				A
O	A	4.5806		A
				A
O	D	4.5489		A
				A
T	A	4.5125		A
T	B	3.2711		B
				B
O	B	3.2266		B
				B
O	C	3.0635	C	B
			C	
T	C	2.9324	C	

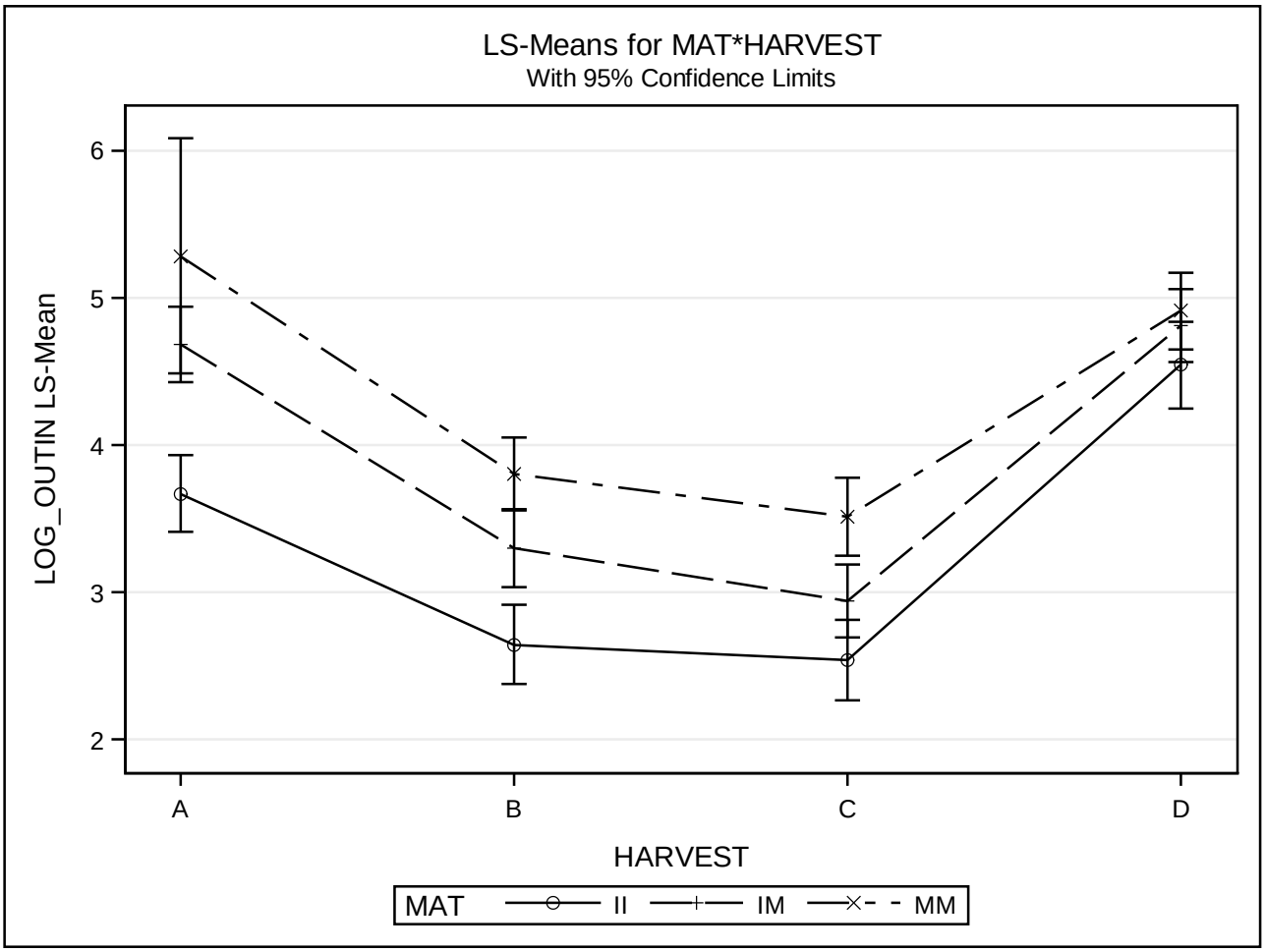
The LINES display does not reflect all significant comparisons.
The following additional pairs are significantly different: (T D,O D).

*MAT*HARVEST Least Squares Means*

MAT	*HARVEST*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Alpha*	*Lower*	*Upper*
II	A	3.6692	0.1137	8.384	32.27	<.0001	0.05	3.4091	3.9294
II	B	2.6450	0.1110	6.365	23.83	<.0001	0.05	2.3771	2.9129
II	C	2.5399	0.1098	5.439	23.14	<.0001	0.05	2.2645	2.8154
II	D	4.5433	0.1461	63.44	31.10	<.0001	0.05	4.2514	4.8352
IM	A	4.6852	0.1201	13.21	39.01	<.0001	0.05	4.4261	4.9442
IM	B	3.3005	0.1244	14.05	26.54	<.0001	0.05	3.0338	3.5671
IM	C	2.9389	0.1125	10.47	26.12	<.0001	0.05	2.6897	3.1881
IM	D	4.8153	0.1114	10.19	43.23	<.0001	0.05	4.5678	5.0628
MM	A	5.2851	0.4084	2055	12.94	<.0001	0.05	4.4843	6.0860
MM	B	3.8010	0.1145	12.37	33.20	<.0001	0.05	3.5524	4.0497
MM	C	3.5149	0.1281	23.05	27.45	<.0001	0.05	3.2500	3.7798
MM	D	4.9125	0.1086	6.459	45.25	<.0001	0.05	4.6513	5.1736

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



*Differences of MAT*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	HARVEST	_MAT	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha	Lower	Upper
II	A	II	B	1.0243	0.07717	2656	13.27	<.0001	<.0001	0.05	0.8730	1.1756
II	A	II	C	1.1293	0.07506	2650	15.05	<.0001	<.0001	0.05	0.9821	1.2765
II	A	II	D	-0.8740	0.1245	2651	-7.02	<.0001	<.0001	0.05	-1.1181	-0.6300
II	A	IM	A	-1.0159	0.08960	2651	-11.34	<.0001	<.0001	0.05	-1.1916	-0.8402
II	A	IM	B	0.3688	0.09231	2658	3.99	<.0001	0.0038	0.05	0.1878	0.5498
II	A	IM	C	0.7303	0.08364	2656	8.73	<.0001	<.0001	0.05	0.5663	0.8943
II	A	IM	D	-1.1460	0.08293	2659	-13.82	<.0001	<.0001	0.05	-1.3087	-0.9834
II	A	MM	A	-1.6159	0.4011	2650	-4.03	<.0001	0.0033	0.05	-2.4024	-0.8293
II	A	MM	B	-0.1318	0.08639	2654	-1.53	0.1273	0.9337	0.05	-0.3012	0.03761
II	A	MM	C	0.1544	0.1008	2659	1.53	0.1257	0.9318	0.05	-0.04323	0.3520
II	A	MM	D	-1.2432	0.07657	2656	-16.24	<.0001	<.0001	0.05	-1.3933	-1.0931
II	B	II	C	0.1050	0.07040	2648	1.49	0.1359	0.9430	0.05	-0.03302	0.2431
II	B	II	D	-1.8983	0.1221	2658	-15.55	<.0001	<.0001	0.05	-2.1377	-1.6589
II	B	IM	A	-2.0402	0.08591	2650	-23.75	<.0001	<.0001	0.05	-2.2086	-1.8717
II	B	IM	B	-0.6555	0.08913	2661	-7.35	<.0001	<.0001	0.05	-0.8303	-0.4807
II	B	IM	C	-0.2940	0.07950	2659	-3.70	0.0002	0.0119	0.05	-0.4498	-0.1381
II	B	IM	D	-2.1703	0.07884	2660	-27.53	<.0001	<.0001	0.05	-2.3249	-2.0157
II	B	MM	A	-2.6401	0.4002	2648	-6.60	<.0001	<.0001	0.05	-3.4248	-1.8555
II	B	MM	B	-1.1561	0.08246	2659	-14.02	<.0001	<.0001	0.05	-1.3178	-0.9944
II	B	MM	C	-0.8699	0.09750	2658	-8.92	<.0001	<.0001	0.05	-1.0611	-0.6787
II	B	MM	D	-2.2675	0.07208	2657	-31.46	<.0001	<.0001	0.05	-2.4088	-2.1261
II	C	II	D	-2.0033	0.1201	2651	-16.68	<.0001	<.0001	0.05	-2.2389	-1.7678
II	C	IM	A	-2.1452	0.08362	2649	-25.66	<.0001	<.0001	0.05	-2.3092	-1.9812
II	C	IM	B	-0.7605	0.08690	2660	-8.75	<.0001	<.0001	0.05	-0.9309	-0.5901
II	C	IM	C	-0.3990	0.07750	2657	-5.15	<.0001	<.0001	0.05	-0.5509	-0.2470
II	C	IM	D	-2.2754	0.07664	2659	-29.69	<.0001	<.0001	0.05	-2.4256	-2.1251
II	C	MM	A	-2.7452	0.4000	2650	-6.86	<.0001	<.0001	0.05	-3.5295	-1.9608
II	C	MM	B	-1.2611	0.08036	2655	-15.69	<.0001	<.0001	0.05	-1.4187	-1.1035
II	C	MM	C	-0.9749	0.09532	2658	-10.23	<.0001	<.0001	0.05	-1.1618	-0.7880
II	C	MM	D	-2.3725	0.06979	2659	-33.99	<.0001	<.0001	0.05	-2.5094	-2.2357
II	D	IM	A	-0.1419	0.1300	2642	-1.09	0.2751	0.9951	0.05	-0.3967	0.1130
II	D	IM	B	1.2428	0.1325	2649	9.38	<.0001	<.0001	0.05	0.9830	1.5026
II	D	IM	C	1.6044	0.1253	2655	12.81	<.0001	<.0001	0.05	1.3587	1.8500
II	D	IM	D	-0.2720	0.1253	2651	-2.17	0.0301	0.5713	0.05	-0.5177	-0.02628
II	D	MM	A	-0.7418	0.4122	2650	-1.80	0.0721	0.8186	0.05	-1.5502	0.06654
II	D	MM	B	0.7423	0.1274	2658	5.83	<.0001	<.0001	0.05	0.4924	0.9921

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	*HARVEST*	*_MAT*	*HARVEST*	*Adj Lower*	*Adj Upper*
II	A	II	B	0.7719	1.2767
II	A	II	C	0.8838	1.3748
II	A	II	D	-1.2812	-0.4669
II	A	IM	A	-1.3090	-0.7228
II	A	IM	B	0.06681	0.6707
II	A	IM	C	0.4567	1.0039
II	A	IM	D	-1.4173	-0.8748
II	A	MM	A	-2.9280	-0.3038
II	A	MM	B	-0.4144	0.1508
II	A	MM	C	-0.1753	0.4840
II	A	MM	D	-1.4937	-0.9928
II	B	II	C	-0.1253	0.3353
II	B	II	D	-2.2977	-1.4990
II	B	IM	A	-2.3212	-1.7592
II	B	IM	B	-0.9470	-0.3640
II	B	IM	C	-0.5540	-0.03390
II	B	IM	D	-2.4282	-1.9124
II	B	MM	A	-3.9491	-1.3312
II	B	MM	B	-1.4258	-0.8863
II	B	MM	C	-1.1888	-0.5510
II	B	MM	D	-2.5033	-2.0317
II	C	II	D	-2.3963	-1.6104
II	C	IM	A	-2.4187	-1.8717
II	C	IM	B	-1.0448	-0.4763
II	C	IM	C	-0.6525	-0.1455
II	C	IM	D	-2.5260	-2.0247
II	C	MM	A	-4.0536	-1.4368
II	C	MM	B	-1.5239	-0.9983
II	C	MM	C	-1.2867	-0.6632
II	C	MM	D	-2.6008	-2.1442
II	D	IM	A	-0.5670	0.2833
II	D	IM	B	0.8094	1.6762
II	D	IM	C	1.1946	2.0141
II	D	IM	D	-0.6819	0.1379
II	D	MM	A	-2.0903	0.6066
II	D	MM	B	0.3255	1.1590

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	HARVEST	_MAT	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha	Lower	Upper
II	D	MM	C	1.0284	0.1373	2657	7.49	<.0001	<.0001	0.05	0.7592	1.2977
II	D	MM	D	-0.3692	0.1209	2653	-3.05	0.0023	0.0941	0.05	-0.6062	-0.1321
IM	A	IM	B	1.3847	0.09977	2658	13.88	<.0001	<.0001	0.05	1.1890	1.5803
IM	A	IM	C	1.7462	0.09155	2657	19.07	<.0001	<.0001	0.05	1.5667	1.9257
IM	A	IM	D	-0.1301	0.09108	2649	-1.43	0.1532	0.9579	0.05	-0.3087	0.04845
IM	A	MM	A	-0.6000	0.4037	2649	-1.49	0.1373	0.9445	0.05	-1.3915	0.1916
IM	A	MM	B	0.8841	0.09436	2659	9.37	<.0001	<.0001	0.05	0.6991	1.0691
IM	A	MM	C	1.1703	0.1071	2656	10.92	<.0001	<.0001	0.05	0.9602	1.3803
IM	A	MM	D	-0.2273	0.08529	2656	-2.67	0.0077	0.2444	0.05	-0.3945	-0.06007
IM	B	IM	C	0.3616	0.09508	2656	3.80	0.0001	0.0081	0.05	0.1751	0.5480
IM	B	IM	D	-1.5148	0.09392	2654	-16.13	<.0001	<.0001	0.05	-1.6990	-1.3306
IM	B	MM	A	-1.9846	0.4039	2653	-4.91	<.0001	<.0001	0.05	-2.7766	-1.1926
IM	B	MM	B	-0.5006	0.09801	2657	-5.11	<.0001	<.0001	0.05	-0.6927	-0.3084
IM	B	MM	C	-0.2144	0.1098	2659	-1.95	0.0510	0.7259	0.05	-0.4298	0.000967
IM	B	MM	D	-1.6120	0.08842	2660	-18.23	<.0001	<.0001	0.05	-1.7854	-1.4386
IM	C	IM	D	-1.8764	0.08497	2658	-22.08	<.0001	<.0001	0.05	-2.0430	-1.7098
IM	C	MM	A	-2.3462	0.4017	2653	-5.84	<.0001	<.0001	0.05	-3.1340	-1.5584
IM	C	MM	B	-0.8621	0.08847	2660	-9.74	<.0001	<.0001	0.05	-1.0356	-0.6886
IM	C	MM	C	-0.5760	0.1019	2656	-5.65	<.0001	<.0001	0.05	-0.7757	-0.3762
IM	C	MM	D	-1.9735	0.07865	2657	-25.09	<.0001	<.0001	0.05	-2.1277	-1.8193
IM	D	MM	A	-0.4698	0.4013	2651	-1.17	0.2418	0.9911	0.05	-1.2566	0.3170
IM	D	MM	B	1.0143	0.08781	2659	11.55	<.0001	<.0001	0.05	0.8421	1.1864
IM	D	MM	C	1.3004	0.1016	2659	12.80	<.0001	<.0001	0.05	1.1013	1.4996
IM	D	MM	D	-0.09716	0.07809	2657	-1.24	0.2135	0.9853	0.05	-0.2503	0.05596
MM	A	MM	B	1.4841	0.4022	2649	3.69	0.0002	0.0123	0.05	0.6954	2.2728
MM	A	MM	C	1.7702	0.4058	2651	4.36	<.0001	0.0008	0.05	0.9745	2.5660
MM	A	MM	D	0.3727	0.4002	2649	0.93	0.3518	0.9988	0.05	-0.4120	1.1574
MM	B	MM	C	0.2862	0.1048	2660	2.73	0.0064	0.2117	0.05	0.08066	0.4917
MM	B	MM	D	-1.1114	0.08186	2659	-13.58	<.0001	<.0001	0.05	-1.2719	-0.9509
MM	C	MM	D	-1.3976	0.09684	2658	-14.43	<.0001	<.0001	0.05	-1.5875	-1.2077

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	*HARVEST*	*_MAT*	*HARVEST*	*Adj Lower*	*Adj Upper*
II	D	MM	C	0.5793	1.4775
II	D	MM	D	-0.7645	0.02621
IM	A	IM	B	1.0583	1.7110
IM	A	IM	C	1.4468	2.0457
IM	A	IM	D	-0.4281	0.1678
IM	A	MM	A	-1.9204	0.7205
IM	A	MM	B	0.5755	1.1928
IM	A	MM	C	0.8198	1.5207
IM	A	MM	D	-0.5063	0.05166
IM	B	IM	C	0.05057	0.6726
IM	B	IM	D	-1.8220	-1.2076
IM	B	MM	A	-3.3058	-0.6635
IM	B	MM	B	-0.8211	-0.1800
IM	B	MM	C	-0.5736	0.1449
IM	B	MM	D	-1.9012	-1.3227
IM	C	IM	D	-2.1543	-1.5984
IM	C	MM	A	-3.6603	-1.0321
IM	C	MM	B	-1.1515	-0.5727
IM	C	MM	C	-0.9092	-0.2427
IM	C	MM	D	-2.2308	-1.7163
IM	D	MM	A	-1.7823	0.8427
IM	D	MM	B	0.7270	1.3015
IM	D	MM	C	0.9682	1.6326
IM	D	MM	D	-0.3526	0.1583
MM	A	MM	B	0.1684	2.7998
MM	A	MM	C	0.4429	3.0976
MM	A	MM	D	-0.9363	1.6816
MM	B	MM	C	-0.05664	0.6290
MM	B	MM	D	-1.3792	-0.8437
MM	C	MM	D	-1.7144	-1.0808

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Tukey-Kramer Grouping for MAT*HARVEST Least Squares Means (Alpha=0.05)*

LS-means with the same letter are not significantly different.

MAT	*HARVEST*	*Estimate*		
MM	A	5.2851		A
				A
MM	D	4.9125		A
				A
IM	D	4.8153		A
				A
IM	A	4.6852		A
				A
II	D	4.5433		A
MM	B	3.8010		B
				B
II	A	3.6692		B
				B
MM	C	3.5149	C	B
			C	
IM	B	3.3005	C	
IM	C	2.9389		D
II	B	2.6450		E
				E
II	C	2.5399		E

*MAT*Nitrogen*HARVEST Least Squares Means*

MAT	*Nitrogen*	*HARVEST*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Alpha*	*Lower*	*Upper*
II	N1	A	3.5618	0.1827	7.877	19.50	<.0001	0.05	3.1394	3.9841
II	N1	B	2.6652	0.1794	7.092	14.86	<.0001	0.05	2.2422	3.0882
II	N1	C	2.3510	0.1773	4.541	13.26	<.0001	0.05	1.8811	2.8209
II	N1	D	4.3907	0.2108	65.27	20.83	<.0001	0.05	3.9697	4.8117
II	N2	A	3.6589	0.1852	9.148	19.76	<.0001	0.05	3.2410	4.0768
II	N2	B	2.6904	0.1778	3.898	15.14	0.0001	0.05	2.1918	3.1891
II	N2	C	2.5744	0.1781	4.768	14.46	<.0001	0.05	2.1098	3.0389
II	N2	D	4.5990	0.2430	43.96	18.93	<.0001	0.05	4.1093	5.0888

Statistical Analysis: 06/05/2013

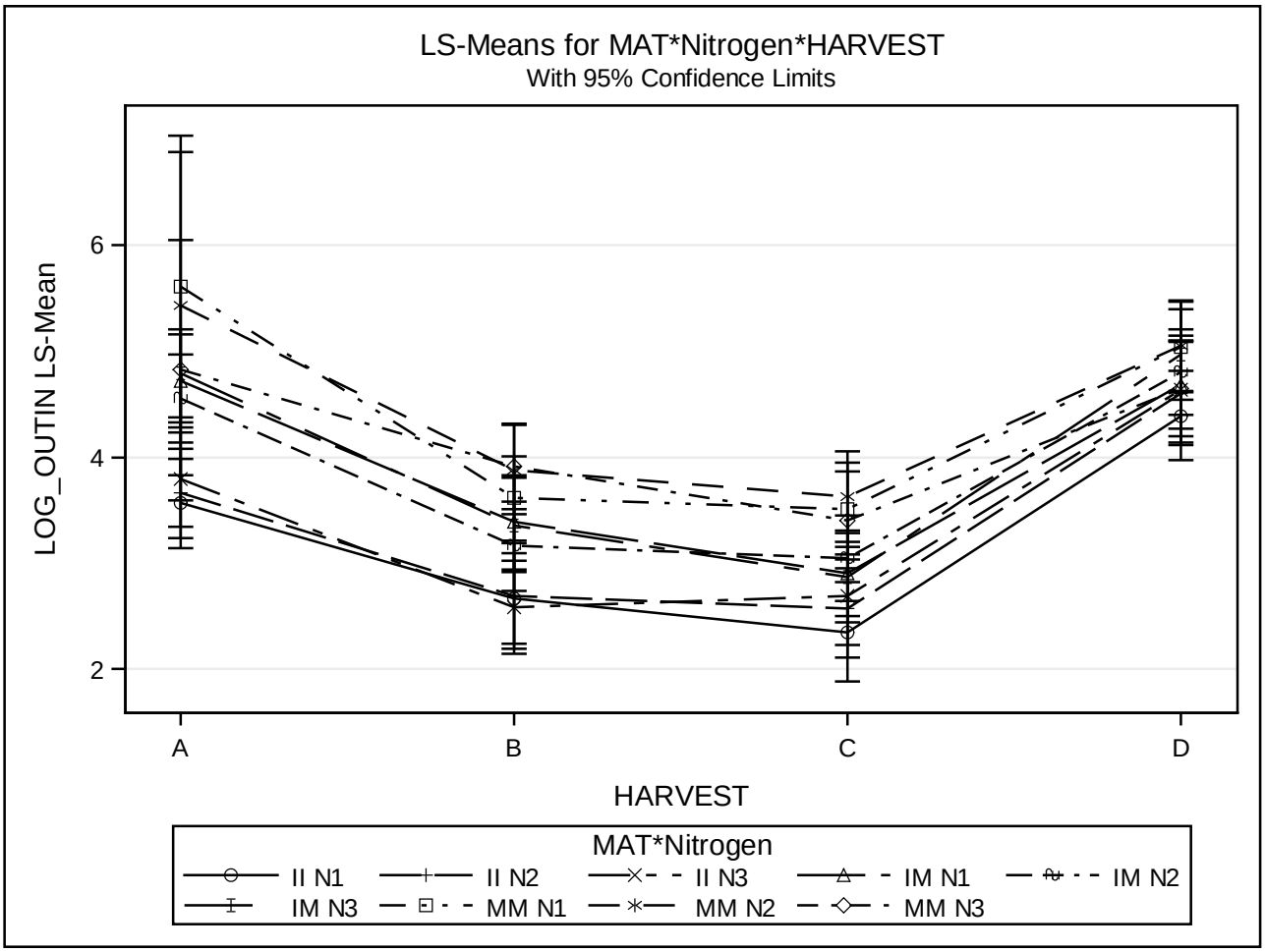
The GLIMMIX Procedure

*MAT*Nitrogen*HARVEST Least Squares Means*

MAT	*Nitrogen*	*HARVEST*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Alpha*	*Lower*	*Upper*
II	N3	A	3.7871	0.1872	6.924	20.23	<.0001	0.05	3.3435	4.2307
II	N3	B	2.5793	0.1813	6.326	14.23	<.0001	0.05	2.1412	3.0173
II	N3	C	2.6944	0.1765	4.759	15.26	<.0001	0.05	2.2336	3.1552
II	N3	D	4.6401	0.2494	55.76	18.61	<.0001	0.05	4.1406	5.1397
IM	N1	A	4.7162	0.1983	10.87	23.79	<.0001	0.05	4.2792	5.1533
IM	N1	B	3.3850	0.2047	12.7	16.54	<.0001	0.05	2.9418	3.8282
IM	N1	C	2.9086	0.1796	9.617	16.20	<.0001	0.05	2.5063	3.3109
IM	N1	D	4.6817	0.1926	14.73	24.31	<.0001	0.05	4.2705	5.0928
IM	N2	A	4.5513	0.1959	16.09	23.23	<.0001	0.05	4.1362	4.9664
IM	N2	B	3.1595	0.1975	15.83	16.00	<.0001	0.05	2.7404	3.5785
IM	N2	C	3.0458	0.1854	13.25	16.43	<.0001	0.05	2.6460	3.4456
IM	N2	D	4.7970	0.1795	9.777	26.73	<.0001	0.05	4.3959	5.1981
IM	N3	A	4.7880	0.1931	12.94	24.79	<.0001	0.05	4.3706	5.2053
IM	N3	B	3.3570	0.2041	11.74	16.45	<.0001	0.05	2.9112	3.8028
IM	N3	C	2.8624	0.1832	7.647	15.63	<.0001	0.05	2.4366	3.2882
IM	N3	D	4.9673	0.1738	5.739	28.57	<.0001	0.05	4.5371	5.3974
MM	N1	A	5.6037	0.6506	2139	8.61	<.0001	0.05	4.3280	6.8795
MM	N1	B	3.6128	0.1815	12.01	19.90	<.0001	0.05	3.2174	4.0083
MM	N1	C	3.5121	0.2071	20.47	16.96	<.0001	0.05	3.0807	3.9436
MM	N1	D	5.0418	0.1777	6.911	28.37	<.0001	0.05	4.6204	5.4631
MM	N2	A	5.4321	0.8149	2314	6.67	<.0001	0.05	3.8340	7.0302
MM	N2	B	3.8807	0.1954	12.1	19.87	<.0001	0.05	3.4555	4.3060
MM	N2	C	3.6280	0.2017	17.03	17.99	<.0001	0.05	3.2025	4.0536
MM	N2	D	5.0471	0.1790	6.439	28.19	<.0001	0.05	4.6162	5.4780
MM	N3	A	4.8195	0.6276	1800	7.68	<.0001	0.05	3.5887	6.0503
MM	N3	B	3.9096	0.1843	12.03	21.22	<.0001	0.05	3.5082	4.3109
MM	N3	C	3.4045	0.2248	39.93	15.14	<.0001	0.05	2.9501	3.8589
MM	N3	D	4.6485	0.1718	4.657	27.05	<.0001	0.05	4.1968	5.1002

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
II	N1	A	II	N1	B	0.8965	0.1350	2646	6.64	<.0001	<.0001	0.05
II	N1	A	II	N1	C	1.2107	0.1276	2649	9.49	<.0001	<.0001	0.05
II	N1	A	II	N1	D	-0.8289	0.1886	2641	-4.40	<.0001	0.0059	0.05
II	N1	A	II	N2	A	-0.09711	0.2506	3.651	-0.39	0.7199	1.0000	0.05
II	N1	A	II	N2	B	0.8713	0.2448	2.341	3.56	0.0558	0.1234	0.05
II	N1	A	II	N2	C	0.9874	0.2450	2.599	4.03	0.0358	0.0255	0.05
II	N1	A	II	N2	D	-1.0373	0.2970	10.92	-3.49	0.0051	0.1498	0.05
II	N1	A	II	N3	A	-0.2253	0.2532	3.083	-0.89	0.4375	1.0000	0.05
II	N1	A	II	N3	B	0.9825	0.2491	2.967	3.94	0.0296	0.0348	0.05
II	N1	A	II	N3	C	0.8673	0.2459	2.565	3.53	0.0495	0.1358	0.05
II	N1	A	II	N3	D	-1.0784	0.3031	13.05	-3.56	0.0035	0.1242	0.05
II	N1	A	IM	N1	A	-1.1545	0.1513	2656	-7.63	<.0001	<.0001	0.05
II	N1	A	IM	N1	B	0.1768	0.1562	2658	1.13	0.2578	1.0000	0.05
II	N1	A	IM	N1	C	0.6532	0.1402	2657	4.66	<.0001	0.0018	0.05
II	N1	A	IM	N1	D	-1.1199	0.1540	2651	-7.27	<.0001	<.0001	0.05
II	N1	A	IM	N2	A	-0.9895	0.2588	5.179	-3.82	0.0115	0.0533	0.05
II	N1	A	IM	N2	B	0.4023	0.2604	5.199	1.55	0.1808	0.9999	0.05
II	N1	A	IM	N2	C	0.5160	0.2504	4.57	2.06	0.0997	0.9868	0.05
II	N1	A	IM	N2	D	-1.2352	0.2472	3.788	-5.00	0.0086	0.0004	0.05
II	N1	A	IM	N3	A	-1.2262	0.2580	4.498	-4.75	0.0067	0.0012	0.05
II	N1	A	IM	N3	B	0.2048	0.2655	4.284	0.77	0.4809	1.0000	0.05
II	N1	A	IM	N3	C	0.6994	0.2506	3.29	2.79	0.0616	0.6450	0.05
II	N1	A	IM	N3	D	-1.4055	0.2444	2.829	-5.75	0.0123	<.0001	0.05
II	N1	A	MM	N1	A	-2.0420	0.6438	2658	-3.17	0.0015	0.3339	0.05
II	N1	A	MM	N1	B	-0.05107	0.1450	2655	-0.35	0.7248	1.0000	0.05
II	N1	A	MM	N1	C	0.04965	0.1670	2658	0.30	0.7663	1.0000	0.05
II	N1	A	MM	N1	D	-1.4800	0.1343	2654	-11.02	<.0001	<.0001	0.05
II	N1	A	MM	N2	A	-1.8703	0.8330	1236	-2.25	0.0249	0.9559	0.05
II	N1	A	MM	N2	B	-0.3189	0.2581	4.377	-1.24	0.2788	1.0000	0.05
II	N1	A	MM	N2	C	-0.06626	0.2629	5.386	-0.25	0.8104	1.0000	0.05
II	N1	A	MM	N2	D	-1.4853	0.2460	3.042	-6.04	0.0088	<.0001	0.05
II	N1	A	MM	N3	A	-1.2578	0.6512	561.2	-1.93	0.0539	0.9953	0.05
II	N1	A	MM	N3	B	-0.3478	0.2519	4.219	-1.38	0.2360	1.0000	0.05
II	N1	A	MM	N3	C	0.1573	0.2831	9.631	0.56	0.5912	1.0000	0.05
II	N1	A	MM	N3	D	-1.0867	0.2426	2.55	-4.48	0.0290	0.0041	0.05
II	N1	B	II	N1	C	0.3142	0.1242	2647	2.53	0.0115	0.8358	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	*Nitrogen*	*HARVEST*	*_MAT*	*Nitrogen*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
II	N1	A	II	N1	B	0.6318	1.1613	0.3778	1.4153
II	N1	A	II	N1	C	0.9605	1.4610	0.7205	1.7010
II	N1	A	II	N1	D	-1.1987	-0.4591	-1.5534	-0.1044
II	N1	A	II	N2	A	-0.8200	0.6257	-1.0599	0.8657
II	N1	A	II	N2	B	-0.04754	1.7902	-0.06901	1.8117
II	N1	A	II	N2	C	0.1348	1.8400	0.04599	1.9288
II	N1	A	II	N2	D	-1.6915	-0.3830	-2.1782	0.1037
II	N1	A	II	N3	A	-1.0190	0.5683	-1.1980	0.7474
II	N1	A	II	N3	B	0.1848	1.7803	0.02561	1.9394
II	N1	A	II	N3	C	0.004027	1.7307	-0.07738	1.8121
II	N1	A	II	N3	D	-1.7330	-0.4238	-2.2429	0.08615
II	N1	A	IM	N1	A	-1.4511	-0.8578	-1.7356	-0.5733
II	N1	A	IM	N1	B	-0.1295	0.4831	-0.4233	0.7769
II	N1	A	IM	N1	C	0.3784	0.9280	0.1147	1.1916
II	N1	A	IM	N1	D	-1.4218	-0.8179	-1.7115	-0.5283
II	N1	A	IM	N2	A	-1.6480	-0.3310	-1.9838	0.004827
II	N1	A	IM	N2	B	-0.2594	1.0640	-0.5980	1.4026
II	N1	A	IM	N2	C	-0.1465	1.1784	-0.4462	1.4781
II	N1	A	IM	N2	D	-1.9370	-0.5334	-2.1850	-0.2854
II	N1	A	IM	N3	A	-1.9124	-0.5400	-2.2175	-0.2348
II	N1	A	IM	N3	B	-0.5136	0.9231	-0.8153	1.2249
II	N1	A	IM	N3	C	-0.05992	1.4586	-0.2634	1.6622
II	N1	A	IM	N3	D	-2.2107	-0.6003	-2.3445	-0.4665
II	N1	A	MM	N1	A	-3.3043	-0.7797	-4.5151	0.4312
II	N1	A	MM	N1	B	-0.3355	0.2333	-0.6082	0.5061
II	N1	A	MM	N1	C	-0.2779	0.3772	-0.5920	0.6913
II	N1	A	MM	N1	D	-1.7433	-1.2167	-1.9959	-0.9641
II	N1	A	MM	N2	A	-3.5046	-0.2360	-5.0706	1.3300
II	N1	A	MM	N2	B	-1.0120	0.3741	-1.3107	0.6728
II	N1	A	MM	N2	C	-0.7278	0.5953	-1.0763	0.9438
II	N1	A	MM	N2	D	-2.2621	-0.7086	-2.4303	-0.5403
II	N1	A	MM	N3	A	-2.5368	0.02131	-3.7595	1.2440
II	N1	A	MM	N3	B	-1.0331	0.3375	-1.3155	0.6199
II	N1	A	MM	N3	C	-0.4768	0.7913	-0.9302	1.2448
II	N1	A	MM	N3	D	-1.9420	-0.2314	-2.0188	-0.1546
II	N1	B	II	N1	C	0.07071	0.5577	-0.1628	0.7912

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
II	N1	B	II	N1	D	-1.7254	0.1861	2649	-9.27	<.0001	<.0001	0.05
II	N1	B	II	N2	A	-0.9936	0.2483	3.483	-4.00	0.0211	0.0282	0.05
II	N1	B	II	N2	B	-0.02519	0.2419	2.146	-0.10	0.9260	1.0000	0.05
II	N1	B	II	N2	C	0.09087	0.2427	2.452	0.37	0.7380	1.0000	0.05
II	N1	B	II	N2	D	-1.9338	0.2956	10.89	-6.54	<.0001	<.0001	0.05
II	N1	B	II	N3	A	-1.1219	0.2513	2.932	-4.46	0.0220	0.0044	0.05
II	N1	B	II	N3	B	0.08598	0.2466	2.749	0.35	0.7523	1.0000	0.05
II	N1	B	II	N3	C	-0.02918	0.2436	2.388	-0.12	0.9140	1.0000	0.05
II	N1	B	II	N3	D	-1.9749	0.3014	12.78	-6.55	<.0001	<.0001	0.05
II	N1	B	IM	N1	A	-2.0510	0.1486	2655	-13.81	<.0001	<.0001	0.05
II	N1	B	IM	N1	B	-0.7197	0.1571	2660	-4.58	<.0001	0.0026	0.05
II	N1	B	IM	N1	C	-0.2433	0.1375	2659	-1.77	0.0769	0.9990	0.05
II	N1	B	IM	N1	D	-2.0164	0.1510	2658	-13.35	<.0001	<.0001	0.05
II	N1	B	IM	N2	A	-1.8860	0.2566	4.99	-7.35	0.0007	<.0001	0.05
II	N1	B	IM	N2	B	-0.4942	0.2573	4.859	-1.92	0.1144	0.9957	0.05
II	N1	B	IM	N2	C	-0.3806	0.2483	4.402	-1.53	0.1936	1.0000	0.05
II	N1	B	IM	N2	D	-2.1317	0.2449	3.614	-8.70	0.0015	<.0001	0.05
II	N1	B	IM	N3	A	-2.1227	0.2556	4.232	-8.30	0.0009	<.0001	0.05
II	N1	B	IM	N3	B	-0.6918	0.2632	4.047	-2.63	0.0576	0.7714	0.05
II	N1	B	IM	N3	C	-0.1972	0.2484	3.098	-0.79	0.4837	1.0000	0.05
II	N1	B	IM	N3	D	-2.3020	0.2421	2.637	-9.51	0.0041	<.0001	0.05
II	N1	B	MM	N1	A	-2.9385	0.6407	2659	-4.59	<.0001	0.0025	0.05
II	N1	B	MM	N1	B	-0.9476	0.1422	2647	-6.66	<.0001	<.0001	0.05
II	N1	B	MM	N1	C	-0.8469	0.1648	2659	-5.14	<.0001	0.0002	0.05
II	N1	B	MM	N1	D	-2.3765	0.1312	2658	-18.12	<.0001	<.0001	0.05
II	N1	B	MM	N2	A	-2.7668	0.8324	1247	-3.32	0.0009	0.2344	0.05
II	N1	B	MM	N2	B	-1.2155	0.2558	4.19	-4.75	0.0080	0.0012	0.05
II	N1	B	MM	N2	C	-0.9628	0.2609	5.238	-3.69	0.0130	0.0827	0.05
II	N1	B	MM	N2	D	-2.3819	0.2435	2.87	-9.78	0.0027	<.0001	0.05
II	N1	B	MM	N3	A	-2.1543	0.6516	569.7	-3.31	0.0010	0.2449	0.05
II	N1	B	MM	N3	B	-1.2443	0.2497	3.994	-4.98	0.0076	0.0004	0.05
II	N1	B	MM	N3	C	-0.7392	0.2813	9.406	-2.63	0.0265	0.7717	0.05
II	N1	B	MM	N3	D	-1.9833	0.2404	2.375	-8.25	0.0084	<.0001	0.05
II	N1	C	II	N1	D	-2.0396	0.1812	2618	-11.26	<.0001	<.0001	0.05
II	N1	C	II	N2	A	-1.3078	0.2465	2.787	-5.31	0.0157	<.0001	0.05
II	N1	C	II	N2	B	-0.3394	0.2404	1.69	-1.41	0.3141	1.0000	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Lower	Upper	Adj Lower	Adj Upper
II	N1	B	II	N1	D	-2.0903	-1.3606	-2.4403	-1.0106
II	N1	B	II	N2	A	-1.7253	-0.2620	-1.9475	-0.03976
II	N1	B	II	N2	B	-1.0010	0.9506	-0.9544	0.9040
II	N1	B	II	N2	C	-0.7888	0.9705	-0.8414	1.0232
II	N1	B	II	N2	D	-2.5851	-1.2825	-3.0693	-0.7983
II	N1	B	II	N3	A	-1.9321	-0.3116	-2.0871	-0.1566
II	N1	B	II	N3	B	-0.7409	0.9129	-0.8614	1.0333
II	N1	B	II	N3	C	-0.9300	0.8717	-0.9651	0.9068
II	N1	B	II	N3	D	-2.6271	-1.3227	-3.1326	-0.8172
II	N1	B	IM	N1	A	-2.3423	-1.7597	-2.6217	-1.4802
II	N1	B	IM	N1	B	-1.0278	-0.4117	-1.3232	-0.1163
II	N1	B	IM	N1	C	-0.5130	0.02632	-0.7717	0.2850
II	N1	B	IM	N1	D	-2.3125	-1.7203	-2.5966	-1.4362
II	N1	B	IM	N2	A	-2.5459	-1.2261	-2.8717	-0.9004
II	N1	B	IM	N2	B	-1.1613	0.1729	-1.4825	0.4941
II	N1	B	IM	N2	C	-1.0457	0.2846	-1.3343	0.5732
II	N1	B	IM	N2	D	-2.8413	-1.4222	-3.0726	-1.1909
II	N1	B	IM	N3	A	-2.8173	-1.4281	-3.1047	-1.1407
II	N1	B	IM	N3	B	-1.4192	0.03572	-1.7029	0.3194
II	N1	B	IM	N3	C	-0.9738	0.5795	-1.1515	0.7572
II	N1	B	IM	N3	D	-3.1361	-1.4679	-3.2322	-1.3719
II	N1	B	MM	N1	A	-4.1948	-1.6822	-5.3999	-0.4771
II	N1	B	MM	N1	B	-1.2264	-0.6688	-1.4938	-0.4014
II	N1	B	MM	N1	C	-1.1701	-0.5237	-1.4801	-0.2137
II	N1	B	MM	N1	D	-2.6338	-2.1193	-2.8805	-1.8726
II	N1	B	MM	N2	A	-4.3998	-1.1339	-5.9645	0.4309
II	N1	B	MM	N2	B	-1.9132	-0.5178	-2.1982	-0.2328
II	N1	B	MM	N2	C	-1.6244	-0.3012	-1.9651	0.03952
II	N1	B	MM	N2	D	-3.1771	-1.5866	-3.3174	-1.4463
II	N1	B	MM	N3	A	-3.4340	-0.8745	-4.6574	0.3488
II	N1	B	MM	N3	B	-1.9379	-0.5507	-2.2035	-0.2852
II	N1	B	MM	N3	C	-1.3715	-0.1070	-1.8200	0.3415
II	N1	B	MM	N3	D	-2.8758	-1.0907	-2.9067	-1.0598
II	N1	C	II	N1	D	-2.3950	-1.6843	-2.7358	-1.3435
II	N1	C	II	N2	A	-2.1274	-0.4883	-2.2548	-0.3608
II	N1	C	II	N2	B	-1.5786	0.8999	-1.2631	0.5843

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
II	N1	C	II	N2	C	-0.2233	0.2404	1.862	-0.93	0.4571	1.0000	0.05
II	N1	C	II	N2	D	-2.2480	0.2936	9.363	-7.66	<.0001	<.0001	0.05
II	N1	C	II	N3	A	-1.4361	0.2495	2.323	-5.76	0.0202	<.0001	0.05
II	N1	C	II	N3	B	-0.2282	0.2451	2.189	-0.93	0.4427	1.0000	0.05
II	N1	C	II	N3	C	-0.3434	0.2418	1.841	-1.42	0.3013	1.0000	0.05
II	N1	C	II	N3	D	-2.2891	0.2997	11.12	-7.64	<.0001	<.0001	0.05
II	N1	C	IM	N1	A	-2.3652	0.1412	2647	-16.75	<.0001	<.0001	0.05
II	N1	C	IM	N1	B	-1.0339	0.1475	2661	-7.01	<.0001	<.0001	0.05
II	N1	C	IM	N1	C	-0.5575	0.1302	2659	-4.28	<.0001	0.0094	0.05
II	N1	C	IM	N1	D	-2.3306	0.1439	2659	-16.20	<.0001	<.0001	0.05
II	N1	C	IM	N2	A	-2.2002	0.2546	4.073	-8.64	0.0009	<.0001	0.05
II	N1	C	IM	N2	B	-0.8084	0.2561	4.081	-3.16	0.0333	0.3448	0.05
II	N1	C	IM	N2	C	-0.6947	0.2459	3.478	-2.83	0.0560	0.6160	0.05
II	N1	C	IM	N2	D	-2.4459	0.2430	2.861	-10.07	0.0025	<.0001	0.05
II	N1	C	IM	N3	A	-2.4369	0.2538	3.433	-9.60	0.0013	<.0001	0.05
II	N1	C	IM	N3	B	-1.0060	0.2618	3.359	-3.84	0.0254	0.0499	0.05
II	N1	C	IM	N3	C	-0.5114	0.2464	2.423	-2.08	0.1509	0.9852	0.05
II	N1	C	IM	N3	D	-2.6162	0.2404	2.051	-10.88	0.0076	<.0001	0.05
II	N1	C	MM	N1	A	-3.2527	0.6403	2659	-5.08	<.0001	0.0002	0.05
II	N1	C	MM	N1	B	-1.2618	0.1349	2649	-9.35	<.0001	<.0001	0.05
II	N1	C	MM	N1	C	-1.1611	0.1586	2658	-7.32	<.0001	<.0001	0.05
II	N1	C	MM	N1	D	-2.6907	0.1236	2660	-21.76	<.0001	<.0001	0.05
II	N1	C	MM	N2	A	-3.0810	0.8318	1206	-3.70	0.0002	0.0791	0.05
II	N1	C	MM	N2	B	-1.5297	0.2541	3.423	-6.02	0.0062	<.0001	0.05
II	N1	C	MM	N2	C	-1.2770	0.2588	4.277	-4.93	0.0066	0.0005	0.05
II	N1	C	MM	N2	D	-2.6961	0.2417	2.251	-11.16	0.0051	<.0001	0.05
II	N1	C	MM	N3	A	-2.4685	0.6501	537.6	-3.80	0.0002	0.0582	0.05
II	N1	C	MM	N3	B	-1.5585	0.2480	3.224	-6.28	0.0066	<.0001	0.05
II	N1	C	MM	N3	C	-1.0534	0.2794	7.956	-3.77	0.0055	0.0635	0.05
II	N1	C	MM	N3	D	-2.2975	0.2385	1.817	-9.63	0.0144	<.0001	0.05
II	N1	D	II	N2	A	0.7318	0.2734	12.8	2.68	0.0192	0.7359	0.05
II	N1	D	II	N2	B	1.7003	0.2685	9.629	6.33	0.0001	<.0001	0.05
II	N1	D	II	N2	C	1.8163	0.2685	10.31	6.76	<.0001	<.0001	0.05
II	N1	D	II	N2	D	-0.2084	0.3049	19.7	-0.68	0.5024	1.0000	0.05
II	N1	D	II	N3	A	0.6036	0.2754	11.34	2.19	0.0501	0.9679	0.05
II	N1	D	II	N3	B	1.8114	0.2718	11.41	6.67	<.0001	<.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Lower	Upper	Adj Lower	Adj Upper
II	N1	C	II	N2	C	-1.3345	0.8878	-1.1468	0.7001
II	N1	C	II	N2	D	-2.9082	-1.5878	-3.3758	-1.1202
II	N1	C	II	N3	A	-2.3783	-0.4938	-2.3944	-0.4777
II	N1	C	II	N3	B	-1.2003	0.7439	-1.1699	0.7134
II	N1	C	II	N3	C	-1.4748	0.7880	-1.2722	0.5854
II	N1	C	II	N3	D	-2.9478	-1.6304	-3.4404	-1.1378
II	N1	C	IM	N1	A	-2.6421	-2.0883	-2.9077	-1.8227
II	N1	C	IM	N1	B	-1.3231	-0.7448	-1.6005	-0.4674
II	N1	C	IM	N1	C	-0.8128	-0.3023	-1.0576	-0.05747
II	N1	C	IM	N1	D	-2.6128	-2.0484	-2.8835	-1.7778
II	N1	C	IM	N2	A	-2.9023	-1.4982	-3.1785	-1.2220
II	N1	C	IM	N2	B	-1.5139	-0.1030	-1.7922	0.1754
II	N1	C	IM	N2	C	-1.4199	0.03042	-1.6395	0.2500
II	N1	C	IM	N2	D	-3.2408	-1.6511	-3.3793	-1.5126
II	N1	C	IM	N3	A	-3.1901	-1.6837	-3.4121	-1.4617
II	N1	C	IM	N3	B	-1.7910	-0.2209	-2.0117	-0.00016
II	N1	C	IM	N3	C	-1.4125	0.3898	-1.4579	0.4352
II	N1	C	IM	N3	D	-3.6263	-1.6062	-3.5397	-1.6928
II	N1	C	MM	N1	A	-4.5082	-1.9972	-5.7125	-0.7928
II	N1	C	MM	N1	B	-1.5263	-0.9973	-1.7800	-0.7436
II	N1	C	MM	N1	C	-1.4721	-0.8501	-1.7703	-0.5518
II	N1	C	MM	N1	D	-2.9331	-2.4483	-3.1657	-2.2158
II	N1	C	MM	N2	A	-4.7129	-1.4492	-6.2765	0.1144
II	N1	C	MM	N2	B	-2.2846	-0.7748	-2.5057	-0.5536
II	N1	C	MM	N2	C	-1.9776	-0.5764	-2.2712	-0.2827
II	N1	C	MM	N2	D	-3.6321	-1.7600	-3.6244	-1.7677
II	N1	C	MM	N3	A	-3.7455	-1.1915	-4.9660	0.02901
II	N1	C	MM	N3	B	-2.3178	-0.7993	-2.5114	-0.6057
II	N1	C	MM	N3	C	-1.6983	-0.4086	-2.1267	0.01975
II	N1	C	MM	N3	D	-3.4291	-1.1658	-3.2137	-1.3813
II	N1	D	II	N2	A	0.1402	1.3234	-0.3186	1.7822
II	N1	D	II	N2	B	1.0988	2.3017	0.6687	2.7318
II	N1	D	II	N2	C	1.2205	2.4121	0.7848	2.8478
II	N1	D	II	N2	D	-0.8450	0.4283	-1.3798	0.9631
II	N1	D	II	N3	A	-0.00046	1.2076	-0.4546	1.6617
II	N1	D	II	N3	B	1.2159	2.4069	0.7674	2.8554

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
II	N1	D	II	N3	C	1.6963	0.2685	10.41	6.32	<.0001	<.0001	0.05
II	N1	D	II	N3	D	-0.2495	0.3170	26.69	-0.79	0.4382	1.0000	0.05
II	N1	D	IM	N1	A	-0.3255	0.1994	2588	-1.63	0.1027	0.9998	0.05
II	N1	D	IM	N1	B	1.0057	0.2035	2568	4.94	<.0001	0.0005	0.05
II	N1	D	IM	N1	C	1.4821	0.1895	2657	7.82	<.0001	<.0001	0.05
II	N1	D	IM	N1	D	-0.2910	0.2045	2656	-1.42	0.1549	1.0000	0.05
II	N1	D	IM	N2	A	-0.1606	0.2808	15.99	-0.57	0.5754	1.0000	0.05
II	N1	D	IM	N2	B	1.2312	0.2821	15.79	4.36	0.0005	0.0067	0.05
II	N1	D	IM	N2	C	1.3449	0.2735	15.43	4.92	0.0002	0.0005	0.05
II	N1	D	IM	N2	D	-0.4063	0.2696	13.31	-1.51	0.1551	1.0000	0.05
II	N1	D	IM	N3	A	-0.3973	0.2791	14.5	-1.42	0.1758	1.0000	0.05
II	N1	D	IM	N3	B	1.0337	0.2867	13.43	3.61	0.0030	0.1077	0.05
II	N1	D	IM	N3	C	1.5283	0.2730	12.14	5.60	0.0001	<.0001	0.05
II	N1	D	IM	N3	D	-0.5766	0.2662	11.06	-2.17	0.0530	0.9727	0.05
II	N1	D	MM	N1	A	-1.2130	0.6560	2654	-1.85	0.0645	0.9978	0.05
II	N1	D	MM	N1	B	0.7778	0.1928	2657	4.03	<.0001	0.0250	0.05
II	N1	D	MM	N1	C	0.8786	0.2100	2642	4.18	<.0001	0.0140	0.05
II	N1	D	MM	N1	D	-0.6511	0.1851	2652	-3.52	0.0004	0.1398	0.05
II	N1	D	MM	N2	A	-1.0414	0.8401	1436	-1.24	0.2153	1.0000	0.05
II	N1	D	MM	N2	B	0.5100	0.2807	14.12	1.82	0.0905	0.9984	0.05
II	N1	D	MM	N2	C	0.7627	0.2851	16.27	2.67	0.0164	0.7373	0.05
II	N1	D	MM	N2	D	-0.6564	0.2695	11.59	-2.44	0.0320	0.8869	0.05
II	N1	D	MM	N3	A	-0.4288	0.6616	736.9	-0.65	0.5171	1.0000	0.05
II	N1	D	MM	N3	B	0.4811	0.2741	14.69	1.76	0.1001	0.9992	0.05
II	N1	D	MM	N3	C	0.9862	0.3029	24.37	3.26	0.0033	0.2763	0.05
II	N1	D	MM	N3	D	-0.2578	0.2653	10.6	-0.97	0.3528	1.0000	0.05
II	N2	A	II	N2	B	0.9685	0.1306	2655	7.42	<.0001	<.0001	0.05
II	N2	A	II	N2	C	1.0845	0.1336	2646	8.12	<.0001	<.0001	0.05
II	N2	A	II	N2	D	-0.9402	0.2079	2658	-4.52	<.0001	0.0034	0.05
II	N2	A	II	N3	A	-0.1282	0.2545	3.423	-0.50	0.6451	1.0000	0.05
II	N2	A	II	N3	B	1.0796	0.2502	3.246	4.32	0.0195	0.0082	0.05
II	N2	A	II	N3	C	0.9645	0.2470	2.835	3.91	0.0330	0.0400	0.05
II	N2	A	II	N3	D	-0.9813	0.3038	13.72	-3.23	0.0062	0.2934	0.05
II	N2	A	IM	N1	A	-1.0573	0.2620	4.47	-4.04	0.0125	0.0248	0.05
II	N2	A	IM	N1	B	0.2739	0.2663	4.894	1.03	0.3518	1.0000	0.05
II	N2	A	IM	N1	C	0.7503	0.2490	4.098	3.01	0.0382	0.4571	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Lower	Upper	Adj Lower	Adj Upper
II	N1	D	II	N3	C	1.1011	2.2915	0.6646	2.7279
II	N1	D	II	N3	D	-0.9002	0.4013	-1.4672	0.9683
II	N1	D	IM	N1	A	-0.7165	0.06544	-1.0916	0.4405
II	N1	D	IM	N1	B	0.6066	1.4048	0.2237	1.7877
II	N1	D	IM	N1	C	1.1105	1.8537	0.7540	2.2102
II	N1	D	IM	N1	D	-0.6919	0.1100	-1.0766	0.4946
II	N1	D	IM	N2	A	-0.7560	0.4348	-1.2394	0.9183
II	N1	D	IM	N2	B	0.6326	1.8298	0.1476	2.3148
II	N1	D	IM	N2	C	0.7634	1.9264	0.2943	2.3955
II	N1	D	IM	N2	D	-0.9873	0.1747	-1.4419	0.6293
II	N1	D	IM	N3	A	-0.9940	0.1995	-1.4697	0.6751
II	N1	D	IM	N3	B	0.4163	1.6511	-0.06783	2.1352
II	N1	D	IM	N3	C	0.9343	2.1222	0.4797	2.5769
II	N1	D	IM	N3	D	-1.1621	0.008960	-1.5993	0.4461
II	N1	D	MM	N1	A	-2.4993	0.07324	-3.7332	1.3071
II	N1	D	MM	N1	B	0.3998	1.1559	0.03708	1.5186
II	N1	D	MM	N1	C	0.4669	1.2902	0.07199	1.6851
II	N1	D	MM	N1	D	-1.0141	-0.2881	-1.3623	0.06011
II	N1	D	MM	N2	A	-2.6894	0.6066	-4.2689	2.1861
II	N1	D	MM	N2	B	-0.09156	1.1115	-0.5684	1.5883
II	N1	D	MM	N2	C	0.1590	1.3663	-0.3328	1.8581
II	N1	D	MM	N2	D	-1.2458	-0.06698	-1.6916	0.3788
II	N1	D	MM	N3	A	-1.7278	0.8701	-2.9707	2.1130
II	N1	D	MM	N3	B	-0.1043	1.0665	-0.5721	1.5343
II	N1	D	MM	N3	C	0.3616	1.6108	-0.1774	2.1498
II	N1	D	MM	N3	D	-0.8444	0.3288	-1.2770	0.7614
II	N2	A	II	N2	B	0.7125	1.2244	0.4669	1.4700
II	N2	A	II	N2	C	0.8225	1.3465	0.5712	1.5978
II	N2	A	II	N2	D	-1.3478	-0.5325	-1.7388	-0.1415
II	N2	A	II	N3	A	-0.8844	0.6280	-1.1060	0.8496
II	N2	A	II	N3	B	0.3166	1.8427	0.1186	2.0407
II	N2	A	II	N3	C	0.1520	1.7769	0.01568	1.9132
II	N2	A	II	N3	D	-1.6340	-0.3285	-2.1483	0.1858
II	N2	A	IM	N1	A	-1.7555	-0.3592	-2.0637	-0.05096
II	N2	A	IM	N1	B	-0.4151	0.9629	-0.7491	1.2969
II	N2	A	IM	N1	C	0.06550	1.4351	-0.2062	1.7068

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
II	N2	A	IM	N1	D	-1.0228	0.2587	5.157	-3.95	0.0102	0.0338	0.05
II	N2	A	IM	N2	A	-0.8924	0.1598	2643	-5.59	<.0001	<.0001	0.05
II	N2	A	IM	N2	B	0.4994	0.1613	2648	3.10	0.0020	0.3903	0.05
II	N2	A	IM	N2	C	0.6131	0.1528	2646	4.01	<.0001	0.0272	0.05
II	N2	A	IM	N2	D	-1.1381	0.1453	2643	-7.83	<.0001	<.0001	0.05
II	N2	A	IM	N3	A	-1.1291	0.2590	4.798	-4.36	0.0080	0.0068	0.05
II	N2	A	IM	N3	B	0.3019	0.2668	4.597	1.13	0.3134	1.0000	0.05
II	N2	A	IM	N3	C	0.7965	0.2517	3.594	3.16	0.0395	0.3395	0.05
II	N2	A	IM	N3	D	-1.3084	0.2456	3.112	-5.33	0.0118	<.0001	0.05
II	N2	A	MM	N1	A	-1.9448	0.6761	790.8	-2.88	0.0041	0.5726	0.05
II	N2	A	MM	N1	B	0.04604	0.2505	4.62	0.18	0.8620	1.0000	0.05
II	N2	A	MM	N1	C	0.1468	0.2686	6.582	0.55	0.6028	1.0000	0.05
II	N2	A	MM	N1	D	-1.3829	0.2472	3.452	-5.59	0.0077	<.0001	0.05
II	N2	A	MM	N2	A	-1.7732	0.8058	2650	-2.20	0.0278	0.9661	0.05
II	N2	A	MM	N2	B	-0.2218	0.1557	2655	-1.42	0.1544	1.0000	0.05
II	N2	A	MM	N2	C	0.03086	0.1650	2658	0.19	0.8517	1.0000	0.05
II	N2	A	MM	N2	D	-1.3882	0.1380	2653	-10.06	<.0001	<.0001	0.05
II	N2	A	MM	N3	A	-1.1607	0.6472	697.2	-1.79	0.0733	0.9988	0.05
II	N2	A	MM	N3	B	-0.2507	0.2530	4.589	-0.99	0.3711	1.0000	0.05
II	N2	A	MM	N3	C	0.2544	0.2842	10.07	0.90	0.3916	1.0000	0.05
II	N2	A	MM	N3	D	-0.9896	0.2438	2.834	-4.06	0.0300	0.0227	0.05
II	N2	B	II	N2	C	0.1161	0.1151	2648	1.01	0.3134	1.0000	0.05
II	N2	B	II	N2	D	-1.9086	0.1954	2658	-9.77	<.0001	<.0001	0.05
II	N2	B	II	N3	A	-1.0967	0.2487	2.163	-4.41	0.0413	0.0055	0.05
II	N2	B	II	N3	B	0.1112	0.2442	2.003	0.46	0.6936	1.0000	0.05
II	N2	B	II	N3	C	-0.00399	0.2411	1.706	-0.02	0.9885	1.0000	0.05
II	N2	B	II	N3	D	-1.9497	0.2991	10.71	-6.52	<.0001	<.0001	0.05
II	N2	B	IM	N1	A	-2.0258	0.2560	2.993	-7.91	0.0042	<.0001	0.05
II	N2	B	IM	N1	B	-0.6946	0.2600	3.303	-2.67	0.0683	0.7401	0.05
II	N2	B	IM	N1	C	-0.2181	0.2429	2.617	-0.90	0.4440	1.0000	0.05
II	N2	B	IM	N1	D	-1.9912	0.2530	3.494	-7.87	0.0024	<.0001	0.05
II	N2	B	IM	N2	A	-1.8608	0.1459	2642	-12.76	<.0001	<.0001	0.05
II	N2	B	IM	N2	B	-0.4690	0.1473	2656	-3.18	0.0015	0.3256	0.05
II	N2	B	IM	N2	C	-0.3554	0.1364	2644	-2.61	0.0092	0.7872	0.05
II	N2	B	IM	N2	D	-2.1065	0.1296	2646	-16.25	<.0001	<.0001	0.05
II	N2	B	IM	N3	A	-2.0975	0.2535	3.216	-8.28	0.0028	<.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	*Nitrogen*	*HARVEST*	*_MAT*	*Nitrogen*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
II	N2	A	IM	N1	D	-1.6818	-0.3637	-2.0168	-0.02875
II	N2	A	IM	N2	A	-1.2057	-0.5791	-1.5062	-0.2786
II	N2	A	IM	N2	B	0.1832	0.8156	-0.1201	1.1189
II	N2	A	IM	N2	C	0.3134	0.9128	0.02593	1.2003
II	N2	A	IM	N2	D	-1.4231	-0.8531	-1.6964	-0.5798
II	N2	A	IM	N3	A	-1.8033	-0.4548	-2.1240	-0.1341
II	N2	A	IM	N3	B	-0.4024	1.0062	-0.7231	1.3269
II	N2	A	IM	N3	C	0.06538	1.5276	-0.1705	1.7635
II	N2	A	IM	N3	D	-2.0743	-0.5425	-2.2518	-0.3649
II	N2	A	MM	N1	A	-3.2720	-0.6177	-4.5422	0.6525
II	N2	A	MM	N1	B	-0.6143	0.7064	-0.9165	1.0086
II	N2	A	MM	N1	C	-0.4965	0.7901	-0.8850	1.1785
II	N2	A	MM	N1	D	-2.1143	-0.6515	-2.3325	-0.4333
II	N2	A	MM	N2	A	-3.3532	-0.1932	-4.8688	1.3224
II	N2	A	MM	N2	B	-0.5272	0.08351	-0.8201	0.3764
II	N2	A	MM	N2	C	-0.2927	0.3544	-0.6030	0.6647
II	N2	A	MM	N2	D	-1.6589	-1.1175	-1.9185	-0.8579
II	N2	A	MM	N3	A	-2.4313	0.1100	-3.6469	1.3256
II	N2	A	MM	N3	B	-0.9190	0.4176	-1.2227	0.7213
II	N2	A	MM	N3	C	-0.3782	0.8870	-0.8373	1.3461
II	N2	A	MM	N3	D	-1.7917	-0.1876	-1.9261	-0.05319
II	N2	B	II	N2	C	-0.1096	0.3417	-0.3261	0.5582
II	N2	B	II	N2	D	-2.2918	-1.5254	-2.6593	-1.1579
II	N2	B	II	N3	A	-2.0930	-0.1003	-2.0522	-0.1412
II	N2	B	II	N3	B	-0.9382	1.1605	-0.8272	1.0495
II	N2	B	II	N3	C	-1.2328	1.2248	-0.9303	0.9223
II	N2	B	II	N3	D	-2.6101	-1.2893	-3.0986	-0.8008
II	N2	B	IM	N1	A	-2.8415	-1.2101	-3.0092	-1.0424
II	N2	B	IM	N1	B	-1.4808	0.09169	-1.6936	0.3045
II	N2	B	IM	N1	C	-1.0592	0.6229	-1.1512	0.7149
II	N2	B	IM	N1	D	-2.7355	-1.2469	-2.9630	-1.0194
II	N2	B	IM	N2	A	-2.1469	-1.5748	-2.4212	-1.3005
II	N2	B	IM	N2	B	-0.7579	-0.1801	-1.0351	0.09696
II	N2	B	IM	N2	C	-0.6228	-0.08793	-0.8793	0.1686
II	N2	B	IM	N2	D	-2.3607	-1.8524	-2.6045	-1.6085
II	N2	B	IM	N3	A	-2.8743	-1.3207	-3.0713	-1.1238

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
II	N2	B	IM	N3	B	-0.6666	0.2611	3.097	-2.55	0.0811	0.8218	0.05
II	N2	B	IM	N3	C	-0.1720	0.2460	2.283	-0.70	0.5490	1.0000	0.05
II	N2	B	IM	N3	D	-2.2768	0.2397	1.883	-9.50	0.0132	<.0001	0.05
II	N2	B	MM	N1	A	-2.9133	0.6726	733.5	-4.33	<.0001	0.0077	0.05
II	N2	B	MM	N1	B	-0.9224	0.2444	2.994	-3.77	0.0327	0.0629	0.05
II	N2	B	MM	N1	C	-0.8217	0.2628	4.652	-3.13	0.0287	0.3676	0.05
II	N2	B	MM	N1	D	-2.3513	0.2410	2.146	-9.76	0.0082	<.0001	0.05
II	N2	B	MM	N2	A	-2.7416	0.8028	2651	-3.41	0.0006	0.1855	0.05
II	N2	B	MM	N2	B	-1.1903	0.1416	2654	-8.40	<.0001	<.0001	0.05
II	N2	B	MM	N2	C	-0.9376	0.1499	2654	-6.25	<.0001	<.0001	0.05
II	N2	B	MM	N2	D	-2.3567	0.1215	2661	-19.40	<.0001	<.0001	0.05
II	N2	B	MM	N3	A	-2.1291	0.6454	648.6	-3.30	0.0010	0.2494	0.05
II	N2	B	MM	N3	B	-1.2191	0.2473	2.994	-4.93	0.0161	0.0005	0.05
II	N2	B	MM	N3	C	-0.7141	0.2795	7.599	-2.55	0.0354	0.8208	0.05
II	N2	B	MM	N3	D	-1.9581	0.2378	1.678	-8.23	0.0236	<.0001	0.05
II	N2	C	II	N2	D	-2.0247	0.1975	2660	-10.25	<.0001	<.0001	0.05
II	N2	C	II	N3	A	-1.2127	0.2490	2.397	-4.87	0.0273	0.0007	0.05
II	N2	C	II	N3	B	-0.00488	0.2449	2.263	-0.02	0.9857	1.0000	0.05
II	N2	C	II	N3	C	-0.1200	0.2413	1.9	-0.50	0.6704	1.0000	0.05
II	N2	C	II	N3	D	-2.0658	0.2990	11.32	-6.91	<.0001	<.0001	0.05
II	N2	C	IM	N1	A	-2.1419	0.2561	3.262	-8.36	0.0026	<.0001	0.05
II	N2	C	IM	N1	B	-0.8106	0.2608	3.679	-3.11	0.0402	0.3816	0.05
II	N2	C	IM	N1	C	-0.3342	0.2432	2.904	-1.37	0.2658	1.0000	0.05
II	N2	C	IM	N1	D	-2.1073	0.2534	3.855	-8.32	0.0013	<.0001	0.05
II	N2	C	IM	N2	A	-1.9769	0.1485	2650	-13.31	<.0001	<.0001	0.05
II	N2	C	IM	N2	B	-0.5851	0.1500	2648	-3.90	<.0001	0.0407	0.05
II	N2	C	IM	N2	C	-0.4714	0.1414	2642	-3.33	0.0009	0.2285	0.05
II	N2	C	IM	N2	D	-2.2226	0.1322	2653	-16.81	<.0001	<.0001	0.05
II	N2	C	IM	N3	A	-2.2136	0.2536	3.497	-8.73	0.0017	<.0001	0.05
II	N2	C	IM	N3	B	-0.7826	0.2616	3.406	-2.99	0.0494	0.4749	0.05
II	N2	C	IM	N3	C	-0.2880	0.2461	2.496	-1.17	0.3413	1.0000	0.05
II	N2	C	IM	N3	D	-2.3929	0.2402	2.124	-9.96	0.0081	<.0001	0.05
II	N2	C	MM	N1	A	-3.0294	0.6731	755.7	-4.50	<.0001	0.0037	0.05
II	N2	C	MM	N1	B	-1.0385	0.2449	3.336	-4.24	0.0194	0.0112	0.05
II	N2	C	MM	N1	C	-0.9377	0.2627	4.983	-3.57	0.0161	0.1198	0.05
II	N2	C	MM	N1	D	-2.4674	0.2413	2.395	-10.22	0.0050	<.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Lower	Upper	Adj Lower	Adj Upper
II	N2	B	IM	N3	B	-1.4830	0.1498	-1.6696	0.3364
II	N2	B	IM	N3	C	-1.1143	0.7704	-1.1172	0.7733
II	N2	B	IM	N3	D	-3.3719	-1.1818	-3.1976	-1.3560
II	N2	B	MM	N1	A	-4.2338	-1.5928	-5.4973	-0.3293
II	N2	B	MM	N1	B	-1.7012	-0.1437	-1.8614	0.01656
II	N2	B	MM	N1	C	-1.5128	-0.1306	-1.8314	0.1880
II	N2	B	MM	N1	D	-3.3235	-1.3792	-3.2773	-1.4254
II	N2	B	MM	N2	A	-4.3159	-1.1674	-5.8259	0.3426
II	N2	B	MM	N2	B	-1.4680	-0.9125	-1.7344	-0.6461
II	N2	B	MM	N2	C	-1.2315	-0.6437	-1.5135	-0.3617
II	N2	B	MM	N2	D	-2.5948	-2.1185	-2.8233	-1.8901
II	N2	B	MM	N3	A	-3.3964	-0.8618	-4.6085	0.3503
II	N2	B	MM	N3	B	-2.0070	-0.4312	-2.1692	-0.2691
II	N2	B	MM	N3	C	-1.3646	-0.06354	-1.7879	0.3598
II	N2	B	MM	N3	D	-3.1944	-0.7217	-2.8716	-1.0446
II	N2	C	II	N2	D	-2.4120	-1.6374	-2.7835	-1.2659
II	N2	C	II	N3	A	-2.1309	-0.2946	-2.1695	-0.2560
II	N2	C	II	N3	B	-0.9495	0.9398	-0.9456	0.9358
II	N2	C	II	N3	C	-1.2124	0.9724	-1.0471	0.8070
II	N2	C	II	N3	D	-2.7217	-1.4098	-3.2146	-0.9169
II	N2	C	IM	N1	A	-2.9210	-1.3627	-3.1256	-1.1581
II	N2	C	IM	N1	B	-1.5604	-0.06086	-1.8126	0.1914
II	N2	C	IM	N1	C	-1.1228	0.4544	-1.2684	0.6000
II	N2	C	IM	N1	D	-2.8213	-1.3932	-3.0807	-1.1339
II	N2	C	IM	N2	A	-2.2681	-1.6857	-2.5474	-1.4064
II	N2	C	IM	N2	B	-0.8792	-0.2910	-1.1613	-0.00887
II	N2	C	IM	N2	C	-0.7486	-0.1942	-1.0146	0.07172
II	N2	C	IM	N2	D	-2.4819	-1.9633	-2.7305	-1.7147
II	N2	C	IM	N3	A	-2.9594	-1.4678	-3.1877	-1.2395
II	N2	C	IM	N3	B	-1.5616	-0.00360	-1.7875	0.2222
II	N2	C	IM	N3	C	-1.1687	0.5927	-1.2333	0.6573
II	N2	C	IM	N3	D	-3.3704	-1.4154	-3.3155	-1.4702
II	N2	C	MM	N1	A	-4.3508	-1.7079	-5.6153	-0.4434
II	N2	C	MM	N1	B	-1.7752	-0.3017	-1.9792	-0.09774
II	N2	C	MM	N1	C	-1.6137	-0.2618	-1.9469	0.07144
II	N2	C	MM	N1	D	-3.3577	-1.5770	-3.3944	-1.5403

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
II	N2	C	MM	N2	A	-2.8577	0.8038	2651	-3.56	0.0004	0.1251	0.05
II	N2	C	MM	N2	B	-1.3063	0.1431	2658	-9.13	<.0001	<.0001	0.05
II	N2	C	MM	N2	C	-1.0537	0.1537	2656	-6.86	<.0001	<.0001	0.05
II	N2	C	MM	N2	D	-2.4727	0.1247	2655	-19.83	<.0001	<.0001	0.05
II	N2	C	MM	N3	A	-2.2452	0.6455	666.1	-3.48	0.0005	0.1561	0.05
II	N2	C	MM	N3	B	-1.3352	0.2477	3.319	-5.39	0.0096	<.0001	0.05
II	N2	C	MM	N3	C	-0.8301	0.2791	8.004	-2.97	0.0178	0.4901	0.05
II	N2	C	MM	N3	D	-2.0741	0.2381	1.885	-8.71	0.0155	<.0001	0.05
II	N2	D	II	N3	A	0.8120	0.2989	10.54	2.72	0.0208	0.7050	0.05
II	N2	D	II	N3	B	2.0198	0.2958	10.63	6.83	<.0001	<.0001	0.05
II	N2	D	II	N3	C	1.9046	0.2926	9.806	6.51	<.0001	<.0001	0.05
II	N2	D	II	N3	D	-0.04110	0.3339	20.96	-0.12	0.9032	1.0000	0.05
II	N2	D	IM	N1	A	-0.1172	0.3064	11.65	-0.38	0.7090	1.0000	0.05
II	N2	D	IM	N1	B	1.2141	0.3107	12.34	3.91	0.0020	0.0398	0.05
II	N2	D	IM	N1	C	1.6905	0.2952	11.86	5.73	<.0001	<.0001	0.05
II	N2	D	IM	N1	D	-0.08261	0.3023	12.78	-0.27	0.7890	1.0000	0.05
II	N2	D	IM	N2	A	0.04778	0.2172	2660	0.22	0.8259	1.0000	0.05
II	N2	D	IM	N2	B	1.4396	0.2182	2650	6.60	<.0001	<.0001	0.05
II	N2	D	IM	N2	C	1.5533	0.2104	2654	7.38	<.0001	<.0001	0.05
II	N2	D	IM	N2	D	-0.1979	0.2060	2656	-0.96	0.3368	1.0000	0.05
II	N2	D	IM	N3	A	-0.1889	0.3025	12.96	-0.62	0.5431	1.0000	0.05
II	N2	D	IM	N3	B	1.2421	0.3096	12.12	4.01	0.0017	0.0272	0.05
II	N2	D	IM	N3	C	1.7366	0.2969	11.22	5.85	0.0001	<.0001	0.05
II	N2	D	IM	N3	D	-0.3682	0.2904	10.25	-1.27	0.2328	1.0000	0.05
II	N2	D	MM	N1	A	-1.0047	0.6939	745	-1.45	0.1481	1.0000	0.05
II	N2	D	MM	N1	B	0.9862	0.2969	12.92	3.32	0.0056	0.2358	0.05
II	N2	D	MM	N1	C	1.0869	0.3122	15.1	3.48	0.0033	0.1547	0.05
II	N2	D	MM	N1	D	-0.4427	0.2936	10.64	-1.51	0.1607	1.0000	0.05
II	N2	D	MM	N2	A	-0.8330	0.8151	2648	-1.02	0.3068	1.0000	0.05
II	N2	D	MM	N2	B	0.7183	0.2132	2659	3.37	0.0008	0.2088	0.05
II	N2	D	MM	N2	C	0.9710	0.2189	2660	4.44	<.0001	0.0049	0.05
II	N2	D	MM	N2	D	-0.4481	0.2014	2660	-2.22	0.0262	0.9610	0.05
II	N2	D	MM	N3	A	-0.2205	0.6661	687.4	-0.33	0.7407	1.0000	0.05
II	N2	D	MM	N3	B	0.6895	0.2980	13.22	2.31	0.0374	0.9362	0.05
II	N2	D	MM	N3	C	1.1946	0.3250	20.51	3.68	0.0015	0.0866	0.05
II	N2	D	MM	N3	D	-0.04946	0.2897	9.997	-0.17	0.8678	1.0000	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Lower	Upper	Adj Lower	Adj Upper
II	N2	C	MM	N2	A	-4.4338	-1.2816	-5.9457	0.2303
II	N2	C	MM	N2	B	-1.5870	-1.0257	-1.8563	-0.7564
II	N2	C	MM	N2	C	-1.3550	-0.7523	-1.6440	-0.4633
II	N2	C	MM	N2	D	-2.7173	-2.2282	-2.9519	-1.9936
II	N2	C	MM	N3	A	-3.5126	-0.9777	-4.7251	0.2347
II	N2	C	MM	N3	B	-2.0824	-0.5880	-2.2869	-0.3835
II	N2	C	MM	N3	C	-1.4738	-0.1865	-1.9025	0.2423
II	N2	C	MM	N3	D	-3.1611	-0.9871	-2.9888	-1.1594
II	N2	D	II	N3	A	0.1506	1.4733	-0.3363	1.9602
II	N2	D	II	N3	B	1.3660	2.6735	0.8835	3.1561
II	N2	D	II	N3	C	1.2509	2.5583	0.7806	3.0287
II	N2	D	II	N3	D	-0.7355	0.6533	-1.3237	1.2415
II	N2	D	IM	N1	A	-0.7869	0.5526	-1.2942	1.0598
II	N2	D	IM	N1	B	0.5391	1.8890	0.02026	2.4079
II	N2	D	IM	N1	C	1.0465	2.3344	0.5565	2.8244
II	N2	D	IM	N1	D	-0.7368	0.5715	-1.2438	1.0786
II	N2	D	IM	N2	A	-0.3780	0.4736	-0.7865	0.8820
II	N2	D	IM	N2	B	1.0118	1.8674	0.6014	2.2777
II	N2	D	IM	N2	C	1.1407	1.9658	0.7450	2.3615
II	N2	D	IM	N2	D	-0.6019	0.2061	-0.9894	0.5936
II	N2	D	IM	N3	A	-0.8426	0.4647	-1.3510	0.9731
II	N2	D	IM	N3	B	0.5682	1.9159	0.05263	2.4315
II	N2	D	IM	N3	C	1.0848	2.3885	0.5961	2.8772
II	N2	D	IM	N3	D	-1.0130	0.2766	-1.4837	0.7473
II	N2	D	MM	N1	A	-2.3669	0.3575	-3.6704	1.6610
II	N2	D	MM	N1	B	0.3444	1.6280	-0.1544	2.1268
II	N2	D	MM	N1	C	0.4218	1.7520	-0.1125	2.2864
II	N2	D	MM	N1	D	-1.0916	0.2062	-1.5707	0.6853
II	N2	D	MM	N2	A	-2.4312	0.7652	-3.9643	2.2982
II	N2	D	MM	N2	B	0.3003	1.1363	-0.1006	1.5373
II	N2	D	MM	N2	C	0.5418	1.4002	0.1302	1.8119
II	N2	D	MM	N2	D	-0.8431	-0.05304	-1.2220	0.3259
II	N2	D	MM	N3	A	-1.5283	1.0874	-2.7795	2.3386
II	N2	D	MM	N3	B	0.04684	1.3321	-0.4553	1.8342
II	N2	D	MM	N3	C	0.5177	1.8714	-0.05399	2.4431
II	N2	D	MM	N3	D	-0.6950	0.5961	-1.1624	1.0635

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
II	N3	A	II	N3	B	1.2078	0.1334	2659	9.05	<.0001	<.0001	0.05
II	N3	A	II	N3	C	1.0927	0.1273	2653	8.58	<.0001	<.0001	0.05
II	N3	A	II	N3	D	-0.8531	0.2121	2648	-4.02	<.0001	0.0261	0.05
II	N3	A	IM	N1	A	-0.9291	0.2645	3.782	-3.51	0.0270	0.1417	0.05
II	N3	A	IM	N1	B	0.4021	0.2693	4.182	1.49	0.2066	1.0000	0.05
II	N3	A	IM	N1	C	0.8785	0.2517	3.449	3.49	0.0319	0.1505	0.05
II	N3	A	IM	N1	D	-0.8946	0.2606	4.522	-3.43	0.0218	0.1767	0.05
II	N3	A	IM	N2	A	-0.7642	0.2623	4.751	-2.91	0.0354	0.5416	0.05
II	N3	A	IM	N2	B	0.6276	0.2642	4.712	2.38	0.0666	0.9135	0.05
II	N3	A	IM	N2	C	0.7413	0.2554	4.144	2.90	0.0422	0.5504	0.05
II	N3	A	IM	N2	D	-1.0099	0.2508	3.519	-4.03	0.0203	0.0257	0.05
II	N3	A	IM	N3	A	-1.0009	0.1502	2652	-6.66	<.0001	<.0001	0.05
II	N3	A	IM	N3	B	0.4301	0.1542	2660	2.79	0.0053	0.6457	0.05
II	N3	A	IM	N3	C	0.9247	0.1372	2660	6.74	<.0001	<.0001	0.05
II	N3	A	IM	N3	D	-1.1802	0.1295	2655	-9.11	<.0001	<.0001	0.05
II	N3	A	MM	N1	A	-1.8166	0.6745	793.2	-2.69	0.0072	0.7232	0.05
II	N3	A	MM	N1	B	0.1743	0.2533	3.896	0.69	0.5302	1.0000	0.05
II	N3	A	MM	N1	C	0.2750	0.2715	5.579	1.01	0.3530	1.0000	0.05
II	N3	A	MM	N1	D	-1.2547	0.2501	2.879	-5.02	0.0168	0.0003	0.05
II	N3	A	MM	N2	A	-1.6450	0.8328	1228	-1.98	0.0485	0.9932	0.05
II	N3	A	MM	N2	B	-0.09362	0.2620	4.028	-0.36	0.7388	1.0000	0.05
II	N3	A	MM	N2	C	0.1591	0.2665	5.01	0.60	0.5766	1.0000	0.05
II	N3	A	MM	N2	D	-1.2600	0.2500	2.799	-5.04	0.0177	0.0003	0.05
II	N3	A	MM	N3	A	-1.0324	0.6135	2647	-1.68	0.0925	0.9996	0.05
II	N3	A	MM	N3	B	-0.1225	0.1454	2642	-0.84	0.3996	1.0000	0.05
II	N3	A	MM	N3	C	0.3826	0.1896	2659	2.02	0.0436	0.9904	0.05
II	N3	A	MM	N3	D	-0.8614	0.1259	2660	-6.84	<.0001	<.0001	0.05
II	N3	B	II	N3	C	-0.1152	0.1231	2651	-0.94	0.3495	1.0000	0.05
II	N3	B	II	N3	D	-2.0609	0.2102	2657	-9.80	<.0001	<.0001	0.05
II	N3	B	IM	N1	A	-2.1370	0.2602	3.629	-8.21	0.0018	<.0001	0.05
II	N3	B	IM	N1	B	-0.8057	0.2649	4.022	-3.04	0.0381	0.4345	0.05
II	N3	B	IM	N1	C	-0.3293	0.2474	3.309	-1.33	0.2674	1.0000	0.05
II	N3	B	IM	N1	D	-2.1024	0.2563	4.375	-8.20	0.0008	<.0001	0.05
II	N3	B	IM	N2	A	-1.9720	0.2584	4.631	-7.63	0.0009	<.0001	0.05
II	N3	B	IM	N2	B	-0.5802	0.2602	4.594	-2.23	0.0810	0.9597	0.05
II	N3	B	IM	N2	C	-0.4665	0.2513	4.009	-1.86	0.1368	0.9977	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	*Nitrogen*	*HARVEST*	*_MAT*	*Nitrogen*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
II	N3	A	II	N3	B	0.9462	1.4695	0.6952	1.7205
II	N3	A	II	N3	C	0.8430	1.3423	0.6036	1.5818
II	N3	A	II	N3	D	-1.2689	-0.4372	-1.6677	-0.03839
II	N3	A	IM	N1	A	-1.6806	-0.1777	-1.9454	0.08717
II	N3	A	IM	N1	B	-0.3329	1.1371	-0.6323	1.4366
II	N3	A	IM	N1	C	0.1335	1.6235	-0.08829	1.8453
II	N3	A	IM	N1	D	-1.5863	-0.2028	-1.8956	0.1065
II	N3	A	IM	N2	A	-1.4493	-0.07905	-1.7720	0.2436
II	N3	A	IM	N2	B	-0.06409	1.3193	-0.3872	1.6424
II	N3	A	IM	N2	C	0.04183	1.4408	-0.2398	1.7224
II	N3	A	IM	N2	D	-1.7454	-0.2743	-1.9734	-0.04641
II	N3	A	IM	N3	A	-1.2954	-0.7063	-1.5780	-0.4237
II	N3	A	IM	N3	B	0.1278	0.7324	-0.1622	1.0224
II	N3	A	IM	N3	C	0.6557	1.1937	0.3977	1.4517
II	N3	A	IM	N3	D	-1.4341	-0.9262	-1.6777	-0.6826
II	N3	A	MM	N1	A	-3.1407	-0.4926	-4.4080	0.7747
II	N3	A	MM	N1	B	-0.5365	0.8850	-0.7988	1.1473
II	N3	A	MM	N1	C	-0.4017	0.9516	-0.7680	1.3179
II	N3	A	MM	N1	D	-2.0700	-0.4394	-2.2156	-0.2937
II	N3	A	MM	N2	A	-3.2789	-0.01109	-4.8444	1.5545
II	N3	A	MM	N2	B	-0.8192	0.6320	-1.1003	0.9131
II	N3	A	MM	N2	C	-0.5257	0.8438	-0.8648	1.1830
II	N3	A	MM	N2	D	-2.0888	-0.4312	-2.2203	-0.2997
II	N3	A	MM	N3	A	-2.2354	0.1705	-3.3894	1.3245
II	N3	A	MM	N3	B	-0.4075	0.1626	-0.6810	0.4360
II	N3	A	MM	N3	C	0.01092	0.7543	-0.3456	1.1108
II	N3	A	MM	N3	D	-1.1083	-0.6146	-1.3450	-0.3778
II	N3	B	II	N3	C	-0.3565	0.1262	-0.5880	0.3576
II	N3	B	II	N3	D	-2.4731	-1.6487	-2.8685	-1.2533
II	N3	B	IM	N1	A	-2.8896	-1.3844	-3.1367	-1.1372
II	N3	B	IM	N1	B	-1.5398	-0.07170	-1.8236	0.2121
II	N3	B	IM	N1	C	-1.0766	0.4179	-1.2796	0.6210
II	N3	B	IM	N1	D	-2.7907	-1.4141	-3.0871	-1.1177
II	N3	B	IM	N2	A	-2.6525	-1.2915	-2.9648	-0.9792
II	N3	B	IM	N2	B	-1.2674	0.1069	-1.5800	0.4196
II	N3	B	IM	N2	C	-1.1637	0.2307	-1.4321	0.4990

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
II	N3	B	IM	N2	D	-2.2177	0.2466	3.365	-8.99	0.0018	<.0001	0.05
II	N3	B	IM	N3	A	-2.2087	0.1473	2646	-14.99	<.0001	<.0001	0.05
II	N3	B	IM	N3	B	-0.7777	0.1528	2638	-5.09	<.0001	0.0002	0.05
II	N3	B	IM	N3	C	-0.2832	0.1330	2658	-2.13	0.0334	0.9785	0.05
II	N3	B	IM	N3	D	-2.3880	0.1252	2658	-19.07	<.0001	<.0001	0.05
II	N3	B	MM	N1	A	-3.0245	0.6732	821.9	-4.49	<.0001	0.0039	0.05
II	N3	B	MM	N1	B	-1.0336	0.2488	3.722	-4.15	0.0165	0.0158	0.05
II	N3	B	MM	N1	C	-0.9329	0.2676	5.498	-3.49	0.0150	0.1527	0.05
II	N3	B	MM	N1	D	-2.4625	0.2457	2.733	-10.02	0.0031	<.0001	0.05
II	N3	B	MM	N2	A	-2.8528	0.8323	1259	-3.43	0.0006	0.1792	0.05
II	N3	B	MM	N2	B	-1.3015	0.2577	3.846	-5.05	0.0080	0.0003	0.05
II	N3	B	MM	N2	C	-1.0488	0.2628	4.918	-3.99	0.0108	0.0294	0.05
II	N3	B	MM	N2	D	-2.4678	0.2458	2.657	-10.04	0.0035	<.0001	0.05
II	N3	B	MM	N3	A	-2.2403	0.6129	2652	-3.66	0.0003	0.0923	0.05
II	N3	B	MM	N3	B	-1.3303	0.1419	2658	-9.37	<.0001	<.0001	0.05
II	N3	B	MM	N3	C	-0.8252	0.1860	2657	-4.44	<.0001	0.0049	0.05
II	N3	B	MM	N3	D	-2.0693	0.1211	2645	-17.09	<.0001	<.0001	0.05
II	N3	C	II	N3	D	-1.9457	0.2055	2653	-9.47	<.0001	<.0001	0.05
II	N3	C	IM	N1	A	-2.0218	0.2572	3.197	-7.86	0.0034	<.0001	0.05
II	N3	C	IM	N1	B	-0.6906	0.2622	3.62	-2.63	0.0643	0.7678	0.05
II	N3	C	IM	N1	C	-0.2142	0.2440	2.852	-0.88	0.4478	1.0000	0.05
II	N3	C	IM	N1	D	-1.9872	0.2532	3.863	-7.85	0.0016	<.0001	0.05
II	N3	C	IM	N2	A	-1.8569	0.2553	4.131	-7.27	0.0017	<.0001	0.05
II	N3	C	IM	N2	B	-0.4651	0.2570	4.08	-1.81	0.1432	0.9985	0.05
II	N3	C	IM	N2	C	-0.3514	0.2479	3.499	-1.42	0.2390	1.0000	0.05
II	N3	C	IM	N2	D	-2.1026	0.2433	2.927	-8.64	0.0036	<.0001	0.05
II	N3	C	IM	N3	A	-2.0935	0.1416	2650	-14.79	<.0001	<.0001	0.05
II	N3	C	IM	N3	B	-0.6626	0.1458	2657	-4.54	<.0001	0.0031	0.05
II	N3	C	IM	N3	C	-0.1680	0.1277	2658	-1.32	0.1886	1.0000	0.05
II	N3	C	IM	N3	D	-2.2728	0.1187	2654	-19.14	<.0001	<.0001	0.05
II	N3	C	MM	N1	A	-2.9093	0.6722	818.1	-4.33	<.0001	0.0078	0.05
II	N3	C	MM	N1	B	-0.9184	0.2457	3.268	-3.74	0.0288	0.0710	0.05
II	N3	C	MM	N1	C	-0.8177	0.2644	4.91	-3.09	0.0277	0.3936	0.05
II	N3	C	MM	N1	D	-2.3473	0.2425	2.345	-9.68	0.0061	<.0001	0.05
II	N3	C	MM	N2	A	-2.7377	0.8312	1258	-3.29	0.0010	0.2527	0.05
II	N3	C	MM	N2	B	-1.1863	0.2548	3.435	-4.66	0.0138	0.0019	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	*Nitrogen*	*HARVEST*	*_MAT*	*Nitrogen*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
II	N3	B	IM	N2	D	-2.9564	-1.4790	-3.1650	-1.2704
II	N3	B	IM	N3	A	-2.4976	-1.9198	-2.7747	-1.6427
II	N3	B	IM	N3	B	-1.0774	-0.4781	-1.3648	-0.1906
II	N3	B	IM	N3	C	-0.5440	-0.02235	-0.7941	0.2278
II	N3	B	IM	N3	D	-2.6336	-2.1424	-2.8691	-1.9069
II	N3	B	MM	N1	A	-4.3459	-1.7031	-5.6108	-0.4382
II	N3	B	MM	N1	B	-1.7452	-0.3220	-1.9894	-0.07778
II	N3	B	MM	N1	C	-1.6024	-0.2633	-1.9610	0.09523
II	N3	B	MM	N1	D	-3.2896	-1.6354	-3.4066	-1.5184
II	N3	B	MM	N2	A	-4.4857	-1.2200	-6.0503	0.3446
II	N3	B	MM	N2	B	-2.0284	-0.5745	-2.2916	-0.3114
II	N3	B	MM	N2	C	-1.7277	-0.3698	-2.0584	-0.03918
II	N3	B	MM	N2	D	-3.3103	-1.6254	-3.4121	-1.5236
II	N3	B	MM	N3	A	-3.4421	-1.0385	-4.5949	0.1143
II	N3	B	MM	N3	B	-1.6086	-1.0521	-1.8755	-0.7851
II	N3	B	MM	N3	C	-1.1900	-0.4605	-1.5399	-0.1106
II	N3	B	MM	N3	D	-2.3067	-1.8318	-2.5344	-1.6041
II	N3	C	II	N3	D	-2.3486	-1.5428	-2.7351	-1.1564
II	N3	C	IM	N1	A	-2.8123	-1.2313	-3.0097	-1.0339
II	N3	C	IM	N1	B	-1.4499	0.06873	-1.6981	0.3169
II	N3	C	IM	N1	C	-1.0141	0.5858	-1.1517	0.7234
II	N3	C	IM	N1	D	-2.7001	-1.2744	-2.9598	-1.0146
II	N3	C	IM	N2	A	-2.5569	-1.1568	-2.8376	-0.8761
II	N3	C	IM	N2	B	-1.1731	0.2430	-1.4524	0.5223
II	N3	C	IM	N2	C	-1.0803	0.3776	-1.3037	0.6010
II	N3	C	IM	N2	D	-2.8879	-1.3172	-3.0373	-1.1678
II	N3	C	IM	N3	A	-2.3711	-1.8160	-2.6373	-1.5497
II	N3	C	IM	N3	B	-0.9485	-0.3767	-1.2227	-0.1024
II	N3	C	IM	N3	C	-0.4185	0.08248	-0.6587	0.3227
II	N3	C	IM	N3	D	-2.5057	-2.0400	-2.7290	-1.8167
II	N3	C	MM	N1	A	-4.2287	-1.5900	-5.4916	-0.3271
II	N3	C	MM	N1	B	-1.6654	-0.1714	-1.8625	0.02569
II	N3	C	MM	N1	C	-1.5012	-0.1342	-1.8335	0.1981
II	N3	C	MM	N1	D	-3.2567	-1.4380	-3.2792	-1.4155
II	N3	C	MM	N2	A	-4.3684	-1.1069	-5.9311	0.4558
II	N3	C	MM	N2	B	-1.9421	-0.4305	-2.1652	-0.2074

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
II	N3	C	MM	N2	C	-0.9336	0.2594	4.359	-3.60	0.0197	0.1097	0.05
II	N3	C	MM	N2	D	-2.3527	0.2424	2.268	-9.71	0.0068	<.0001	0.05
II	N3	C	MM	N3	A	-2.1251	0.6116	2651	-3.47	0.0005	0.1576	0.05
II	N3	C	MM	N3	B	-1.2152	0.1356	2644	-8.96	<.0001	<.0001	0.05
II	N3	C	MM	N3	C	-0.7101	0.1821	2658	-3.90	<.0001	0.0409	0.05
II	N3	C	MM	N3	D	-1.9541	0.1145	2660	-17.07	<.0001	<.0001	0.05
II	N3	D	IM	N1	A	-0.07608	0.3121	13.54	-0.24	0.8111	1.0000	0.05
II	N3	D	IM	N1	B	1.2552	0.3169	14.31	3.96	0.0014	0.0328	0.05
II	N3	D	IM	N1	C	1.7316	0.3012	14.05	5.75	<.0001	<.0001	0.05
II	N3	D	IM	N1	D	-0.04151	0.3092	16.02	-0.13	0.8949	1.0000	0.05
II	N3	D	IM	N2	A	0.08888	0.3104	16.32	0.29	0.7783	1.0000	0.05
II	N3	D	IM	N2	B	1.4807	0.3122	16.07	4.74	0.0002	0.0012	0.05
II	N3	D	IM	N2	C	1.5944	0.3039	15.36	5.25	<.0001	0.0001	0.05
II	N3	D	IM	N2	D	-0.1568	0.3006	14.41	-0.52	0.6098	1.0000	0.05
II	N3	D	IM	N3	A	-0.1478	0.2218	2657	-0.67	0.5051	1.0000	0.05
II	N3	D	IM	N3	B	1.2832	0.2241	2656	5.73	<.0001	<.0001	0.05
II	N3	D	IM	N3	C	1.7777	0.2120	2658	8.39	<.0001	<.0001	0.05
II	N3	D	IM	N3	D	-0.3271	0.2091	2660	-1.56	0.1179	0.9999	0.05
II	N3	D	MM	N1	A	-0.9636	0.6972	837.1	-1.38	0.1673	1.0000	0.05
II	N3	D	MM	N1	B	1.0273	0.3025	15.07	3.40	0.0040	0.1952	0.05
II	N3	D	MM	N1	C	1.1280	0.3178	17.04	3.55	0.0025	0.1273	0.05
II	N3	D	MM	N1	D	-0.4016	0.2996	12.52	-1.34	0.2039	1.0000	0.05
II	N3	D	MM	N2	A	-0.7919	0.8513	1252	-0.93	0.3524	1.0000	0.05
II	N3	D	MM	N2	B	0.7594	0.3097	14.36	2.45	0.0276	0.8789	0.05
II	N3	D	MM	N2	C	1.0121	0.3136	16.31	3.23	0.0052	0.2949	0.05
II	N3	D	MM	N2	D	-0.4070	0.3003	12.55	-1.36	0.1992	1.0000	0.05
II	N3	D	MM	N3	A	-0.1794	0.6348	2649	-0.28	0.7775	1.0000	0.05
II	N3	D	MM	N3	B	0.7306	0.2175	2648	3.36	0.0008	0.2145	0.05
II	N3	D	MM	N3	C	1.2357	0.2489	2648	4.96	<.0001	0.0004	0.05
II	N3	D	MM	N3	D	-0.00836	0.2047	2659	-0.04	0.9674	1.0000	0.05
IM	N1	A	IM	N1	B	1.3312	0.1683	2658	7.91	<.0001	<.0001	0.05
IM	N1	A	IM	N1	C	1.8076	0.1529	2654	11.82	<.0001	<.0001	0.05
IM	N1	A	IM	N1	D	0.03458	0.1648	2650	0.21	0.8339	1.0000	0.05
IM	N1	A	IM	N2	A	0.1650	0.2684	5.795	0.61	0.5622	1.0000	0.05
IM	N1	A	IM	N2	B	1.5568	0.2705	5.93	5.75	0.0012	<.0001	0.05
IM	N1	A	IM	N2	C	1.6704	0.2616	5.447	6.39	0.0010	<.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Lower	Upper	Adj Lower	Adj Upper
II	N3	C	MM	N2	C	-1.6310	-0.2362	-1.9302	0.06294
II	N3	C	MM	N2	D	-3.2858	-1.4196	-3.2838	-1.4216
II	N3	C	MM	N3	A	-3.3244	-0.9258	-4.4748	0.2246
II	N3	C	MM	N3	B	-1.4811	-0.9492	-1.7363	-0.6940
II	N3	C	MM	N3	C	-1.0671	-0.3530	-1.4096	-0.01050
II	N3	C	MM	N3	D	-2.1786	-1.7296	-2.3939	-1.5143
II	N3	D	IM	N1	A	-0.7477	0.5955	-1.2752	1.1230
II	N3	D	IM	N1	B	0.5768	1.9335	0.03759	2.4727
II	N3	D	IM	N1	C	1.0858	2.3773	0.5744	2.8887
II	N3	D	IM	N1	D	-0.6970	0.6140	-1.2295	1.1465
II	N3	D	IM	N2	A	-0.5682	0.7460	-1.1038	1.2815
II	N3	D	IM	N2	B	0.8191	2.1422	0.2814	2.6800
II	N3	D	IM	N2	C	0.9479	2.2408	0.4268	2.7619
II	N3	D	IM	N2	D	-0.7998	0.4861	-1.3115	0.9979
II	N3	D	IM	N3	A	-0.5827	0.2871	-0.9998	0.7042
II	N3	D	IM	N3	B	0.8437	1.7226	0.4221	2.1442
II	N3	D	IM	N3	C	1.3620	2.1935	0.9633	2.5922
II	N3	D	IM	N3	D	-0.7372	0.08297	-1.1306	0.4763
II	N3	D	MM	N1	A	-2.3320	0.4048	-3.6420	1.7148
II	N3	D	MM	N1	B	0.3827	1.6719	-0.1350	2.1896
II	N3	D	MM	N1	C	0.4576	1.7985	-0.09301	2.3491
II	N3	D	MM	N1	D	-1.0515	0.2482	-1.5527	0.7495
II	N3	D	MM	N2	A	-2.4621	0.8783	-4.0625	2.4787
II	N3	D	MM	N2	B	0.09675	1.4221	-0.4303	1.9492
II	N3	D	MM	N2	C	0.3484	1.6758	-0.1925	2.2167
II	N3	D	MM	N2	D	-1.0580	0.2441	-1.5605	0.7466
II	N3	D	MM	N3	A	-1.4241	1.0653	-2.6180	2.2592
II	N3	D	MM	N3	B	0.3041	1.1570	-0.1049	1.5661
II	N3	D	MM	N3	C	0.7476	1.7237	0.2794	2.1919
II	N3	D	MM	N3	D	-0.4098	0.3930	-0.7948	0.7780
IM	N1	A	IM	N1	B	1.0012	1.6613	0.6845	1.9779
IM	N1	A	IM	N1	C	1.5078	2.1075	1.2202	2.3951
IM	N1	A	IM	N1	D	-0.2887	0.3578	-0.5987	0.6679
IM	N1	A	IM	N2	A	-0.4975	0.8274	-0.8662	1.1961
IM	N1	A	IM	N2	B	0.8929	2.2206	0.5174	2.5961
IM	N1	A	IM	N2	C	1.0143	2.3266	0.6656	2.6753

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
IM	N1	A	IM	N2	D	-0.08075	0.2585	4.604	-0.31	0.7684	1.0000	0.05
IM	N1	A	IM	N3	A	-0.07173	0.2681	5.104	-0.27	0.7996	1.0000	0.05
IM	N1	A	IM	N3	B	1.3592	0.2761	4.956	4.92	0.0045	0.0005	0.05
IM	N1	A	IM	N3	C	1.8538	0.2617	3.98	7.08	0.0021	<.0001	0.05
IM	N1	A	IM	N3	D	-0.2510	0.2560	3.535	-0.98	0.3890	1.0000	0.05
IM	N1	A	MM	N1	A	-0.8875	0.6477	2659	-1.37	0.1707	1.0000	0.05
IM	N1	A	MM	N1	B	1.1034	0.1579	2647	6.99	<.0001	<.0001	0.05
IM	N1	A	MM	N1	C	1.2041	0.1771	2654	6.80	<.0001	<.0001	0.05
IM	N1	A	MM	N1	D	-0.3255	0.1475	2655	-2.21	0.0274	0.9648	0.05
IM	N1	A	MM	N2	A	-0.7159	0.8363	1180	-0.86	0.3922	1.0000	0.05
IM	N1	A	MM	N2	B	0.8355	0.2687	5.129	3.11	0.0257	0.3805	0.05
IM	N1	A	MM	N2	C	1.0882	0.2735	6.209	3.98	0.0068	0.0307	0.05
IM	N1	A	MM	N2	D	-0.3309	0.2570	3.755	-1.29	0.2716	1.0000	0.05
IM	N1	A	MM	N3	A	-0.1033	0.6574	531.2	-0.16	0.8752	1.0000	0.05
IM	N1	A	MM	N3	B	0.8067	0.2630	4.981	3.07	0.0280	0.4137	0.05
IM	N1	A	MM	N3	C	1.3117	0.2929	10.33	4.48	0.0011	0.0041	0.05
IM	N1	A	MM	N3	D	0.06772	0.2542	3.229	0.27	0.8061	1.0000	0.05
IM	N1	B	IM	N1	C	0.4764	0.1592	2633	2.99	0.0028	0.4745	0.05
IM	N1	B	IM	N1	D	-1.2967	0.1698	2660	-7.64	<.0001	<.0001	0.05
IM	N1	B	IM	N2	A	-1.1663	0.2736	6.462	-4.26	0.0045	0.0102	0.05
IM	N1	B	IM	N2	B	0.2255	0.2729	6.039	0.83	0.4401	1.0000	0.05
IM	N1	B	IM	N2	C	0.3392	0.2667	6.085	1.27	0.2499	1.0000	0.05
IM	N1	B	IM	N2	D	-1.4120	0.2627	5.017	-5.38	0.0030	<.0001	0.05
IM	N1	B	IM	N3	A	-1.4030	0.2730	5.595	-5.14	0.0026	0.0002	0.05
IM	N1	B	IM	N3	B	0.02799	0.2792	5.131	0.10	0.9239	1.0000	0.05
IM	N1	B	IM	N3	C	0.5226	0.2669	4.457	1.96	0.1145	0.9941	0.05
IM	N1	B	IM	N3	D	-1.5823	0.2611	3.98	-6.06	0.0038	<.0001	0.05
IM	N1	B	MM	N1	A	-2.2187	0.6484	2657	-3.42	0.0006	0.1820	0.05
IM	N1	B	MM	N1	B	-0.2279	0.1648	2638	-1.38	0.1670	1.0000	0.05
IM	N1	B	MM	N1	C	-0.1271	0.1830	2660	-0.69	0.4873	1.0000	0.05
IM	N1	B	MM	N1	D	-1.6568	0.1539	2646	-10.77	<.0001	<.0001	0.05
IM	N1	B	MM	N2	A	-2.0471	0.8375	1166	-2.44	0.0147	0.8829	0.05
IM	N1	B	MM	N2	B	-0.4957	0.2734	5.648	-1.81	0.1228	0.9985	0.05
IM	N1	B	MM	N2	C	-0.2430	0.2773	6.606	-0.88	0.4115	1.0000	0.05
IM	N1	B	MM	N2	D	-1.6621	0.2615	4.174	-6.35	0.0027	<.0001	0.05
IM	N1	B	MM	N3	A	-1.4345	0.6576	517.2	-2.18	0.0296	0.9698	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	*Nitrogen*	*HARVEST*	*_MAT*	*Nitrogen*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
IM	N1	A	IM	N2	D	-0.7628	0.6013	-1.0737	0.9122
IM	N1	A	IM	N3	A	-0.7568	0.6134	-1.1019	0.9584
IM	N1	A	IM	N3	B	0.6477	2.0708	0.2987	2.4198
IM	N1	A	IM	N3	C	1.1257	2.5820	0.8482	2.8594
IM	N1	A	IM	N3	D	-1.0002	0.4982	-1.2345	0.7324
IM	N1	A	MM	N1	A	-2.1576	0.3826	-3.3759	1.6009
IM	N1	A	MM	N1	B	0.7937	1.4131	0.4966	1.7101
IM	N1	A	MM	N1	C	0.8568	1.5515	0.5236	1.8847
IM	N1	A	MM	N1	D	-0.6148	-0.03629	-0.8922	0.2412
IM	N1	A	MM	N2	A	-2.3567	0.9250	-3.9287	2.4970
IM	N1	A	MM	N2	B	0.1500	1.5210	-0.1968	1.8678
IM	N1	A	MM	N2	C	0.4244	1.7520	0.03751	2.1389
IM	N1	A	MM	N2	D	-1.0632	0.4015	-1.3183	0.6566
IM	N1	A	MM	N3	A	-1.3948	1.1882	-2.6289	2.4223
IM	N1	A	MM	N3	B	0.1298	1.4835	-0.2037	1.8170
IM	N1	A	MM	N3	C	0.6619	1.9616	0.1865	2.4370
IM	N1	A	MM	N3	D	-0.7098	0.8452	-0.9089	1.0444
IM	N1	B	IM	N1	C	0.1642	0.7886	-0.1352	1.0880
IM	N1	B	IM	N1	D	-1.6296	-0.9637	-1.9491	-0.6443
IM	N1	B	IM	N2	A	-1.8244	-0.5082	-2.2175	-0.1151
IM	N1	B	IM	N2	B	-0.4413	0.8923	-0.8230	1.2740
IM	N1	B	IM	N2	C	-0.3112	0.9896	-0.6854	1.3638
IM	N1	B	IM	N2	D	-2.0866	-0.7374	-2.4212	-0.4028
IM	N1	B	IM	N3	A	-2.0828	-0.7231	-2.4517	-0.3542
IM	N1	B	IM	N3	B	-0.6841	0.7401	-1.0445	1.1004
IM	N1	B	IM	N3	C	-0.1893	1.2345	-0.5026	1.5478
IM	N1	B	IM	N3	D	-2.3085	-0.8560	-2.5852	-0.5793
IM	N1	B	MM	N1	A	-3.4902	-0.9473	-4.7097	0.2722
IM	N1	B	MM	N1	B	-0.5511	0.09537	-0.8611	0.4054
IM	N1	B	MM	N1	C	-0.4860	0.2317	-0.8302	0.5760
IM	N1	B	MM	N1	D	-1.9585	-1.3550	-2.2479	-1.0656
IM	N1	B	MM	N2	A	-3.6903	-0.4038	-5.2647	1.1705
IM	N1	B	MM	N2	B	-1.1749	0.1835	-1.5460	0.5545
IM	N1	B	MM	N2	C	-0.9068	0.4207	-1.3084	0.8223
IM	N1	B	MM	N2	D	-2.3765	-0.9477	-2.6669	-0.6573
IM	N1	B	MM	N3	A	-2.7264	-0.1427	-3.9607	1.0916

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
IM	N1	B	MM	N3	B	-0.5246	0.2682	5.546	-1.96	0.1022	0.9942	0.05
IM	N1	B	MM	N3	C	-0.01950	0.2971	10.86	-0.07	0.9489	1.0000	0.05
IM	N1	B	MM	N3	D	-1.2635	0.2593	3.653	-4.87	0.0103	0.0007	0.05
IM	N1	C	IM	N1	D	-1.7731	0.1552	2659	-11.42	<.0001	<.0001	0.05
IM	N1	C	IM	N2	A	-1.6427	0.2570	5.735	-6.39	0.0008	<.0001	0.05
IM	N1	C	IM	N2	B	-0.2509	0.2586	5.766	-0.97	0.3709	1.0000	0.05
IM	N1	C	IM	N2	C	-0.1372	0.2482	5.012	-0.55	0.6041	1.0000	0.05
IM	N1	C	IM	N2	D	-1.8884	0.2454	4.236	-7.70	0.0012	<.0001	0.05
IM	N1	C	IM	N3	A	-1.8794	0.2562	4.961	-7.33	0.0008	<.0001	0.05
IM	N1	C	IM	N3	B	-0.4484	0.2640	4.736	-1.70	0.1534	0.9996	0.05
IM	N1	C	IM	N3	C	0.04617	0.2485	3.604	0.19	0.8626	1.0000	0.05
IM	N1	C	IM	N3	D	-2.0587	0.2426	3.159	-8.49	0.0028	<.0001	0.05
IM	N1	C	MM	N1	A	-2.6952	0.6435	2655	-4.19	<.0001	0.0138	0.05
IM	N1	C	MM	N1	B	-0.7043	0.1469	2648	-4.80	<.0001	0.0010	0.05
IM	N1	C	MM	N1	C	-0.6035	0.1678	2659	-3.60	0.0003	0.1104	0.05
IM	N1	C	MM	N1	D	-2.1332	0.1358	2643	-15.71	<.0001	<.0001	0.05
IM	N1	C	MM	N2	A	-2.5235	0.8327	1287	-3.03	0.0025	0.4431	0.05
IM	N1	C	MM	N2	B	-0.9721	0.2564	4.858	-3.79	0.0134	0.0593	0.05
IM	N1	C	MM	N2	C	-0.7194	0.2611	5.945	-2.76	0.0334	0.6739	0.05
IM	N1	C	MM	N2	D	-2.1385	0.2442	3.41	-8.76	0.0019	<.0001	0.05
IM	N1	C	MM	N3	A	-1.9110	0.6508	595.9	-2.94	0.0035	0.5219	0.05
IM	N1	C	MM	N3	B	-1.0010	0.2502	4.705	-4.00	0.0117	0.0284	0.05
IM	N1	C	MM	N3	C	-0.4959	0.2813	10.51	-1.76	0.1070	0.9991	0.05
IM	N1	C	MM	N3	D	-1.7399	0.2407	2.845	-7.23	0.0065	<.0001	0.05
IM	N1	D	IM	N2	A	0.1304	0.2667	6.99	0.49	0.6399	1.0000	0.05
IM	N1	D	IM	N2	B	1.5222	0.2680	6.947	5.68	0.0008	<.0001	0.05
IM	N1	D	IM	N2	C	1.6359	0.2590	6.431	6.32	0.0006	<.0001	0.05
IM	N1	D	IM	N2	D	-0.1153	0.2558	5.452	-0.45	0.6695	1.0000	0.05
IM	N1	D	IM	N3	A	-0.1063	0.2646	6.164	-0.40	0.7014	1.0000	0.05
IM	N1	D	IM	N3	B	1.3247	0.2727	5.956	4.86	0.0029	0.0007	0.05
IM	N1	D	IM	N3	C	1.8192	0.2580	4.822	7.05	0.0010	<.0001	0.05
IM	N1	D	IM	N3	D	-0.2856	0.2511	4.132	-1.14	0.3170	1.0000	0.05
IM	N1	D	MM	N1	A	-0.9221	0.6463	2658	-1.43	0.1538	1.0000	0.05
IM	N1	D	MM	N1	B	1.0688	0.1602	2658	6.67	<.0001	<.0001	0.05
IM	N1	D	MM	N1	C	1.1695	0.1800	2659	6.50	<.0001	<.0001	0.05
IM	N1	D	MM	N1	D	-0.3601	0.1509	2658	-2.39	0.0171	0.9092	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	*Nitrogen*	*HARVEST*	*_MAT*	*Nitrogen*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
IM	N1	B	MM	N3	B	-1.1942	0.1450	-1.5551	0.5059
IM	N1	B	MM	N3	C	-0.6746	0.6356	-1.1611	1.1221
IM	N1	B	MM	N3	D	-2.0112	-0.5158	-2.2596	-0.2674
IM	N1	C	IM	N1	D	-2.0774	-1.4687	-2.3694	-1.1767
IM	N1	C	IM	N2	A	-2.2787	-1.0067	-2.6300	-0.6553
IM	N1	C	IM	N2	B	-0.8900	0.3882	-1.2445	0.7427
IM	N1	C	IM	N2	C	-0.7748	0.5003	-1.0907	0.8163
IM	N1	C	IM	N2	D	-2.5550	-1.2218	-2.8311	-0.9457
IM	N1	C	IM	N3	A	-2.5396	-1.2191	-2.8638	-0.8949
IM	N1	C	IM	N3	B	-1.1386	0.2417	-1.4626	0.5658
IM	N1	C	IM	N3	C	-0.6748	0.7671	-0.9085	1.0009
IM	N1	C	IM	N3	D	-2.8093	-1.3081	-2.9907	-1.1267
IM	N1	C	MM	N1	A	-3.9570	-1.4333	-5.1673	-0.2230
IM	N1	C	MM	N1	B	-0.9923	-0.4163	-1.2685	-0.1400
IM	N1	C	MM	N1	C	-0.9325	-0.2745	-1.2481	0.04105
IM	N1	C	MM	N1	D	-2.3995	-1.8669	-2.6550	-1.6114
IM	N1	C	MM	N2	A	-4.1570	-0.8900	-5.7224	0.6754
IM	N1	C	MM	N2	B	-1.6370	-0.3072	-1.9571	0.01287
IM	N1	C	MM	N2	C	-1.3598	-0.07912	-1.7225	0.2837
IM	N1	C	MM	N2	D	-2.8654	-1.4116	-3.0767	-1.2004
IM	N1	C	MM	N3	A	-3.1891	-0.6328	-4.4113	0.5894
IM	N1	C	MM	N3	B	-1.6565	-0.3455	-1.9623	-0.03970
IM	N1	C	MM	N3	C	-1.1187	0.1269	-1.5767	0.5849
IM	N1	C	MM	N3	D	-2.5302	-0.9496	-2.6648	-0.8150
IM	N1	D	IM	N2	A	-0.5005	0.7613	-0.8943	1.1551
IM	N1	D	IM	N2	B	0.8874	2.1570	0.4924	2.5519
IM	N1	D	IM	N2	C	1.0123	2.2594	0.6409	2.6308
IM	N1	D	IM	N2	D	-0.7568	0.5261	-1.0980	0.8673
IM	N1	D	IM	N3	A	-0.7496	0.5370	-1.1228	0.9102
IM	N1	D	IM	N3	B	0.6562	1.9931	0.2770	2.3723
IM	N1	D	IM	N3	C	1.1485	2.4899	0.8280	2.8105
IM	N1	D	IM	N3	D	-0.9740	0.4028	-1.2502	0.6790
IM	N1	D	MM	N1	A	-2.1894	0.3453	-3.4051	1.5609
IM	N1	D	MM	N1	B	0.7547	1.3829	0.4535	1.6842
IM	N1	D	MM	N1	C	0.8166	1.5225	0.4781	1.8610
IM	N1	D	MM	N1	D	-0.6560	-0.06420	-0.9399	0.2196

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
IM	N1	D	MM	N2	A	-0.7504	0.8350	1255	-0.90	0.3690	1.0000	0.05
IM	N1	D	MM	N2	B	0.8009	0.2657	5.91	3.01	0.0240	0.4563	0.05
IM	N1	D	MM	N2	C	1.0536	0.2703	7.084	3.90	0.0058	0.0410	0.05
IM	N1	D	MM	N2	D	-0.3654	0.2539	4.371	-1.44	0.2177	1.0000	0.05
IM	N1	D	MM	N3	A	-0.1379	0.6535	587.3	-0.21	0.8330	1.0000	0.05
IM	N1	D	MM	N3	B	0.7721	0.2593	6.041	2.98	0.0245	0.4872	0.05
IM	N1	D	MM	N3	C	1.2772	0.2890	12.08	4.42	0.0008	0.0053	0.05
IM	N1	D	MM	N3	D	0.03314	0.2501	3.894	0.13	0.9011	1.0000	0.05
IM	N2	A	IM	N2	B	1.3918	0.1758	2650	7.92	<.0001	<.0001	0.05
IM	N2	A	IM	N2	C	1.5055	0.1649	2646	9.13	<.0001	<.0001	0.05
IM	N2	A	IM	N2	D	-0.2457	0.1596	2641	-1.54	0.1237	0.9999	0.05
IM	N2	A	IM	N3	A	-0.2367	0.2667	6.436	-0.89	0.4068	1.0000	0.05
IM	N2	A	IM	N3	B	1.1943	0.2743	6.074	4.35	0.0047	0.0070	0.05
IM	N2	A	IM	N3	C	1.6889	0.2600	5.066	6.50	0.0012	<.0001	0.05
IM	N2	A	IM	N3	D	-0.4160	0.2541	4.538	-1.64	0.1685	0.9998	0.05
IM	N2	A	MM	N1	A	-1.0525	0.6783	809.6	-1.55	0.1211	0.9999	0.05
IM	N2	A	MM	N1	B	0.9384	0.2585	6.376	3.63	0.0099	0.0999	0.05
IM	N2	A	MM	N1	C	1.0391	0.2759	8.504	3.77	0.0049	0.0644	0.05
IM	N2	A	MM	N1	D	-0.4905	0.2554	4.952	-1.92	0.1134	0.9958	0.05
IM	N2	A	MM	N2	A	-0.8808	0.8085	2649	-1.09	0.2761	1.0000	0.05
IM	N2	A	MM	N2	B	0.6706	0.1694	2659	3.96	<.0001	0.0332	0.05
IM	N2	A	MM	N2	C	0.9232	0.1769	2650	5.22	<.0001	0.0001	0.05
IM	N2	A	MM	N2	D	-0.4958	0.1532	2651	-3.24	0.0012	0.2898	0.05
IM	N2	A	MM	N3	A	-0.2683	0.6516	719.7	-0.41	0.6807	1.0000	0.05
IM	N2	A	MM	N3	B	0.6417	0.2611	6.3	2.46	0.0474	0.8762	0.05
IM	N2	A	MM	N3	C	1.1468	0.2914	12.45	3.94	0.0018	0.0360	0.05
IM	N2	A	MM	N3	D	-0.09724	0.2521	4.162	-0.39	0.7187	1.0000	0.05
IM	N2	B	IM	N2	C	0.1137	0.1673	2655	0.68	0.4968	1.0000	0.05
IM	N2	B	IM	N2	D	-1.6375	0.1608	2657	-10.19	<.0001	<.0001	0.05
IM	N2	B	IM	N3	A	-1.6285	0.2687	6.399	-6.06	0.0007	<.0001	0.05
IM	N2	B	IM	N3	B	-0.1975	0.2757	5.949	-0.72	0.5009	1.0000	0.05
IM	N2	B	IM	N3	C	0.2971	0.2616	4.995	1.14	0.3077	1.0000	0.05
IM	N2	B	IM	N3	D	-1.8078	0.2558	4.471	-7.07	0.0014	<.0001	0.05
IM	N2	B	MM	N1	A	-2.4443	0.6784	794.6	-3.60	0.0003	0.1084	0.05
IM	N2	B	MM	N1	B	-0.4534	0.2598	6.333	-1.74	0.1290	0.9993	0.05
IM	N2	B	MM	N1	C	-0.3526	0.2777	8.571	-1.27	0.2375	1.0000	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	*Nitrogen*	*HARVEST*	*_MAT*	*Nitrogen*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
IM	N1	D	MM	N2	A	-2.3885	0.8877	-3.9582	2.4573
IM	N1	D	MM	N2	B	0.1484	1.4535	-0.2198	1.8217
IM	N1	D	MM	N2	C	0.4161	1.6912	0.01535	2.0919
IM	N1	D	MM	N2	D	-1.0475	0.3166	-1.3410	0.6101
IM	N1	D	MM	N3	A	-1.4214	1.1456	-2.6485	2.3727
IM	N1	D	MM	N3	B	0.1386	1.4056	-0.2242	1.7683
IM	N1	D	MM	N3	C	0.6481	1.9063	0.1671	2.3873
IM	N1	D	MM	N3	D	-0.6686	0.7349	-0.9275	0.9938
IM	N2	A	IM	N2	B	1.0471	1.7365	0.7164	2.0672
IM	N2	A	IM	N2	C	1.1822	1.8287	0.8721	2.1388
IM	N2	A	IM	N2	D	-0.5586	0.06717	-0.8587	0.3673
IM	N2	A	IM	N3	A	-0.8788	0.4054	-1.2614	0.7880
IM	N2	A	IM	N3	B	0.5251	1.8634	0.1406	2.2480
IM	N2	A	IM	N3	C	1.0233	2.3545	0.6902	2.6875
IM	N2	A	IM	N3	D	-1.0897	0.2578	-1.3922	0.5603
IM	N2	A	MM	N1	A	-2.3838	0.2789	-3.6582	1.5532
IM	N2	A	MM	N1	B	0.3148	1.5621	-0.05474	1.9316
IM	N2	A	MM	N1	C	0.4095	1.6688	-0.02067	2.0990
IM	N2	A	MM	N1	D	-1.1489	0.1680	-1.4717	0.4907
IM	N2	A	MM	N2	A	-2.4662	0.7046	-3.9870	2.2254
IM	N2	A	MM	N2	B	0.3383	1.0028	0.01964	1.3215
IM	N2	A	MM	N2	C	0.5764	1.2701	0.2437	1.6028
IM	N2	A	MM	N2	D	-0.7963	-0.1953	-1.0846	0.09291
IM	N2	A	MM	N3	A	-1.5476	1.0111	-2.7717	2.2352
IM	N2	A	MM	N3	B	0.01007	1.2733	-0.3615	1.6449
IM	N2	A	MM	N3	C	0.5144	1.7792	0.02720	2.2664
IM	N2	A	MM	N3	D	-0.7867	0.5922	-1.0659	0.8714
IM	N2	B	IM	N2	C	-0.2143	0.4417	-0.5289	0.7563
IM	N2	B	IM	N2	D	-1.9527	-1.3223	-2.2551	-1.0199
IM	N2	B	IM	N3	A	-2.2761	-0.9808	-2.6607	-0.5963
IM	N2	B	IM	N3	B	-0.8736	0.4786	-1.2568	0.8618
IM	N2	B	IM	N3	C	-0.3756	0.9698	-0.7080	1.3022
IM	N2	B	IM	N3	D	-2.4893	-1.1262	-2.7904	-0.8252
IM	N2	B	MM	N1	A	-3.7758	-1.1127	-5.0503	0.1618
IM	N2	B	MM	N1	B	-1.0811	0.1744	-1.4515	0.5448
IM	N2	B	MM	N1	C	-0.9856	0.2803	-1.4193	0.7140

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
IM	N2	B	MM	N1	D	-1.8823	0.2565	4.89	-7.34	0.0008	<.0001	0.05
IM	N2	B	MM	N2	A	-2.2726	0.8095	2650	-2.81	0.0050	0.6310	0.05
IM	N2	B	MM	N2	B	-0.7212	0.1710	2657	-4.22	<.0001	0.0122	0.05
IM	N2	B	MM	N2	C	-0.4685	0.1787	2658	-2.62	0.0088	0.7757	0.05
IM	N2	B	MM	N2	D	-1.8876	0.1545	2658	-12.22	<.0001	<.0001	0.05
IM	N2	B	MM	N3	A	-1.6601	0.6520	702.9	-2.55	0.0111	0.8262	0.05
IM	N2	B	MM	N3	B	-0.7501	0.2626	6.174	-2.86	0.0281	0.5901	0.05
IM	N2	B	MM	N3	C	-0.2450	0.2929	12.18	-0.84	0.4189	1.0000	0.05
IM	N2	B	MM	N3	D	-1.4890	0.2539	4.123	-5.86	0.0038	<.0001	0.05
IM	N2	C	IM	N2	D	-1.7512	0.1508	2650	-11.61	<.0001	<.0001	0.05
IM	N2	C	IM	N3	A	-1.7422	0.2599	5.744	-6.70	0.0006	<.0001	0.05
IM	N2	C	IM	N3	B	-0.3112	0.2681	5.521	-1.16	0.2934	1.0000	0.05
IM	N2	C	IM	N3	C	0.1834	0.2515	4.18	0.73	0.5046	1.0000	0.05
IM	N2	C	IM	N3	D	-1.9215	0.2467	3.876	-7.79	0.0017	<.0001	0.05
IM	N2	C	MM	N1	A	-2.5579	0.6746	848.3	-3.79	0.0002	0.0593	0.05
IM	N2	C	MM	N1	B	-0.5670	0.2502	5.711	-2.27	0.0662	0.9504	0.05
IM	N2	C	MM	N1	C	-0.4663	0.2681	7.891	-1.74	0.1207	0.9993	0.05
IM	N2	C	MM	N1	D	-1.9960	0.2468	4.318	-8.09	0.0009	<.0001	0.05
IM	N2	C	MM	N2	A	-2.3863	0.8071	2652	-2.96	0.0031	0.5047	0.05
IM	N2	C	MM	N2	B	-0.8349	0.1618	2660	-5.16	<.0001	0.0002	0.05
IM	N2	C	MM	N2	C	-0.5822	0.1679	2660	-3.47	0.0005	0.1607	0.05
IM	N2	C	MM	N2	D	-2.0013	0.1445	2660	-13.85	<.0001	<.0001	0.05
IM	N2	C	MM	N3	A	-1.7737	0.6481	737.7	-2.74	0.0064	0.6889	0.05
IM	N2	C	MM	N3	B	-0.8638	0.2539	5.554	-3.40	0.0163	0.1922	0.05
IM	N2	C	MM	N3	C	-0.3587	0.2859	11.91	-1.25	0.2336	1.0000	0.05
IM	N2	C	MM	N3	D	-1.6027	0.2447	3.518	-6.55	0.0043	<.0001	0.05
IM	N2	D	IM	N3	A	0.009016	0.2556	5.033	0.04	0.9732	1.0000	0.05
IM	N2	D	IM	N3	B	1.4400	0.2634	4.786	5.47	0.0032	<.0001	0.05
IM	N2	D	IM	N3	C	1.9346	0.2479	3.7	7.80	0.0020	<.0001	0.05
IM	N2	D	IM	N3	D	-0.1703	0.2418	3.206	-0.70	0.5290	1.0000	0.05
IM	N2	D	MM	N1	A	-0.8068	0.6741	830.2	-1.20	0.2317	1.0000	0.05
IM	N2	D	MM	N1	B	1.1841	0.2468	4.759	4.80	0.0056	0.0010	0.05
IM	N2	D	MM	N1	C	1.2849	0.2651	6.818	4.85	0.0020	0.0008	0.05
IM	N2	D	MM	N1	D	-0.2448	0.2435	3.543	-1.01	0.3784	1.0000	0.05
IM	N2	D	MM	N2	A	-0.6351	0.8053	2651	-0.79	0.4304	1.0000	0.05
IM	N2	D	MM	N2	B	0.9163	0.1548	2660	5.92	<.0001	<.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Lower	Upper	Adj Lower	Adj Upper
IM	N2	B	MM	N1	D	-2.5461	-1.2185	-2.8676	-0.8969
IM	N2	B	MM	N2	A	-3.8599	-0.6853	-5.3824	0.8372
IM	N2	B	MM	N2	B	-1.0565	-0.3859	-1.3782	-0.06431
IM	N2	B	MM	N2	C	-0.8189	-0.1182	-1.1550	0.2179
IM	N2	B	MM	N2	D	-2.1905	-1.5848	-2.4810	-1.2943
IM	N2	B	MM	N3	A	-2.9402	-0.3799	-4.1650	0.8448
IM	N2	B	MM	N3	B	-1.3884	-0.1118	-1.7591	0.2589
IM	N2	B	MM	N3	C	-0.8821	0.3920	-1.3701	0.8801
IM	N2	B	MM	N3	D	-2.1858	-0.7922	-2.4646	-0.5135
IM	N2	C	IM	N2	D	-2.0469	-1.4554	-2.3306	-1.1717
IM	N2	C	IM	N3	A	-2.3850	-1.0993	-2.7405	-0.7438
IM	N2	C	IM	N3	B	-0.9812	0.3588	-1.3410	0.7186
IM	N2	C	IM	N3	C	-0.5031	0.8698	-0.7826	1.1494
IM	N2	C	IM	N3	D	-2.6152	-1.2277	-2.8694	-0.9736
IM	N2	C	MM	N1	A	-3.8821	-1.2338	-5.1497	0.03384
IM	N2	C	MM	N1	B	-1.1868	0.05272	-1.5282	0.3941
IM	N2	C	MM	N1	C	-1.0860	0.1534	-1.4962	0.5636
IM	N2	C	MM	N1	D	-2.6618	-1.3301	-2.9442	-1.0478
IM	N2	C	MM	N2	A	-3.9690	-0.8036	-5.4871	0.7145
IM	N2	C	MM	N2	B	-1.1522	-0.5176	-1.4566	-0.2133
IM	N2	C	MM	N2	C	-0.9115	-0.2530	-1.2273	0.06281
IM	N2	C	MM	N2	D	-2.2847	-1.7179	-2.5565	-1.4461
IM	N2	C	MM	N3	A	-3.0461	-0.5014	-4.2636	0.7161
IM	N2	C	MM	N3	B	-1.4975	-0.2301	-1.8394	0.1118
IM	N2	C	MM	N3	C	-0.9821	0.2647	-1.4570	0.7396
IM	N2	C	MM	N3	D	-2.3204	-0.8850	-2.5428	-0.6626
IM	N2	D	IM	N3	A	-0.6469	0.6649	-0.9731	0.9911
IM	N2	D	IM	N3	B	0.7536	2.1264	0.4279	2.4520
IM	N2	D	IM	N3	C	1.2236	2.6455	0.9821	2.8870
IM	N2	D	IM	N3	D	-0.9125	0.5720	-1.0991	0.7586
IM	N2	D	MM	N1	A	-2.1299	0.5164	-3.3966	1.7831
IM	N2	D	MM	N1	B	0.5399	1.8284	0.2359	2.1323
IM	N2	D	MM	N1	C	0.6546	1.9151	0.2664	2.3033
IM	N2	D	MM	N1	D	-0.9567	0.4671	-1.1802	0.6907
IM	N2	D	MM	N2	A	-2.2141	0.9439	-3.7288	2.4585
IM	N2	D	MM	N2	B	0.6127	1.2199	0.3215	1.5111

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
IM	N2	D	MM	N2	C	1.1689	0.1632	2658	7.16	<.0001	<.0001	0.05
IM	N2	D	MM	N2	D	-0.2501	0.1368	2647	-1.83	0.0677	0.9982	0.05
IM	N2	D	MM	N3	A	-0.02256	0.6465	737.1	-0.03	0.9722	1.0000	0.05
IM	N2	D	MM	N3	B	0.8874	0.2494	4.788	3.56	0.0175	0.1241	0.05
IM	N2	D	MM	N3	C	1.3925	0.2808	10.55	4.96	0.0005	0.0004	0.05
IM	N2	D	MM	N3	D	0.1485	0.2400	2.918	0.62	0.5811	1.0000	0.05
IM	N3	A	IM	N3	B	1.4310	0.1664	2659	8.60	<.0001	<.0001	0.05
IM	N3	A	IM	N3	C	1.9255	0.1510	2658	12.75	<.0001	<.0001	0.05
IM	N3	A	IM	N3	D	-0.1793	0.1436	2652	-1.25	0.2119	1.0000	0.05
IM	N3	A	MM	N1	A	-0.8158	0.6773	851.4	-1.20	0.2287	1.0000	0.05
IM	N3	A	MM	N1	B	1.1751	0.2577	5.512	4.56	0.0048	0.0029	0.05
IM	N3	A	MM	N1	C	1.2758	0.2755	7.407	4.63	0.0021	0.0021	0.05
IM	N3	A	MM	N1	D	-0.2538	0.2546	4.194	-1.00	0.3728	1.0000	0.05
IM	N3	A	MM	N2	A	-0.6441	0.8346	1281	-0.77	0.4404	1.0000	0.05
IM	N3	A	MM	N2	B	0.9072	0.2665	5.522	3.40	0.0164	0.1909	0.05
IM	N3	A	MM	N2	C	1.1599	0.2709	6.713	4.28	0.0040	0.0094	0.05
IM	N3	A	MM	N2	D	-0.2591	0.2546	4.044	-1.02	0.3657	1.0000	0.05
IM	N3	A	MM	N3	A	-0.03158	0.6161	2649	-0.05	0.9591	1.0000	0.05
IM	N3	A	MM	N3	B	0.8784	0.1580	2652	5.56	<.0001	<.0001	0.05
IM	N3	A	MM	N3	C	1.3835	0.1991	2658	6.95	<.0001	<.0001	0.05
IM	N3	A	MM	N3	D	0.1394	0.1399	2656	1.00	0.3188	1.0000	0.05
IM	N3	B	IM	N3	C	0.4946	0.1544	2643	3.20	0.0014	0.3116	0.05
IM	N3	B	IM	N3	D	-1.6103	0.1480	2651	-10.88	<.0001	<.0001	0.05
IM	N3	B	MM	N1	A	-2.2467	0.6793	771.3	-3.31	0.0010	0.2444	0.05
IM	N3	B	MM	N1	B	-0.2558	0.2658	5.294	-0.96	0.3776	1.0000	0.05
IM	N3	B	MM	N1	C	-0.1551	0.2825	6.921	-0.55	0.6002	1.0000	0.05
IM	N3	B	MM	N1	D	-1.6848	0.2626	4.067	-6.42	0.0029	<.0001	0.05
IM	N3	B	MM	N2	A	-2.0751	0.8375	1197	-2.48	0.0134	0.8658	0.05
IM	N3	B	MM	N2	B	-0.5237	0.2743	5.292	-1.91	0.1113	0.9962	0.05
IM	N3	B	MM	N2	C	-0.2710	0.2782	6.301	-0.97	0.3658	1.0000	0.05
IM	N3	B	MM	N2	D	-1.6901	0.2624	3.877	-6.44	0.0033	<.0001	0.05
IM	N3	B	MM	N3	A	-1.4625	0.6177	2649	-2.37	0.0180	0.9168	0.05
IM	N3	B	MM	N3	B	-0.5526	0.1633	2644	-3.38	0.0007	0.2010	0.05
IM	N3	B	MM	N3	C	-0.04750	0.2029	2651	-0.23	0.8149	1.0000	0.05
IM	N3	B	MM	N3	D	-1.2915	0.1449	2628	-8.91	<.0001	<.0001	0.05
IM	N3	C	IM	N3	D	-2.1048	0.1288	2659	-16.35	<.0001	<.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	*Nitrogen*	*HARVEST*	*_MAT*	*Nitrogen*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
IM	N2	D	MM	N2	C	0.8488	1.4890	0.5418	1.7961
IM	N2	D	MM	N2	D	-0.5185	0.01821	-0.7759	0.2756
IM	N2	D	MM	N3	A	-1.2917	1.2466	-2.5061	2.4610
IM	N2	D	MM	N3	B	0.2376	1.5372	-0.07083	1.8456
IM	N2	D	MM	N3	C	0.7713	2.0137	0.3139	2.4711
IM	N2	D	MM	N3	D	-0.6276	0.9245	-0.7734	1.0704
IM	N3	A	IM	N3	B	1.1048	1.7572	0.7918	2.0701
IM	N3	A	IM	N3	C	1.6295	2.2216	1.3454	2.5056
IM	N3	A	IM	N3	D	-0.4609	0.1023	-0.7310	0.3724
IM	N3	A	MM	N1	A	-2.1451	0.5135	-3.4177	1.7861
IM	N3	A	MM	N1	B	0.5307	1.8196	0.1850	2.1653
IM	N3	A	MM	N1	C	0.6316	1.9201	0.2175	2.3342
IM	N3	A	MM	N1	D	-0.9480	0.4404	-1.2320	0.7244
IM	N3	A	MM	N2	A	-2.2815	0.9932	-3.8505	2.5622
IM	N3	A	MM	N2	B	0.2412	1.5733	-0.1167	1.9311
IM	N3	A	MM	N2	C	0.5138	1.8060	0.1193	2.2006
IM	N3	A	MM	N2	D	-0.9630	0.4447	-1.2373	0.7190
IM	N3	A	MM	N3	A	-1.2397	1.1765	-2.3985	2.3354
IM	N3	A	MM	N3	B	0.5686	1.1882	0.2714	1.4854
IM	N3	A	MM	N3	C	0.9930	1.7739	0.6185	2.1484
IM	N3	A	MM	N3	D	-0.1348	0.4137	-0.3979	0.6768
IM	N3	B	IM	N3	C	0.1919	0.7973	-0.09853	1.0877
IM	N3	B	IM	N3	D	-1.9004	-1.3201	-2.1787	-1.0418
IM	N3	B	MM	N1	A	-3.5803	-0.9132	-4.8566	0.3631
IM	N3	B	MM	N1	B	-0.9277	0.4160	-1.2768	0.7651
IM	N3	B	MM	N1	C	-0.8247	0.5144	-1.2404	0.9302
IM	N3	B	MM	N1	D	-2.4092	-0.9604	-2.6937	-0.6759
IM	N3	B	MM	N2	A	-3.7183	-0.4319	-5.2927	1.1425
IM	N3	B	MM	N2	B	-1.2174	0.1699	-1.5777	0.5302
IM	N3	B	MM	N2	C	-0.9439	0.4018	-1.3397	0.7976
IM	N3	B	MM	N2	D	-2.4277	-0.9525	-2.6980	-0.6822
IM	N3	B	MM	N3	A	-2.6738	-0.2513	-3.8356	0.9106
IM	N3	B	MM	N3	B	-0.8727	-0.2324	-1.1798	0.07465
IM	N3	B	MM	N3	C	-0.4453	0.3504	-0.8270	0.7320
IM	N3	B	MM	N3	D	-1.5756	-1.0074	-1.8481	-0.7349
IM	N3	C	IM	N3	D	-2.3574	-1.8523	-2.5996	-1.6101

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
IM	N3	C	MM	N1	A	-2.7413	0.6738	834.2	-4.07	<.0001	0.0219	0.05
IM	N3	C	MM	N1	B	-0.7504	0.2504	4.117	-3.00	0.0386	0.4707	0.05
IM	N3	C	MM	N1	C	-0.6497	0.2691	5.962	-2.41	0.0525	0.8970	0.05
IM	N3	C	MM	N1	D	-2.1794	0.2473	3.043	-8.81	0.0029	<.0001	0.05
IM	N3	C	MM	N2	A	-2.5697	0.8325	1272	-3.09	0.0021	0.3981	0.05
IM	N3	C	MM	N2	B	-1.0183	0.2594	4.247	-3.93	0.0153	0.0372	0.05
IM	N3	C	MM	N2	C	-0.7656	0.2640	5.31	-2.90	0.0315	0.5529	0.05
IM	N3	C	MM	N2	D	-2.1847	0.2472	2.948	-8.84	0.0033	<.0001	0.05
IM	N3	C	MM	N3	A	-1.9571	0.6142	2654	-3.19	0.0015	0.3236	0.05
IM	N3	C	MM	N3	B	-1.0472	0.1453	2658	-7.21	<.0001	<.0001	0.05
IM	N3	C	MM	N3	C	-0.5421	0.1882	2651	-2.88	0.0040	0.5692	0.05
IM	N3	C	MM	N3	D	-1.7861	0.1252	2659	-14.27	<.0001	<.0001	0.05
IM	N3	D	MM	N1	A	-0.6365	0.6716	856.3	-0.95	0.3436	1.0000	0.05
IM	N3	D	MM	N1	B	1.3544	0.2442	3.597	5.55	0.0070	<.0001	0.05
IM	N3	D	MM	N1	C	1.4551	0.2631	5.366	5.53	0.0021	<.0001	0.05
IM	N3	D	MM	N1	D	-0.07451	0.2411	2.607	-0.31	0.7803	1.0000	0.05
IM	N3	D	MM	N2	A	-0.4648	0.8303	1295	-0.56	0.5757	1.0000	0.05
IM	N3	D	MM	N2	B	1.0865	0.2535	3.757	4.29	0.0146	0.0093	0.05
IM	N3	D	MM	N2	C	1.3392	0.2582	4.775	5.19	0.0040	0.0001	0.05
IM	N3	D	MM	N2	D	-0.07984	0.2410	2.499	-0.33	0.7662	1.0000	0.05
IM	N3	D	MM	N3	A	0.1477	0.6127	2651	0.24	0.8095	1.0000	0.05
IM	N3	D	MM	N3	B	1.0577	0.1381	2658	7.66	<.0001	<.0001	0.05
IM	N3	D	MM	N3	C	1.5628	0.1844	2658	8.48	<.0001	<.0001	0.05
IM	N3	D	MM	N3	D	0.3188	0.1167	2657	2.73	0.0064	0.6938	0.05
MM	N1	A	MM	N1	B	1.9909	0.6433	2658	3.09	0.0020	0.3918	0.05
MM	N1	A	MM	N1	C	2.0916	0.6531	2658	3.20	0.0014	0.3122	0.05
MM	N1	A	MM	N1	D	0.5620	0.6409	2658	0.88	0.3806	1.0000	0.05
MM	N1	A	MM	N2	A	0.1716	0.9446	1626	0.18	0.8558	1.0000	0.05
MM	N1	A	MM	N2	B	1.7230	0.6777	767.7	2.54	0.0112	0.8284	0.05
MM	N1	A	MM	N2	C	1.9757	0.6800	786.6	2.91	0.0038	0.5481	0.05
MM	N1	A	MM	N2	D	0.5566	0.6736	784.8	0.83	0.4088	1.0000	0.05
MM	N1	A	MM	N3	A	0.7842	0.9813	1735	0.80	0.4243	1.0000	0.05
MM	N1	A	MM	N3	B	1.6942	0.6742	889.3	2.51	0.0122	0.8462	0.05
MM	N1	A	MM	N3	C	2.1992	0.6878	879	3.20	0.0014	0.3157	0.05
MM	N1	A	MM	N3	D	0.9552	0.6707	847.6	1.42	0.1548	1.0000	0.05
MM	N1	B	MM	N1	C	0.1007	0.1722	2661	0.58	0.5587	1.0000	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Lower	Upper	Adj Lower	Adj Upper
IM	N3	C	MM	N1	A	-4.0638	-1.4189	-5.3297	-0.1529
IM	N3	C	MM	N1	B	-1.4379	-0.06295	-1.7123	0.2115
IM	N3	C	MM	N1	C	-1.3092	0.009794	-1.6836	0.3841
IM	N3	C	MM	N1	D	-2.9601	-1.3986	-3.1293	-1.2294
IM	N3	C	MM	N2	A	-4.2028	-0.9365	-5.7677	0.6284
IM	N3	C	MM	N2	B	-1.7223	-0.3143	-2.0148	-0.02177
IM	N3	C	MM	N2	C	-1.4326	-0.09864	-1.7800	0.2487
IM	N3	C	MM	N2	D	-2.9793	-1.3900	-3.1344	-1.2350
IM	N3	C	MM	N3	A	-3.1615	-0.7527	-4.3168	0.4025
IM	N3	C	MM	N3	B	-1.3320	-0.7623	-1.6052	-0.4891
IM	N3	C	MM	N3	C	-0.9111	-0.1731	-1.2650	0.1809
IM	N3	C	MM	N3	D	-2.0316	-1.5406	-2.2671	-1.3051
IM	N3	D	MM	N1	A	-1.9547	0.6817	-3.2166	1.9437
IM	N3	D	MM	N1	B	0.6454	2.0635	0.4162	2.2926
IM	N3	D	MM	N1	C	0.7925	2.1178	0.4444	2.4659
IM	N3	D	MM	N1	D	-0.9117	0.7627	-1.0009	0.8519
IM	N3	D	MM	N2	A	-2.0937	1.1641	-3.6547	2.7250
IM	N3	D	MM	N2	B	0.3644	1.8087	0.1127	2.0604
IM	N3	D	MM	N2	C	0.6659	2.0126	0.3471	2.3313
IM	N3	D	MM	N2	D	-0.9413	0.7816	-1.0055	0.8458
IM	N3	D	MM	N3	A	-1.0538	1.3492	-2.2063	2.5017
IM	N3	D	MM	N3	B	0.7869	1.3284	0.5272	1.5882
IM	N3	D	MM	N3	C	1.2012	1.9243	0.8544	2.2711
IM	N3	D	MM	N3	D	0.08987	0.5476	-0.1297	0.7672
MM	N1	A	MM	N1	B	0.7295	3.2523	-0.4804	4.4622
MM	N1	A	MM	N1	C	0.8110	3.3722	-0.4174	4.6006
MM	N1	A	MM	N1	D	-0.6947	1.8186	-1.9001	3.0240
MM	N1	A	MM	N2	A	-1.6811	2.0244	-3.4572	3.8005
MM	N1	A	MM	N2	B	0.3927	3.0534	-0.8805	4.3266
MM	N1	A	MM	N2	C	0.6408	3.3106	-0.6368	4.5882
MM	N1	A	MM	N2	D	-0.7656	1.8789	-2.0311	3.1444
MM	N1	A	MM	N3	A	-1.1404	2.7088	-2.9856	4.5540
MM	N1	A	MM	N3	B	0.3709	3.0174	-0.8961	4.2844
MM	N1	A	MM	N3	C	0.8494	3.5491	-0.4430	4.8415
MM	N1	A	MM	N3	D	-0.3613	2.2717	-1.6216	3.5320
MM	N1	B	MM	N1	C	-0.2369	0.4384	-0.5608	0.7622

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
MM	N1	B	MM	N1	D	-1.4289	0.1415	2660	-10.10	<.0001	<.0001	0.05
MM	N1	B	MM	N2	A	-1.8192	0.8331	1306	-2.18	0.0292	0.9694	0.05
MM	N1	B	MM	N2	B	-0.2679	0.2572	5.291	-1.04	0.3429	1.0000	0.05
MM	N1	B	MM	N2	C	-0.01519	0.2628	6.638	-0.06	0.9556	1.0000	0.05
MM	N1	B	MM	N2	D	-1.4343	0.2457	3.859	-5.84	0.0048	<.0001	0.05
MM	N1	B	MM	N3	A	-1.2067	0.6522	612.6	-1.85	0.0648	0.9978	0.05
MM	N1	B	MM	N3	B	-0.2967	0.2515	5.213	-1.18	0.2891	1.0000	0.05
MM	N1	B	MM	N3	C	0.2083	0.2830	11.48	0.74	0.4764	1.0000	0.05
MM	N1	B	MM	N3	D	-1.0357	0.2426	3.287	-4.27	0.0196	0.0099	0.05
MM	N1	C	MM	N1	D	-1.5296	0.1644	2658	-9.30	<.0001	<.0001	0.05
MM	N1	C	MM	N2	A	-1.9200	0.8377	1236	-2.29	0.0221	0.9431	0.05
MM	N1	C	MM	N2	B	-0.3686	0.2755	7.444	-1.34	0.2204	1.0000	0.05
MM	N1	C	MM	N2	C	-0.1159	0.2784	8.355	-0.42	0.6876	1.0000	0.05
MM	N1	C	MM	N2	D	-1.5350	0.2635	5.639	-5.82	0.0014	<.0001	0.05
MM	N1	C	MM	N3	A	-1.3074	0.6574	560.9	-1.99	0.0472	0.9924	0.05
MM	N1	C	MM	N3	B	-0.3975	0.2703	7.305	-1.47	0.1832	1.0000	0.05
MM	N1	C	MM	N3	C	0.1076	0.3008	14.1	0.36	0.7258	1.0000	0.05
MM	N1	C	MM	N3	D	-1.1364	0.2615	4.998	-4.35	0.0074	0.0073	0.05
MM	N1	D	MM	N2	A	-0.3903	0.8318	1256	-0.47	0.6390	1.0000	0.05
MM	N1	D	MM	N2	B	1.1611	0.2546	4.143	4.56	0.0095	0.0028	0.05
MM	N1	D	MM	N2	C	1.4137	0.2598	5.214	5.44	0.0025	<.0001	0.05
MM	N1	D	MM	N2	D	-0.00533	0.2427	2.881	-0.02	0.9839	1.0000	0.05
MM	N1	D	MM	N3	A	0.2222	0.6502	571.2	0.34	0.7326	1.0000	0.05
MM	N1	D	MM	N3	B	1.1322	0.2487	3.954	4.55	0.0107	0.0029	0.05
MM	N1	D	MM	N3	C	1.6373	0.2801	9.313	5.84	0.0002	<.0001	0.05
MM	N1	D	MM	N3	D	0.3933	0.2392	2.325	1.64	0.2243	0.9998	0.05
MM	N2	A	MM	N2	B	1.5514	0.8077	2652	1.92	0.0549	0.9957	0.05
MM	N2	A	MM	N2	C	1.8041	0.8069	2651	2.24	0.0255	0.9583	0.05
MM	N2	A	MM	N2	D	0.3850	0.8050	2651	0.48	0.6325	1.0000	0.05
MM	N2	A	MM	N3	A	0.6125	1.0428	1926	0.59	0.5570	1.0000	0.05
MM	N2	A	MM	N3	B	1.5225	0.8336	1332	1.83	0.0680	0.9983	0.05
MM	N2	A	MM	N3	C	2.0276	0.8444	1300	2.40	0.0165	0.9028	0.05
MM	N2	A	MM	N3	D	0.7836	0.8300	1289	0.94	0.3453	1.0000	0.05
MM	N2	B	MM	N2	C	0.2527	0.1722	2657	1.47	0.1423	1.0000	0.05
MM	N2	B	MM	N2	D	-1.1664	0.1482	2658	-7.87	<.0001	<.0001	0.05
MM	N2	B	MM	N3	A	-0.9388	0.6503	677.4	-1.44	0.1493	1.0000	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	*Nitrogen*	*HARVEST*	*_MAT*	*Nitrogen*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
MM	N1	B	MM	N1	D	-1.7065	-1.1514	-1.9727	-0.8852
MM	N1	B	MM	N2	A	-3.4536	-0.1849	-5.0198	1.3813
MM	N1	B	MM	N2	B	-0.9183	0.3826	-1.2561	0.7203
MM	N1	B	MM	N2	C	-0.6437	0.6133	-1.0250	0.9946
MM	N1	B	MM	N2	D	-2.1263	-0.7422	-2.3781	-0.4905
MM	N1	B	MM	N3	A	-2.4875	0.07412	-3.7123	1.2989
MM	N1	B	MM	N3	B	-0.9354	0.3419	-1.2629	0.6694
MM	N1	B	MM	N3	C	-0.4115	0.8282	-0.8791	1.2958
MM	N1	B	MM	N3	D	-1.7709	-0.3005	-1.9676	-0.1037
MM	N1	C	MM	N1	D	-1.8521	-1.2072	-2.1614	-0.8979
MM	N1	C	MM	N2	A	-3.5635	-0.2765	-5.1382	1.2983
MM	N1	C	MM	N2	B	-1.0123	0.2751	-1.4271	0.6899
MM	N1	C	MM	N2	C	-0.7531	0.5213	-1.1853	0.9535
MM	N1	C	MM	N2	D	-2.1900	-0.8800	-2.5474	-0.5225
MM	N1	C	MM	N3	A	-2.5987	-0.01616	-3.8329	1.2181
MM	N1	C	MM	N3	B	-1.0312	0.2363	-1.4359	0.6410
MM	N1	C	MM	N3	C	-0.5371	0.7524	-1.0481	1.2633
MM	N1	C	MM	N3	D	-1.8088	-0.4640	-2.1411	-0.1316
MM	N1	D	MM	N2	A	-2.0223	1.2416	-3.5860	2.8054
MM	N1	D	MM	N2	B	0.4638	1.8583	0.1830	2.1391
MM	N1	D	MM	N2	C	0.7540	2.0734	0.4156	2.4119
MM	N1	D	MM	N2	D	-0.7961	0.7854	-0.9378	0.9271
MM	N1	D	MM	N3	A	-1.0548	1.4993	-2.2757	2.7201
MM	N1	D	MM	N3	B	0.4387	1.8257	0.1769	2.0875
MM	N1	D	MM	N3	C	1.0068	2.2678	0.5611	2.7135
MM	N1	D	MM	N3	D	-0.5097	1.2962	-0.5258	1.3123
MM	N2	A	MM	N2	B	-0.03244	3.1352	-1.5517	4.6544
MM	N2	A	MM	N2	C	0.2217	3.3864	-1.2960	4.9041
MM	N2	A	MM	N2	D	-1.1936	1.9635	-2.7077	3.4777
MM	N2	A	MM	N3	A	-1.4327	2.6578	-3.3938	4.6189
MM	N2	A	MM	N3	B	-0.1127	3.1577	-1.6798	4.7248
MM	N2	A	MM	N3	C	0.3711	3.6841	-1.2162	5.2714
MM	N2	A	MM	N3	D	-0.8447	2.4119	-2.4051	3.9723
MM	N2	B	MM	N2	C	-0.08491	0.5903	-0.4087	0.9141
MM	N2	B	MM	N2	D	-1.4570	-0.8758	-1.7357	-0.5971
MM	N2	B	MM	N3	A	-2.2156	0.3380	-3.4371	1.5594

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Nitrogen	HARVEST	_MAT	Nitrogen	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
MM	N2	B	MM	N3	B	-0.02886	0.2604	5.283	-0.11	0.9159	1.0000	0.05
MM	N2	B	MM	N3	C	0.4762	0.2916	11.06	1.63	0.1305	0.9998	0.05
MM	N2	B	MM	N3	D	-0.7678	0.2517	3.462	-3.05	0.0460	0.4275	0.05
MM	N2	C	MM	N2	D	-1.4191	0.1575	2657	-9.01	<.0001	<.0001	0.05
MM	N2	C	MM	N3	A	-1.1915	0.6525	698.7	-1.83	0.0683	0.9983	0.05
MM	N2	C	MM	N3	B	-0.2815	0.2653	6.574	-1.06	0.3260	1.0000	0.05
MM	N2	C	MM	N3	C	0.2235	0.2947	12.51	0.76	0.4622	1.0000	0.05
MM	N2	C	MM	N3	D	-1.0205	0.2564	4.411	-3.98	0.0135	0.0305	0.05
MM	N2	D	MM	N3	A	0.2276	0.6459	690.7	0.35	0.7247	1.0000	0.05
MM	N2	D	MM	N3	B	1.1375	0.2484	3.81	4.58	0.0114	0.0026	0.05
MM	N2	D	MM	N3	C	1.6426	0.2802	8.969	5.86	0.0002	<.0001	0.05
MM	N2	D	MM	N3	D	0.3986	0.2393	2.276	1.67	0.2224	0.9997	0.05
MM	N3	A	MM	N3	B	0.9100	0.6155	2648	1.48	0.1394	1.0000	0.05
MM	N3	A	MM	N3	C	1.4150	0.6275	2654	2.26	0.0242	0.9534	0.05
MM	N3	A	MM	N3	D	0.1710	0.6117	2651	0.28	0.7798	1.0000	0.05
MM	N3	B	MM	N3	C	0.5051	0.1950	2658	2.59	0.0097	0.7980	0.05
MM	N3	B	MM	N3	D	-0.7389	0.1343	2658	-5.50	<.0001	<.0001	0.05
MM	N3	C	MM	N3	D	-1.2440	0.1809	2658	-6.88	<.0001	<.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Nitrogen*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	*Nitrogen*	*HARVEST*	*_MAT*	*Nitrogen*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
MM	N2	B	MM	N3	B	-0.6876	0.6299	-1.0293	0.9716
MM	N2	B	MM	N3	C	-0.1651	1.1176	-0.6440	1.5964
MM	N2	B	MM	N3	D	-1.5117	-0.02385	-1.7350	0.1994
MM	N2	C	MM	N2	D	-1.7279	-1.1102	-2.0242	-0.8140
MM	N2	C	MM	N3	A	-2.4726	0.08960	-3.6983	1.3153
MM	N2	C	MM	N3	B	-0.9172	0.3541	-1.3007	0.7376
MM	N2	C	MM	N3	C	-0.4156	0.8627	-0.9085	1.3556
MM	N2	C	MM	N3	D	-1.7069	-0.3341	-2.0054	-0.03555
MM	N2	D	MM	N3	A	-1.0406	1.4957	-2.2538	2.7089
MM	N2	D	MM	N3	B	0.4340	1.8410	0.1831	2.0919
MM	N2	D	MM	N3	C	1.0084	2.2768	0.5661	2.7191
MM	N2	D	MM	N3	D	-0.5201	1.3173	-0.5207	1.3179
MM	N3	A	MM	N3	B	-0.2969	2.1168	-1.4546	3.2745
MM	N3	A	MM	N3	C	0.1846	2.6455	-0.9956	3.8257
MM	N3	A	MM	N3	D	-1.0284	1.3705	-2.1789	2.5210
MM	N3	B	MM	N3	C	0.1226	0.8875	-0.2442	1.2544
MM	N3	B	MM	N3	D	-1.0022	-0.4757	-1.2547	-0.2231
MM	N3	C	MM	N3	D	-1.5987	-0.8893	-1.9389	-0.5491

Conservative Tukey-Kramer Grouping for
*MAT*Nitrogen*HARVEST Least Squares Means*
(Alpha=0.05)

LS-means with the same letter are not
significantly different.

MAT	*Nitrogen*	*HARVEST*	*Estimate*		
MM	N1	A	5.6037		A
					A
MM	N2	A	5.4321	B	A
				B	A
MM	N2	D	5.0471	B	A
				B	A
MM	N1	D	5.0418	B	A
				B	A
IM	N3	D	4.9673	B	A
				B	A
MM	N3	A	4.8195	B	A
				B	A
IM	N2	D	4.7970	B	A

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Conservative Tukey-Kramer Grouping for MAT*Nitrogen*HARVEST Least Squares Means (Alpha=0.05)*

LS-means with the same letter are not significantly different.

MAT	*Nitrogen*	*HARVEST*	*Estimate*		
				B	A
IM	N3	A	4.7880	B	A
				B	A
IM	N1	A	4.7162	B	A
				B	A
IM	N1	D	4.6817	B	A
				B	A
MM	N3	D	4.6485	B	A
				B	A
II	N3	D	4.6401	B	A
				B	A
II	N2	D	4.5990	B	A
				B	A
IM	N2	A	4.5513	B	A
				B	A
II	N1	D	4.3907	B	A
				B	A
MM	N3	B	3.9096	B	A
				B	A
MM	N2	B	3.8807	B	A
				B	A
II	N3	A	3.7871	B	A
				B	A
II	N2	A	3.6589	B	A
				B	A
MM	N2	C	3.6280	B	A
				B	A
MM	N1	B	3.6128	B	A
				B	A
II	N1	A	3.5618	B	A
				B	A
MM	N1	C	3.5121	B	A
				B	A
MM	N3	C	3.4045	B	A

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Conservative Tukey-Kramer Grouping for MAT*Nitrogen*HARVEST Least Squares Means (Alpha=0.05)*

LS-means with the same letter are not significantly different.

MAT	*Nitrogen*	*HARVEST*	*Estimate*		
				B	A
IM	N1	B	3.3850	B	A
				B	A
IM	N3	B	3.3570	B	A
				B	A
IM	N2	B	3.1595	B	A
				B	A
IM	N2	C	3.0458	B	A
				B	
IM	N1	C	2.9086	B	
				B	
IM	N3	C	2.8624	B	
				B	
II	N3	C	2.6944	B	
				B	
II	N2	B	2.6904	B	
				B	
II	N1	B	2.6652	B	
				B	
II	N3	B	2.5793	B	
				B	
II	N2	C	2.5744	B	
				B	
II	N1	C	2.3510	B	

*MAT*Cultivar*HARVEST Least Squares Means*

MAT	*Cultivar*	*HARVEST*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Alpha*	*Lower*	*Upper*
II	SE	A	3.6322	0.1260	19.26	28.83	<.0001	0.05	3.3687	3.8957
II	SE	B	2.5312	0.1172	11.01	21.59	<.0001	0.05	2.2732	2.7892
II	SE	C	2.5491	0.1158	11.23	22.02	<.0001	0.05	2.2949	2.8033
II	SE	D	4.6199	0.1473	49.59	31.35	<.0001	0.05	4.3239	4.9159
II	SF	A	3.7063	0.1306	26.95	28.39	<.0001	0.05	3.4384	3.9742
II	SF	B	2.7588	0.1293	23.15	21.34	<.0001	0.05	2.4915	3.0261
II	SF	C	2.5308	0.1259	16.14	20.10	<.0001	0.05	2.2640	2.7976

Statistical Analysis: 06/05/2013

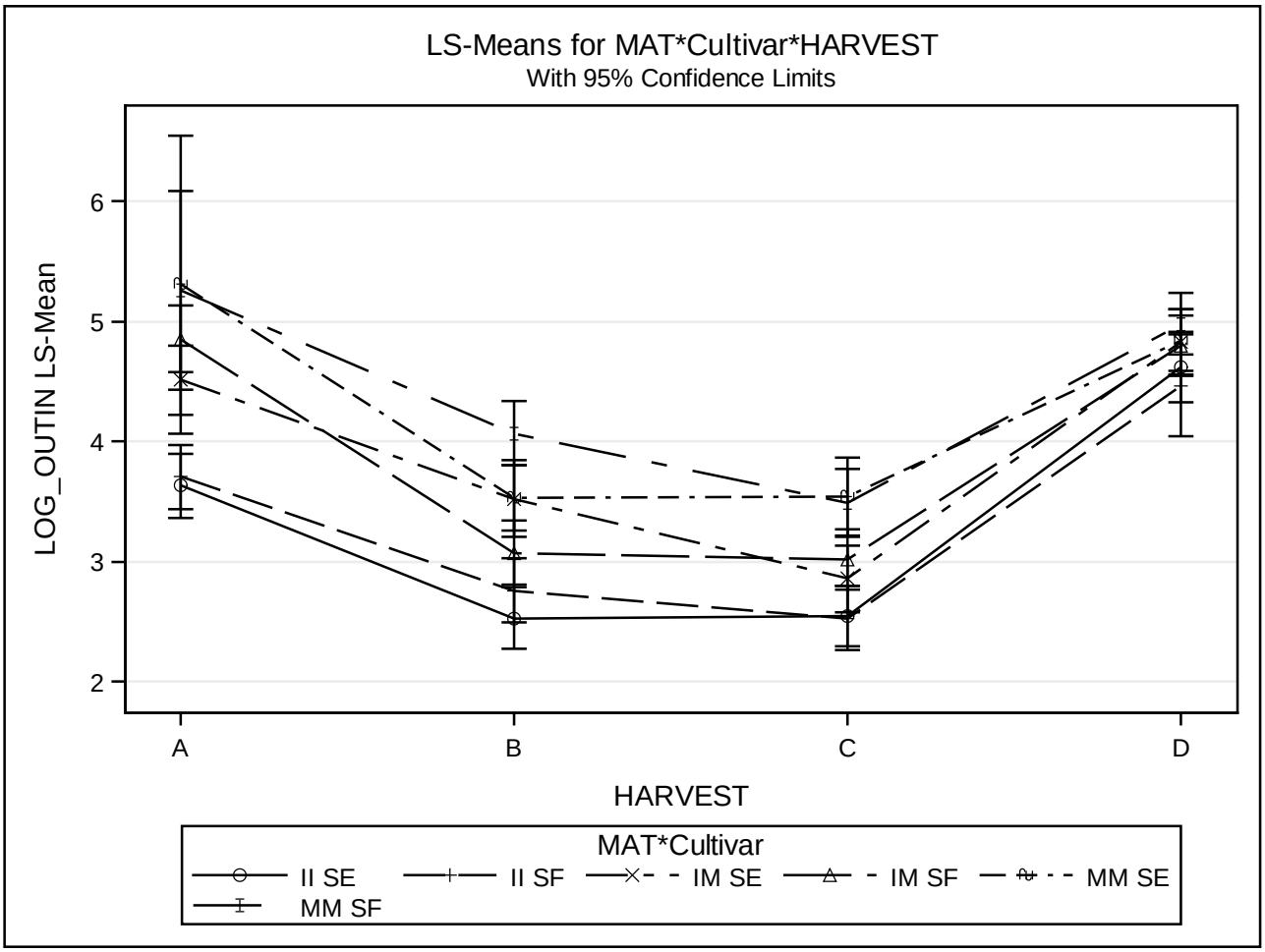
The GLIMMIX Procedure

*MAT*Cultivar*HARVEST Least Squares Means*

MAT	*Cultivar*	*HARVEST*	*Estimate*	*Standard Error*	*DF*	*t Value*	*Pr > |t|*	*Alpha*	*Lower*	*Upper*
II	SF	D	4.4667	0.2167	525.3	20.61	<.0001	0.05	4.0410	4.8924
IM	SE	A	4.5158	0.1422	38.46	31.76	<.0001	0.05	4.2281	4.8035
IM	SE	B	3.5267	0.1579	55.25	22.34	<.0001	0.05	3.2103	3.8431
IM	SE	C	2.8572	0.1363	43.78	20.96	<.0001	0.05	2.5824	3.1320
IM	SE	D	4.8314	0.1329	35.15	36.35	<.0001	0.05	4.5616	5.1012
IM	SF	A	4.8545	0.1371	41.41	35.41	<.0001	0.05	4.5777	5.1313
IM	SF	B	3.0742	0.1299	27.6	23.66	<.0001	0.05	2.8079	3.3406
IM	SF	C	3.0207	0.1209	18.87	24.99	<.0001	0.05	2.7675	3.2738
IM	SF	D	4.7992	0.1217	23.59	39.43	<.0001	0.05	4.5477	5.0506
MM	SE	A	5.3099	0.6328	2547	8.39	<.0001	0.05	4.0690	6.5508
MM	SE	B	3.5329	0.1351	46.99	26.15	<.0001	0.05	3.2611	3.8046
MM	SE	C	3.5391	0.1633	110	21.68	<.0001	0.05	3.2155	3.8626
MM	SE	D	4.8433	0.1213	15.79	39.94	<.0001	0.05	4.5860	5.1007
MM	SF	A	5.2604	0.4237	2128	12.42	<.0001	0.05	4.4295	6.0912
MM	SF	B	4.0692	0.1294	27.49	31.45	<.0001	0.05	3.8039	4.3345
MM	SF	C	3.4907	0.1417	42.59	24.63	<.0001	0.05	3.2049	3.7765
MM	SF	D	4.9816	0.1207	18.39	41.27	<.0001	0.05	4.7284	5.2348

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Cultivar	HARVEST	_MAT	Cultivar	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
II	SE	A	II	SE	B	1.1010	0.09874	2644	11.15	<.0001	<.0001	0.05
II	SE	A	II	SE	C	1.0831	0.09841	2639	11.01	<.0001	<.0001	0.05
II	SE	A	II	SE	D	-0.9877	0.1315	2656	-7.51	<.0001	<.0001	0.05
II	SE	A	II	SF	A	-0.07411	0.1188	860.1	-0.62	0.5329	1.0000	0.05
II	SE	A	II	SF	B	0.8734	0.1168	796.9	7.48	<.0001	<.0001	0.05
II	SE	A	II	SF	C	1.1014	0.1115	700	9.87	<.0001	<.0001	0.05
II	SE	A	II	SF	D	-0.8345	0.2136	2184	-3.91	<.0001	0.0197	0.05
II	SE	A	IM	SE	A	-0.8836	0.1249	2648	-7.08	<.0001	<.0001	0.05
II	SE	A	IM	SE	B	0.1055	0.1393	2660	0.76	0.4489	1.0000	0.05
II	SE	A	IM	SE	C	0.7750	0.1235	2655	6.27	<.0001	<.0001	0.05
II	SE	A	IM	SE	D	-1.1992	0.1190	2657	-10.08	<.0001	<.0001	0.05
II	SE	A	IM	SF	A	-1.2223	0.1276	1031	-9.58	<.0001	<.0001	0.05
II	SE	A	IM	SF	B	0.5579	0.1191	837.5	4.68	<.0001	0.0007	0.05
II	SE	A	IM	SF	C	0.6115	0.1112	679.3	5.50	<.0001	<.0001	0.05
II	SE	A	IM	SF	D	-1.1670	0.1138	743.6	-10.25	<.0001	<.0001	0.05
II	SE	A	MM	SE	A	-1.6777	0.6294	2651	-2.67	0.0077	0.5444	0.05
II	SE	A	MM	SE	B	0.09930	0.1236	2656	0.80	0.4216	1.0000	0.05
II	SE	A	MM	SE	C	0.09313	0.1514	2658	0.62	0.5386	1.0000	0.05
II	SE	A	MM	SE	D	-1.2111	0.1043	2656	-11.61	<.0001	<.0001	0.05
II	SE	A	MM	SF	A	-1.6282	0.4211	2647	-3.87	0.0001	0.0228	0.05
II	SE	A	MM	SF	B	-0.4370	0.1190	849.1	-3.67	0.0003	0.0450	0.05
II	SE	A	MM	SF	C	0.1415	0.1304	1058	1.09	0.2781	1.0000	0.05
II	SE	A	MM	SF	D	-1.3494	0.1107	678.2	-12.19	<.0001	<.0001	0.05
II	SE	B	II	SE	C	-0.01791	0.08735	2648	-0.20	0.8376	1.0000	0.05
II	SE	B	II	SE	D	-2.0887	0.1231	2657	-16.97	<.0001	<.0001	0.05
II	SE	B	II	SF	A	-1.1751	0.1103	686.8	-10.65	<.0001	<.0001	0.05
II	SE	B	II	SF	B	-0.2276	0.1077	617.5	-2.11	0.0350	0.9093	0.05
II	SE	B	II	SF	C	0.000350	0.1019	520.6	0.00	0.9973	1.0000	0.05
II	SE	B	II	SF	D	-1.9355	0.2081	2121	-9.30	<.0001	<.0001	0.05
II	SE	B	IM	SE	A	-1.9846	0.1166	2647	-17.01	<.0001	<.0001	0.05
II	SE	B	IM	SE	B	-0.9956	0.1318	2660	-7.56	<.0001	<.0001	0.05
II	SE	B	IM	SE	C	-0.3260	0.1147	2659	-2.84	0.0045	0.4047	0.05
II	SE	B	IM	SE	D	-2.3003	0.1101	2660	-20.90	<.0001	<.0001	0.05
II	SE	B	IM	SF	A	-2.3234	0.1191	846.1	-19.51	<.0001	<.0001	0.05
II	SE	B	IM	SF	B	-0.5431	0.1101	657.4	-4.93	<.0001	0.0002	0.05
II	SE	B	IM	SF	C	-0.4895	0.1014	503.2	-4.83	<.0001	0.0004	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	*Cultivar*	*HARVEST*	*_MAT*	*Cultivar*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
II	SE	A	II	SE	B	0.9074	1.2946	0.7415	1.4606
II	SE	A	II	SE	C	0.8902	1.2761	0.7248	1.4414
II	SE	A	II	SE	D	-1.2455	-0.7299	-1.4665	-0.5089
II	SE	A	II	SF	A	-0.3073	0.1591	-0.5067	0.3585
II	SE	A	II	SF	B	0.6442	1.1026	0.4482	1.2986
II	SE	A	II	SF	C	0.8824	1.3204	0.6953	1.5075
II	SE	A	II	SF	D	-1.2534	-0.4156	-1.6122	-0.05673
II	SE	A	IM	SE	A	-1.1284	-0.6387	-1.3382	-0.4289
II	SE	A	IM	SE	B	-0.1676	0.3785	-0.4016	0.6125
II	SE	A	IM	SE	C	0.5328	1.0172	0.3252	1.2248
II	SE	A	IM	SE	D	-1.4325	-0.9660	-1.6324	-0.7661
II	SE	A	IM	SF	A	-1.4727	-0.9720	-1.6869	-0.7578
II	SE	A	IM	SF	B	0.3242	0.7917	0.1243	0.9916
II	SE	A	IM	SF	C	0.3932	0.8299	0.2067	1.0164
II	SE	A	IM	SF	D	-1.3904	-0.9435	-1.5814	-0.7525
II	SE	A	MM	SE	A	-2.9119	-0.4434	-3.9696	0.6142
II	SE	A	MM	SE	B	-0.1430	0.3416	-0.3506	0.5492
II	SE	A	MM	SE	C	-0.2038	0.3901	-0.4582	0.6445
II	SE	A	MM	SE	D	-1.4157	-1.0066	-1.5909	-0.8314
II	SE	A	MM	SF	A	-2.4538	-0.8025	-3.1613	-0.09505
II	SE	A	MM	SF	B	-0.6705	-0.2035	-0.8702	-0.00378
II	SE	A	MM	SF	C	-0.1144	0.3973	-0.3333	0.6163
II	SE	A	MM	SF	D	-1.5668	-1.1320	-1.7525	-0.9462
II	SE	B	II	SE	C	-0.1892	0.1534	-0.3360	0.3002
II	SE	B	II	SE	D	-2.3301	-1.8474	-2.5369	-1.6406
II	SE	B	II	SF	A	-1.3918	-0.9585	-1.5769	-0.7734
II	SE	B	II	SF	B	-0.4392	-0.01604	-0.6199	0.1647
II	SE	B	II	SF	C	-0.1999	0.2006	-0.3707	0.3714
II	SE	B	II	SF	D	-2.3436	-1.5275	-2.6932	-1.1779
II	SE	B	IM	SE	A	-2.2133	-1.7559	-2.4093	-1.5599
II	SE	B	IM	SE	B	-1.2539	-0.7372	-1.4753	-0.5158
II	SE	B	IM	SE	C	-0.5509	-0.1011	-0.7436	0.09155
II	SE	B	IM	SE	D	-2.5161	-2.0844	-2.7011	-1.8995
II	SE	B	IM	SF	A	-2.5571	-2.0896	-2.7570	-1.8897
II	SE	B	IM	SF	B	-0.7592	-0.3269	-0.9439	-0.1423
II	SE	B	IM	SF	C	-0.6888	-0.2902	-0.8588	-0.1202

*Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Cultivar	HARVEST	_MAT	Cultivar	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
II	SE	B	IM	SF	D	-2.2680	0.1044	563.4	-21.73	<.0001	<.0001	0.05
II	SE	B	MM	SE	A	-2.7787	0.6282	2650	-4.42	<.0001	0.0024	0.05
II	SE	B	MM	SE	B	-1.0017	0.1152	2660	-8.69	<.0001	<.0001	0.05
II	SE	B	MM	SE	C	-1.0079	0.1443	2658	-6.99	<.0001	<.0001	0.05
II	SE	B	MM	SE	D	-2.3122	0.09388	2655	-24.63	<.0001	<.0001	0.05
II	SE	B	MM	SF	A	-2.7292	0.4185	2645	-6.52	<.0001	<.0001	0.05
II	SE	B	MM	SF	B	-1.5380	0.1100	667	-13.99	<.0001	<.0001	0.05
II	SE	B	MM	SF	C	-0.9595	0.1224	888.9	-7.84	<.0001	<.0001	0.05
II	SE	B	MM	SF	D	-2.4504	0.1011	503	-24.23	<.0001	<.0001	0.05
II	SE	C	II	SE	D	-2.0708	0.1230	2655	-16.84	<.0001	<.0001	0.05
II	SE	C	II	SF	A	-1.1572	0.1100	677.7	-10.52	<.0001	<.0001	0.05
II	SE	C	II	SF	B	-0.2097	0.1076	612.3	-1.95	0.0517	0.9593	0.05
II	SE	C	II	SF	C	0.01826	0.1017	512.8	0.18	0.8576	1.0000	0.05
II	SE	C	II	SF	D	-1.9176	0.2080	2125	-9.22	<.0001	<.0001	0.05
II	SE	C	IM	SE	A	-1.9667	0.1165	2651	-16.88	<.0001	<.0001	0.05
II	SE	C	IM	SE	B	-0.9777	0.1318	2657	-7.42	<.0001	<.0001	0.05
II	SE	C	IM	SE	C	-0.3081	0.1146	2658	-2.69	0.0072	0.5248	0.05
II	SE	C	IM	SE	D	-2.2824	0.1095	2655	-20.84	<.0001	<.0001	0.05
II	SE	C	IM	SF	A	-2.3055	0.1189	836.8	-19.39	<.0001	<.0001	0.05
II	SE	C	IM	SF	B	-0.5252	0.1100	652.5	-4.78	<.0001	0.0005	0.05
II	SE	C	IM	SF	C	-0.4716	0.1010	492.8	-4.67	<.0001	0.0008	0.05
II	SE	C	IM	SF	D	-2.2501	0.1040	551.4	-21.65	<.0001	<.0001	0.05
II	SE	C	MM	SE	A	-2.7608	0.6285	2653	-4.39	<.0001	0.0028	0.05
II	SE	C	MM	SE	B	-0.9838	0.1145	2660	-8.59	<.0001	<.0001	0.05
II	SE	C	MM	SE	C	-0.9900	0.1440	2659	-6.87	<.0001	<.0001	0.05
II	SE	C	MM	SE	D	-2.2943	0.09375	2660	-24.47	<.0001	<.0001	0.05
II	SE	C	MM	SF	A	-2.7113	0.4181	2646	-6.48	<.0001	<.0001	0.05
II	SE	C	MM	SF	B	-1.5201	0.1097	657.5	-13.85	<.0001	<.0001	0.05
II	SE	C	MM	SF	C	-0.9416	0.1221	874.9	-7.71	<.0001	<.0001	0.05
II	SE	C	MM	SF	D	-2.4325	0.1007	493.6	-24.16	<.0001	<.0001	0.05
II	SE	D	II	SF	A	0.9136	0.1404	1268	6.51	<.0001	<.0001	0.05
II	SE	D	II	SF	B	1.8611	0.1383	1190	13.45	<.0001	<.0001	0.05
II	SE	D	II	SF	C	2.0891	0.1337	1105	15.63	<.0001	<.0001	0.05
II	SE	D	II	SF	D	0.1532	0.2279	2266	0.67	0.5015	1.0000	0.05
II	SE	D	IM	SE	A	0.1041	0.1453	2655	0.72	0.4736	1.0000	0.05
II	SE	D	IM	SE	B	1.0932	0.1579	2656	6.93	<.0001	<.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Cultivar	HARVEST	_MAT	Cultivar	HARVEST	Lower	Upper	Adj Lower	Adj Upper
II	SE	B	IM	SF	D	-2.4730	-2.0630	-2.6480	-1.8880
II	SE	B	MM	SE	A	-4.0105	-1.5469	-5.0661	-0.4913
II	SE	B	MM	SE	B	-1.2276	-0.7758	-1.4212	-0.5822
II	SE	B	MM	SE	C	-1.2908	-0.7250	-1.5331	-0.4826
II	SE	B	MM	SE	D	-2.4963	-2.1281	-2.6540	-1.9703
II	SE	B	MM	SF	A	-3.5497	-1.9086	-4.2529	-1.2055
II	SE	B	MM	SF	B	-1.7539	-1.3221	-1.9384	-1.1376
II	SE	B	MM	SF	C	-1.1998	-0.7192	-1.4053	-0.5137
II	SE	B	MM	SF	D	-2.6491	-2.2517	-2.8187	-2.0821
II	SE	C	II	SE	D	-2.3120	-1.8296	-2.5187	-1.6230
II	SE	C	II	SF	A	-1.3732	-0.9413	-1.5577	-0.7567
II	SE	C	II	SF	B	-0.4210	0.001579	-0.6015	0.1820
II	SE	C	II	SF	C	-0.1815	0.2180	-0.3520	0.3885
II	SE	C	II	SF	D	-2.3255	-1.5097	-2.6749	-1.1603
II	SE	C	IM	SE	A	-2.1952	-1.7382	-2.3909	-1.5424
II	SE	C	IM	SE	B	-1.2361	-0.7192	-1.4576	-0.4977
II	SE	C	IM	SE	C	-0.5328	-0.08349	-0.7253	0.1090
II	SE	C	IM	SE	D	-2.4971	-2.0676	-2.6812	-1.8835
II	SE	C	IM	SF	A	-2.5389	-2.0721	-2.7384	-1.8725
II	SE	C	IM	SF	B	-0.7411	-0.3093	-0.9255	-0.1248
II	SE	C	IM	SF	C	-0.6701	-0.2730	-0.8395	-0.1037
II	SE	C	IM	SF	D	-2.4543	-2.0459	-2.6286	-1.8716
II	SE	C	MM	SE	A	-3.9932	-1.5284	-5.0492	-0.4724
II	SE	C	MM	SE	B	-1.2084	-0.7592	-1.4008	-0.5668
II	SE	C	MM	SE	C	-1.2724	-0.7076	-1.5143	-0.4656
II	SE	C	MM	SE	D	-2.4781	-2.1104	-2.6356	-1.9529
II	SE	C	MM	SF	A	-3.5312	-1.8914	-4.2338	-1.1888
II	SE	C	MM	SF	B	-1.7356	-1.3047	-1.9197	-1.1206
II	SE	C	MM	SF	C	-1.1812	-0.7020	-1.3861	-0.4972
II	SE	C	MM	SF	D	-2.6303	-2.2347	-2.7991	-2.0659
II	SE	D	II	SF	A	0.6382	1.1890	0.4024	1.4247
II	SE	D	II	SF	B	1.5897	2.1325	1.3574	2.3648
II	SE	D	II	SF	C	1.8268	2.3514	1.6023	2.5759
II	SE	D	II	SF	D	-0.2938	0.6002	-0.6768	0.9832
II	SE	D	IM	SE	A	-0.1807	0.3890	-0.4249	0.6331
II	SE	D	IM	SE	B	0.7836	1.4027	0.5184	1.6680

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Cultivar	HARVEST	_MAT	Cultivar	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
II	SE	D	IM	SE	C	1.7627	0.1436	2659	12.27	<.0001	<.0001	0.05
II	SE	D	IM	SE	D	-0.2115	0.1416	2659	-1.49	0.1353	0.9987	0.05
II	SE	D	IM	SF	A	-0.2346	0.1474	1385	-1.59	0.1117	0.9967	0.05
II	SE	D	IM	SF	B	1.5457	0.1405	1234	11.00	<.0001	<.0001	0.05
II	SE	D	IM	SF	C	1.5992	0.1336	1087	11.97	<.0001	<.0001	0.05
II	SE	D	IM	SF	D	-0.1793	0.1354	1138	-1.32	0.1856	0.9998	0.05
II	SE	D	MM	SE	A	-0.6900	0.6345	2652	-1.09	0.2769	1.0000	0.05
II	SE	D	MM	SE	B	1.0870	0.1436	2657	7.57	<.0001	<.0001	0.05
II	SE	D	MM	SE	C	1.0808	0.1684	2659	6.42	<.0001	<.0001	0.05
II	SE	D	MM	SE	D	-0.2234	0.1272	2658	-1.76	0.0791	0.9879	0.05
II	SE	D	MM	SF	A	-0.6405	0.4276	2646	-1.50	0.1343	0.9986	0.05
II	SE	D	MM	SF	B	0.5507	0.1400	1238	3.93	<.0001	0.0178	0.05
II	SE	D	MM	SF	C	1.1292	0.1507	1419	7.49	<.0001	<.0001	0.05
II	SE	D	MM	SF	D	-0.3617	0.1333	1097	-2.71	0.0068	0.5064	0.05
II	SF	A	II	SF	B	0.9475	0.1182	2659	8.01	<.0001	<.0001	0.05
II	SF	A	II	SF	C	1.1755	0.1130	2656	10.41	<.0001	<.0001	0.05
II	SF	A	II	SF	D	-0.7604	0.2131	2654	-3.57	0.0004	0.0636	0.05
II	SF	A	IM	SE	A	-0.8095	0.1349	1178	-6.00	<.0001	<.0001	0.05
II	SF	A	IM	SE	B	0.1796	0.1481	1362	1.21	0.2255	1.0000	0.05
II	SF	A	IM	SE	C	0.8491	0.1328	1085	6.39	<.0001	<.0001	0.05
II	SF	A	IM	SE	D	-1.1251	0.1289	1012	-8.73	<.0001	<.0001	0.05
II	SF	A	IM	SF	A	-1.1482	0.1284	2655	-8.94	<.0001	<.0001	0.05
II	SF	A	IM	SF	B	0.6321	0.1202	2649	5.26	<.0001	<.0001	0.05
II	SF	A	IM	SF	C	0.6856	0.1123	2658	6.11	<.0001	<.0001	0.05
II	SF	A	IM	SF	D	-1.0929	0.1151	2659	-9.49	<.0001	<.0001	0.05
II	SF	A	MM	SE	A	-1.6036	0.6322	2659	-2.54	0.0113	0.6477	0.05
II	SF	A	MM	SE	B	0.1734	0.1330	1096	1.30	0.1925	0.9998	0.05
II	SF	A	MM	SE	C	0.1672	0.1592	1550	1.05	0.2936	1.0000	0.05
II	SF	A	MM	SE	D	-1.1370	0.1153	768.2	-9.86	<.0001	<.0001	0.05
II	SF	A	MM	SF	A	-1.5540	0.4212	2650	-3.69	0.0002	0.0425	0.05
II	SF	A	MM	SF	B	-0.3629	0.1201	2654	-3.02	0.0025	0.2807	0.05
II	SF	A	MM	SF	C	0.2156	0.1317	2660	1.64	0.1017	0.9952	0.05
II	SF	A	MM	SF	D	-1.2753	0.1120	2657	-11.39	<.0001	<.0001	0.05
II	SF	B	II	SF	C	0.2280	0.1104	2650	2.07	0.0390	0.9266	0.05
II	SF	B	II	SF	D	-1.7079	0.2136	2658	-8.00	<.0001	<.0001	0.05
II	SF	B	IM	SE	A	-1.7570	0.1329	1106	-13.22	<.0001	<.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Cultivar	HARVEST	_MAT	Cultivar	HARVEST	Lower	Upper	Adj Lower	Adj Upper
II	SE	D	IM	SE	C	1.4811	2.0443	1.2397	2.2857
II	SE	D	IM	SE	D	-0.4892	0.06612	-0.7271	0.3040
II	SE	D	IM	SF	A	-0.5238	0.05454	-0.7714	0.3021
II	SE	D	IM	SF	B	1.2701	1.8212	1.0342	2.0571
II	SE	D	IM	SF	C	1.3371	1.8613	1.1129	2.0856
II	SE	D	IM	SF	D	-0.4448	0.08631	-0.6721	0.3136
II	SE	D	MM	SE	A	-1.9341	0.5541	-3.0002	1.6202
II	SE	D	MM	SE	B	0.8054	1.3687	0.5640	1.6100
II	SE	D	MM	SE	C	0.7506	1.4111	0.4676	1.6941
II	SE	D	MM	SE	D	-0.4729	0.02600	-0.6866	0.2397
II	SE	D	MM	SF	A	-1.4788	0.1979	-2.1972	0.9163
II	SE	D	MM	SF	B	0.2760	0.8254	0.04089	1.0605
II	SE	D	MM	SF	C	0.8336	1.4248	0.5806	1.6778
II	SE	D	MM	SF	D	-0.6233	-0.1001	-0.8472	0.1238
II	SF	A	II	SF	B	0.7157	1.1793	0.5170	1.3780
II	SF	A	II	SF	C	0.9540	1.3970	0.7642	1.5868
II	SF	A	II	SF	D	-1.1783	-0.3424	-1.5365	0.01571
II	SF	A	IM	SE	A	-1.0740	-0.5449	-1.3005	-0.3184
II	SF	A	IM	SE	B	-0.1109	0.4701	-0.3596	0.7188
II	SF	A	IM	SE	C	0.5885	1.1097	0.3655	1.3327
II	SF	A	IM	SE	D	-1.3780	-0.8723	-1.5943	-0.6559
II	SF	A	IM	SF	A	-1.4000	-0.8964	-1.6158	-0.6807
II	SF	A	IM	SF	B	0.3964	0.8677	0.1945	1.0696
II	SF	A	IM	SF	C	0.4655	0.9058	0.2768	1.0945
II	SF	A	IM	SF	D	-1.3186	-0.8671	-1.5120	-0.6737
II	SF	A	MM	SE	A	-2.8433	-0.3639	-3.9056	0.6985
II	SF	A	MM	SE	B	-0.08751	0.4343	-0.3108	0.6576
II	SF	A	MM	SE	C	-0.1450	0.4795	-0.4124	0.7469
II	SF	A	MM	SE	D	-1.3634	-0.9106	-1.5569	-0.7171
II	SF	A	MM	SF	A	-2.3799	-0.7282	-3.0876	-0.02051
II	SF	A	MM	SF	B	-0.5983	-0.1274	-0.8001	0.07432
II	SF	A	MM	SF	C	-0.04260	0.4738	-0.2639	0.6951
II	SF	A	MM	SF	D	-1.4948	-1.0557	-1.6830	-0.8676
II	SF	B	II	SF	C	0.01157	0.4444	-0.1739	0.6298
II	SF	B	II	SF	D	-2.1266	-1.2891	-2.4855	-0.9303
II	SF	B	IM	SE	A	-2.0178	-1.4962	-2.2410	-1.2730

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Cultivar	HARVEST	_MAT	Cultivar	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
II	SF	B	IM	SE	B	-0.7679	0.1464	1320	-5.24	<.0001	<.0001	0.05
II	SF	B	IM	SE	C	-0.09841	0.1310	1025	-0.75	0.4526	1.0000	0.05
II	SF	B	IM	SE	D	-2.0726	0.1268	960	-16.34	<.0001	<.0001	0.05
II	SF	B	IM	SF	A	-2.0958	0.1264	2651	-16.58	<.0001	<.0001	0.05
II	SF	B	IM	SF	B	-0.3155	0.1192	2656	-2.65	0.0082	0.5596	0.05
II	SF	B	IM	SF	C	-0.2619	0.1099	2659	-2.38	0.0172	0.7609	0.05
II	SF	B	IM	SF	D	-2.0404	0.1128	2658	-18.10	<.0001	<.0001	0.05
II	SF	B	MM	SE	A	-2.5511	0.6314	2659	-4.04	<.0001	0.0118	0.05
II	SF	B	MM	SE	B	-0.7741	0.1309	1027	-5.91	<.0001	<.0001	0.05
II	SF	B	MM	SE	C	-0.7803	0.1580	1504	-4.94	<.0001	0.0002	0.05
II	SF	B	MM	SE	D	-2.0845	0.1129	692.5	-18.46	<.0001	<.0001	0.05
II	SF	B	MM	SF	A	-2.5016	0.4202	2650	-5.95	<.0001	<.0001	0.05
II	SF	B	MM	SF	B	-1.3104	0.1178	2657	-11.13	<.0001	<.0001	0.05
II	SF	B	MM	SF	C	-0.7319	0.1294	2657	-5.66	<.0001	<.0001	0.05
II	SF	B	MM	SF	D	-2.2228	0.1096	2660	-20.28	<.0001	<.0001	0.05
II	SF	C	II	SF	D	-1.9359	0.2092	2656	-9.25	<.0001	<.0001	0.05
II	SF	C	IM	SE	A	-1.9849	0.1274	1004	-15.58	<.0001	<.0001	0.05
II	SF	C	IM	SE	B	-0.9959	0.1417	1213	-7.03	<.0001	<.0001	0.05
II	SF	C	IM	SE	C	-0.3264	0.1263	945.8	-2.58	0.0099	0.6094	0.05
II	SF	C	IM	SE	D	-2.3006	0.1219	862.3	-18.88	<.0001	<.0001	0.05
II	SF	C	IM	SF	A	-2.3237	0.1211	2648	-19.19	<.0001	<.0001	0.05
II	SF	C	IM	SF	B	-0.5434	0.1129	2658	-4.81	<.0001	0.0004	0.05
II	SF	C	IM	SF	C	-0.4898	0.1041	2658	-4.70	<.0001	0.0007	0.05
II	SF	C	IM	SF	D	-2.2683	0.1073	2655	-21.13	<.0001	<.0001	0.05
II	SF	C	MM	SE	A	-2.7791	0.6306	2659	-4.41	<.0001	0.0026	0.05
II	SF	C	MM	SE	B	-1.0021	0.1263	942.1	-7.93	<.0001	<.0001	0.05
II	SF	C	MM	SE	C	-1.0082	0.1534	1428	-6.57	<.0001	<.0001	0.05
II	SF	C	MM	SE	D	-2.3125	0.1072	601.2	-21.56	<.0001	<.0001	0.05
II	SF	C	MM	SF	A	-2.7295	0.4192	2650	-6.51	<.0001	<.0001	0.05
II	SF	C	MM	SF	B	-1.5384	0.1123	2649	-13.70	<.0001	<.0001	0.05
II	SF	C	MM	SF	C	-0.9599	0.1241	2657	-7.74	<.0001	<.0001	0.05
II	SF	C	MM	SF	D	-2.4508	0.1039	2659	-23.58	<.0001	<.0001	0.05
II	SF	D	IM	SE	A	-0.04908	0.2218	2229	-0.22	0.8249	1.0000	0.05
II	SF	D	IM	SE	B	0.9400	0.2313	2270	4.06	<.0001	0.0108	0.05
II	SF	D	IM	SE	C	1.6095	0.2198	2177	7.32	<.0001	<.0001	0.05
II	SF	D	IM	SE	D	-0.3647	0.2187	2170	-1.67	0.0955	0.9938	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Cultivar	HARVEST	_MAT	Cultivar	HARVEST	Lower	Upper	Adj Lower	Adj Upper
II	SF	B	IM	SE	B	-1.0552	-0.4807	-1.3012	-0.2347
II	SF	B	IM	SE	C	-0.3554	0.1586	-0.5753	0.3784
II	SF	B	IM	SE	D	-2.3216	-1.8237	-2.5345	-1.6108
II	SF	B	IM	SF	A	-2.3437	-1.8478	-2.5561	-1.6354
II	SF	B	IM	SF	B	-0.5492	-0.08173	-0.7495	0.1186
II	SF	B	IM	SF	C	-0.4773	-0.04647	-0.6619	0.1381
II	SF	B	IM	SF	D	-2.2615	-1.8193	-2.4509	-1.6298
II	SF	B	MM	SE	A	-3.7892	-1.3130	-4.8501	-0.2521
II	SF	B	MM	SE	B	-1.0309	-0.5173	-1.2506	-0.2976
II	SF	B	MM	SE	C	-1.0901	-0.4704	-1.3555	-0.2051
II	SF	B	MM	SE	D	-2.3062	-1.8629	-2.4956	-1.6735
II	SF	B	MM	SF	A	-3.3255	-1.6776	-4.0316	-0.9715
II	SF	B	MM	SF	B	-1.5413	-1.0795	-1.7392	-0.8816
II	SF	B	MM	SF	C	-0.9857	-0.4781	-1.2032	-0.2607
II	SF	B	MM	SF	D	-2.4377	-2.0079	-2.6219	-1.8237
II	SF	C	II	SF	D	-2.3461	-1.5256	-2.6976	-1.1741
II	SF	C	IM	SE	A	-2.2350	-1.7349	-2.4489	-1.5210
II	SF	C	IM	SE	B	-1.2739	-0.7179	-1.5119	-0.4799
II	SF	C	IM	SE	C	-0.5742	-0.07857	-0.7862	0.1334
II	SF	C	IM	SE	D	-2.5398	-2.0614	-2.7444	-1.8569
II	SF	C	IM	SF	A	-2.5612	-2.0862	-2.7647	-1.8827
II	SF	C	IM	SF	B	-0.7648	-0.3220	-0.9545	-0.1323
II	SF	C	IM	SF	C	-0.6941	-0.2856	-0.8691	-0.1106
II	SF	C	IM	SF	D	-2.4788	-2.0579	-2.6592	-1.8775
II	SF	C	MM	SE	A	-4.0155	-1.5426	-5.0750	-0.4831
II	SF	C	MM	SE	B	-1.2499	-0.7542	-1.4619	-0.5422
II	SF	C	MM	SE	C	-1.3091	-0.7074	-1.5667	-0.4497
II	SF	C	MM	SE	D	-2.5231	-2.1019	-2.7030	-1.9220
II	SF	C	MM	SF	A	-3.5515	-1.9076	-4.2559	-1.2032
II	SF	C	MM	SF	B	-1.7586	-1.3182	-1.9473	-1.1294
II	SF	C	MM	SF	C	-1.2032	-0.7166	-1.4116	-0.5081
II	SF	C	MM	SF	D	-2.6546	-2.2470	-2.8292	-2.0723
II	SF	D	IM	SE	A	-0.4841	0.3859	-0.8568	0.7587
II	SF	D	IM	SE	B	0.4864	1.3935	0.09776	1.7822
II	SF	D	IM	SE	C	1.1784	2.0406	0.8090	2.4100
II	SF	D	IM	SE	D	-0.7936	0.06411	-1.1610	0.4315

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Cultivar	HARVEST	_MAT	Cultivar	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
II	SF	D	IM	SF	A	-0.3879	0.2186	2646	-1.77	0.0761	0.9862	0.05
II	SF	D	IM	SF	B	1.3924	0.2139	2656	6.51	<.0001	<.0001	0.05
II	SF	D	IM	SF	C	1.4460	0.2090	2656	6.92	<.0001	<.0001	0.05
II	SF	D	IM	SF	D	-0.3325	0.2096	2655	-1.59	0.1128	0.9969	0.05
II	SF	D	MM	SE	A	-0.8432	0.6543	2658	-1.29	0.1976	0.9999	0.05
II	SF	D	MM	SE	B	0.9338	0.2205	2209	4.23	<.0001	0.0054	0.05
II	SF	D	MM	SE	C	0.9276	0.2368	2281	3.92	<.0001	0.0189	0.05
II	SF	D	MM	SE	D	-0.3766	0.2109	2134	-1.79	0.0742	0.9851	0.05
II	SF	D	MM	SF	A	-0.7937	0.4594	2655	-1.73	0.0842	0.9902	0.05
II	SF	D	MM	SF	B	0.3975	0.2135	2658	1.86	0.0627	0.9755	0.05
II	SF	D	MM	SF	C	0.9760	0.2193	2651	4.45	<.0001	0.0022	0.05
II	SF	D	MM	SF	D	-0.5149	0.2083	2653	-2.47	0.0135	0.6973	0.05
IM	SE	A	IM	SE	B	0.9890	0.1527	2659	6.48	<.0001	<.0001	0.05
IM	SE	A	IM	SE	C	1.6586	0.1375	2656	12.06	<.0001	<.0001	0.05
IM	SE	A	IM	SE	D	-0.3157	0.1342	2646	-2.35	0.0187	0.7818	0.05
IM	SE	A	IM	SF	A	-0.3388	0.1425	1314	-2.38	0.0176	0.7656	0.05
IM	SE	A	IM	SF	B	1.4415	0.1347	1141	10.70	<.0001	<.0001	0.05
IM	SE	A	IM	SF	C	1.4951	0.1275	997.1	11.72	<.0001	<.0001	0.05
IM	SE	A	IM	SF	D	-0.2834	0.1302	1072	-2.18	0.0298	0.8819	0.05
IM	SE	A	MM	SE	A	-0.7941	0.6325	2650	-1.26	0.2094	0.9999	0.05
IM	SE	A	MM	SE	B	0.9829	0.1387	2660	7.08	<.0001	<.0001	0.05
IM	SE	A	MM	SE	C	0.9767	0.1631	2657	5.99	<.0001	<.0001	0.05
IM	SE	A	MM	SE	D	-0.3276	0.1216	2654	-2.69	0.0071	0.5223	0.05
IM	SE	A	MM	SF	A	-0.7446	0.4270	2647	-1.74	0.0813	0.9889	0.05
IM	SE	A	MM	SF	B	0.4466	0.1344	1152	3.32	0.0009	0.1319	0.05
IM	SE	A	MM	SF	C	1.0251	0.1445	1328	7.09	<.0001	<.0001	0.05
IM	SE	A	MM	SF	D	-0.4658	0.1270	992.2	-3.67	0.0003	0.0458	0.05
IM	SE	B	IM	SE	C	0.6695	0.1526	2657	4.39	<.0001	0.0028	0.05
IM	SE	B	IM	SE	D	-1.3047	0.1482	2654	-8.80	<.0001	<.0001	0.05
IM	SE	B	IM	SF	A	-1.3278	0.1541	1467	-8.62	<.0001	<.0001	0.05
IM	SE	B	IM	SF	B	0.4525	0.1475	1321	3.07	0.0022	0.2531	0.05
IM	SE	B	IM	SF	C	0.5061	0.1418	1223	3.57	0.0004	0.0633	0.05
IM	SE	B	IM	SF	D	-1.2724	0.1440	1280	-8.84	<.0001	<.0001	0.05
IM	SE	B	MM	SE	A	-1.7832	0.6363	2654	-2.80	0.0051	0.4354	0.05
IM	SE	B	MM	SE	B	-0.00616	0.1538	2642	-0.04	0.9680	1.0000	0.05
IM	SE	B	MM	SE	C	-0.01233	0.1743	2660	-0.07	0.9436	1.0000	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	*Cultivar*	*HARVEST*	*_MAT*	*Cultivar*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
II	SF	D	IM	SF	A	-0.8165	0.04078	-1.1838	0.4081
II	SF	D	IM	SF	B	0.9729	1.8120	0.6134	2.1714
II	SF	D	IM	SF	C	1.0361	1.8559	0.6849	2.2072
II	SF	D	IM	SF	D	-0.7434	0.07846	-1.0956	0.4306
II	SF	D	MM	SE	A	-2.1262	0.4399	-3.2257	1.5393
II	SF	D	MM	SE	B	0.5014	1.3662	0.1309	1.7367
II	SF	D	MM	SE	C	0.4633	1.3920	0.06542	1.7898
II	SF	D	MM	SE	D	-0.7902	0.03687	-1.1444	0.3911
II	SF	D	MM	SF	A	-1.6945	0.1072	-2.4665	0.8791
II	SF	D	MM	SF	B	-0.02110	0.8161	-0.3798	1.1748
II	SF	D	MM	SF	C	0.5459	1.4061	0.1774	1.7746
II	SF	D	MM	SF	D	-0.9233	-0.1065	-1.2733	0.2435
IM	SE	A	IM	SE	B	0.6897	1.2884	0.4332	1.5449
IM	SE	A	IM	SE	C	1.3889	1.9282	1.1578	2.1593
IM	SE	A	IM	SE	D	-0.5787	-0.05259	-0.8042	0.1728
IM	SE	A	IM	SF	A	-0.6184	-0.05917	-0.8577	0.1802
IM	SE	A	IM	SF	B	1.1773	1.7057	0.9512	1.9319
IM	SE	A	IM	SF	C	1.2449	1.7453	1.0308	1.9594
IM	SE	A	IM	SF	D	-0.5389	-0.02788	-0.7576	0.1908
IM	SE	A	MM	SE	A	-2.0343	0.4460	-3.0970	1.5088
IM	SE	A	MM	SE	B	0.7108	1.2549	0.4777	1.4881
IM	SE	A	MM	SE	C	0.6569	1.2965	0.3828	1.5706
IM	SE	A	MM	SE	D	-0.5661	-0.08903	-0.7705	0.1154
IM	SE	A	MM	SF	A	-1.5819	0.09277	-2.2995	0.8103
IM	SE	A	MM	SF	B	0.1829	0.7102	-0.04268	0.9358
IM	SE	A	MM	SF	C	0.7416	1.3085	0.4989	1.5512
IM	SE	A	MM	SF	D	-0.7150	-0.2166	-0.9283	-0.00338
IM	SE	B	IM	SE	C	0.3704	0.9687	0.1140	1.2250
IM	SE	B	IM	SE	D	-1.5954	-1.0140	-1.8445	-0.7649
IM	SE	B	IM	SF	A	-1.6301	-1.0255	-1.8889	-0.7667
IM	SE	B	IM	SF	B	0.1632	0.7418	-0.08452	0.9895
IM	SE	B	IM	SF	C	0.2279	0.7843	-0.01025	1.0224
IM	SE	B	IM	SF	D	-1.5549	-0.9900	-1.7967	-0.7481
IM	SE	B	MM	SE	A	-3.0308	-0.5355	-4.0999	0.5336
IM	SE	B	MM	SE	B	-0.3077	0.2954	-0.5661	0.5538
IM	SE	B	MM	SE	C	-0.3541	0.3294	-0.6469	0.6223

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Cultivar	HARVEST	_MAT	Cultivar	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
IM	SE	B	MM	SE	D	-1.3166	0.1367	2658	-9.63	<.0001	<.0001	0.05
IM	SE	B	MM	SF	A	-1.7336	0.4301	2644	-4.03	<.0001	0.0123	0.05
IM	SE	B	MM	SF	B	-0.5425	0.1479	1358	-3.67	0.0003	0.0458	0.05
IM	SE	B	MM	SF	C	0.03602	0.1574	1498	0.23	0.8190	1.0000	0.05
IM	SE	B	MM	SF	D	-1.4549	0.1412	1216	-10.31	<.0001	<.0001	0.05
IM	SE	C	IM	SE	D	-1.9742	0.1328	2654	-14.87	<.0001	<.0001	0.05
IM	SE	C	IM	SF	A	-1.9973	0.1406	1240	-14.21	<.0001	<.0001	0.05
IM	SE	C	IM	SF	B	-0.2171	0.1332	1067	-1.63	0.1034	0.9954	0.05
IM	SE	C	IM	SF	C	-0.1635	0.1256	904.9	-1.30	0.1933	0.9999	0.05
IM	SE	C	IM	SF	D	-1.9420	0.1280	973.6	-15.17	<.0001	<.0001	0.05
IM	SE	C	MM	SE	A	-2.4527	0.6332	2653	-3.87	0.0001	0.0222	0.05
IM	SE	C	MM	SE	B	-0.6757	0.1367	2660	-4.94	<.0001	0.0002	0.05
IM	SE	C	MM	SE	C	-0.6819	0.1611	2654	-4.23	<.0001	0.0054	0.05
IM	SE	C	MM	SE	D	-1.9861	0.1194	2657	-16.63	<.0001	<.0001	0.05
IM	SE	C	MM	SF	A	-2.4032	0.4245	2645	-5.66	<.0001	<.0001	0.05
IM	SE	C	MM	SF	B	-1.2120	0.1327	1069	-9.13	<.0001	<.0001	0.05
IM	SE	C	MM	SF	C	-0.6335	0.1428	1269	-4.44	<.0001	0.0023	0.05
IM	SE	C	MM	SF	D	-2.1244	0.1249	905.3	-17.00	<.0001	<.0001	0.05
IM	SE	D	IM	SF	A	-0.02311	0.1367	1164	-0.17	0.8657	1.0000	0.05
IM	SE	D	IM	SF	B	1.7572	0.1282	972.6	13.71	<.0001	<.0001	0.05
IM	SE	D	IM	SF	C	1.8108	0.1216	836.7	14.89	<.0001	<.0001	0.05
IM	SE	D	IM	SF	D	0.03226	0.1239	916.8	0.26	0.7946	1.0000	0.05
IM	SE	D	MM	SE	A	-0.4785	0.6321	2653	-0.76	0.4492	1.0000	0.05
IM	SE	D	MM	SE	B	1.2985	0.1333	2653	9.74	<.0001	<.0001	0.05
IM	SE	D	MM	SE	C	1.2924	0.1588	2657	8.14	<.0001	<.0001	0.05
IM	SE	D	MM	SE	D	-0.01191	0.1155	2657	-0.10	0.9179	1.0000	0.05
IM	SE	D	MM	SF	A	-0.4289	0.4236	2647	-1.01	0.3113	1.0000	0.05
IM	SE	D	MM	SF	B	0.7622	0.1285	1002	5.93	<.0001	<.0001	0.05
IM	SE	D	MM	SF	C	1.3407	0.1391	1193	9.64	<.0001	<.0001	0.05
IM	SE	D	MM	SF	D	-0.1502	0.1207	833.4	-1.24	0.2139	0.9999	0.05
IM	SF	A	IM	SF	B	1.7803	0.1292	2658	13.78	<.0001	<.0001	0.05
IM	SF	A	IM	SF	C	1.8339	0.1211	2659	15.14	<.0001	<.0001	0.05
IM	SF	A	IM	SF	D	0.05538	0.1233	2651	0.45	0.6534	1.0000	0.05
IM	SF	A	MM	SE	A	-0.4553	0.6342	2660	-0.72	0.4728	1.0000	0.05
IM	SF	A	MM	SE	B	1.3217	0.1405	1230	9.41	<.0001	<.0001	0.05
IM	SF	A	MM	SE	C	1.3155	0.1655	1647	7.95	<.0001	<.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Cultivar	HARVEST	_MAT	Cultivar	HARVEST	Lower	Upper	Adj Lower	Adj Upper
IM	SE	B	MM	SE	D	-1.5846	-1.0486	-1.8142	-0.8190
IM	SE	B	MM	SF	A	-2.5771	-0.8902	-3.2998	-0.1675
IM	SE	B	MM	SF	B	-0.8326	-0.2523	-1.0810	-0.00389
IM	SE	B	MM	SF	C	-0.2728	0.3448	-0.5372	0.6093
IM	SE	B	MM	SF	D	-1.7318	-1.1779	-1.9689	-0.9409
IM	SE	C	IM	SE	D	-2.2346	-1.7139	-2.4576	-1.4908
IM	SE	C	IM	SF	A	-2.2732	-1.7215	-2.5092	-1.4854
IM	SE	C	IM	SF	B	-0.4784	0.04426	-0.7020	0.2678
IM	SE	C	IM	SF	C	-0.4099	0.08297	-0.6207	0.2937
IM	SE	C	IM	SF	D	-2.1932	-1.6908	-2.4081	-1.4759
IM	SE	C	MM	SE	A	-3.6942	-1.2111	-4.7582	-0.1472
IM	SE	C	MM	SE	B	-0.9438	-0.4076	-1.1735	-0.1778
IM	SE	C	MM	SE	C	-0.9977	-0.3660	-1.2683	-0.09540
IM	SE	C	MM	SE	D	-2.2203	-1.7519	-2.4211	-1.5512
IM	SE	C	MM	SF	A	-3.2355	-1.5708	-3.9487	-0.8576
IM	SE	C	MM	SF	B	-1.4724	-0.9516	-1.6951	-0.7289
IM	SE	C	MM	SF	C	-0.9137	-0.3533	-1.1535	-0.1135
IM	SE	C	MM	SF	D	-2.3696	-1.8792	-2.5793	-1.6695
IM	SE	D	IM	SF	A	-0.2913	0.2450	-0.5207	0.4745
IM	SE	D	IM	SF	B	1.5056	2.0087	1.2904	2.2239
IM	SE	D	IM	SF	C	1.5721	2.0495	1.3679	2.2536
IM	SE	D	IM	SF	D	-0.2108	0.2754	-0.4188	0.4833
IM	SE	D	MM	SE	A	-1.7179	0.7610	-2.7800	1.8231
IM	SE	D	MM	SE	B	1.0372	1.5599	0.8132	1.7838
IM	SE	D	MM	SE	C	0.9809	1.6038	0.7140	1.8707
IM	SE	D	MM	SE	D	-0.2385	0.2147	-0.4326	0.4088
IM	SE	D	MM	SF	A	-1.2595	0.4017	-1.9713	1.1134
IM	SE	D	MM	SF	B	0.5101	1.0144	0.2944	1.2301
IM	SE	D	MM	SF	C	1.0677	1.6137	0.8341	1.8474
IM	SE	D	MM	SF	D	-0.3871	0.08681	-0.5898	0.2894
IM	SF	A	IM	SF	B	1.5269	2.0336	1.3099	2.2507
IM	SF	A	IM	SF	C	1.5964	2.0714	1.3929	2.2749
IM	SF	A	IM	SF	D	-0.1864	0.2972	-0.3936	0.5043
IM	SF	A	MM	SE	A	-1.6989	0.7882	-2.7645	1.8538
IM	SF	A	MM	SE	B	1.0460	1.5973	0.8100	1.8333
IM	SF	A	MM	SE	C	0.9909	1.6401	0.7129	1.9180

*Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Cultivar	HARVEST	_MAT	Cultivar	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
IM	SF	A	MM	SE	D	0.01121	0.1239	919.8	0.09	0.9279	1.0000	0.05
IM	SF	A	MM	SF	A	-0.4058	0.4248	2649	-0.96	0.3395	1.0000	0.05
IM	SF	A	MM	SF	B	0.7853	0.1282	2656	6.13	<.0001	<.0001	0.05
IM	SF	A	MM	SF	C	1.3638	0.1387	2653	9.83	<.0001	<.0001	0.05
IM	SF	A	MM	SF	D	-0.1270	0.1206	2658	-1.05	0.2922	1.0000	0.05
IM	SF	B	IM	SF	C	0.05359	0.1121	2656	0.48	0.6325	1.0000	0.05
IM	SF	B	IM	SF	D	-1.7249	0.1150	2659	-14.99	<.0001	<.0001	0.05
IM	SF	B	MM	SE	A	-2.2356	0.6323	2659	-3.54	0.0004	0.0702	0.05
IM	SF	B	MM	SE	B	-0.4586	0.1330	1065	-3.45	0.0006	0.0916	0.05
IM	SF	B	MM	SE	C	-0.4648	0.1592	1515	-2.92	0.0036	0.3487	0.05
IM	SF	B	MM	SE	D	-1.7691	0.1152	740	-15.36	<.0001	<.0001	0.05
IM	SF	B	MM	SF	A	-2.1861	0.4214	2652	-5.19	<.0001	<.0001	0.05
IM	SF	B	MM	SF	B	-0.9949	0.1205	2657	-8.26	<.0001	<.0001	0.05
IM	SF	B	MM	SF	C	-0.4165	0.1318	2658	-3.16	0.0016	0.2032	0.05
IM	SF	B	MM	SF	D	-1.9073	0.1121	2658	-17.02	<.0001	<.0001	0.05
IM	SF	C	IM	SF	D	-1.7785	0.1058	2658	-16.82	<.0001	<.0001	0.05
IM	SF	C	MM	SE	A	-2.2892	0.6303	2659	-3.63	0.0003	0.0516	0.05
IM	SF	C	MM	SE	B	-0.5122	0.1256	909.6	-4.08	<.0001	0.0102	0.05
IM	SF	C	MM	SE	C	-0.5184	0.1528	1415	-3.39	0.0007	0.1086	0.05
IM	SF	C	MM	SE	D	-1.8227	0.1069	582.5	-17.05	<.0001	<.0001	0.05
IM	SF	C	MM	SF	A	-2.2397	0.4193	2655	-5.34	<.0001	<.0001	0.05
IM	SF	C	MM	SF	B	-1.0485	0.1120	2658	-9.36	<.0001	<.0001	0.05
IM	SF	C	MM	SF	C	-0.4700	0.1243	2660	-3.78	0.0002	0.0310	0.05
IM	SF	C	MM	SF	D	-1.9609	0.1030	2658	-19.04	<.0001	<.0001	0.05
IM	SF	D	MM	SE	A	-0.5107	0.6299	2659	-0.81	0.4176	1.0000	0.05
IM	SF	D	MM	SE	B	1.2663	0.1277	969.8	9.91	<.0001	<.0001	0.05
IM	SF	D	MM	SE	C	1.2601	0.1550	1471	8.13	<.0001	<.0001	0.05
IM	SF	D	MM	SE	D	-0.04417	0.1098	638.9	-0.40	0.6876	1.0000	0.05
IM	SF	D	MM	SF	A	-0.4612	0.4201	2651	-1.10	0.2724	1.0000	0.05
IM	SF	D	MM	SF	B	0.7300	0.1147	2656	6.37	<.0001	<.0001	0.05
IM	SF	D	MM	SF	C	1.3085	0.1259	2652	10.39	<.0001	<.0001	0.05
IM	SF	D	MM	SF	D	-0.1824	0.1057	2651	-1.73	0.0844	0.9902	0.05
MM	SE	A	MM	SE	B	1.7770	0.6327	2651	2.81	0.0050	0.4306	0.05
MM	SE	A	MM	SE	C	1.7708	0.6393	2651	2.77	0.0056	0.4607	0.05
MM	SE	A	MM	SE	D	0.4665	0.6287	2649	0.74	0.4581	1.0000	0.05
MM	SE	A	MM	SF	A	0.04952	0.7020	2659	0.07	0.9438	1.0000	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Cultivar	HARVEST	_MAT	Cultivar	HARVEST	Lower	Upper	Adj Lower	Adj Upper
IM	SF	A	MM	SE	D	-0.2319	0.2543	-0.4398	0.4622
IM	SF	A	MM	SF	A	-1.2388	0.4271	-1.9525	1.1409
IM	SF	A	MM	SF	B	0.5340	1.0367	0.3186	1.2521
IM	SF	A	MM	SF	C	1.0919	1.6358	0.8588	1.8689
IM	SF	A	MM	SF	D	-0.3635	0.1094	-0.5662	0.3121
IM	SF	B	IM	SF	C	-0.1661	0.2733	-0.3544	0.4616
IM	SF	B	IM	SF	D	-1.9505	-1.4993	-2.1438	-1.3060
IM	SF	B	MM	SE	A	-3.4754	-0.9959	-4.5378	0.06653
IM	SF	B	MM	SE	B	-0.7195	-0.1978	-0.9427	0.02546
IM	SF	B	MM	SE	C	-0.7771	-0.1526	-1.0444	0.1148
IM	SF	B	MM	SE	D	-1.9952	-1.5430	-2.1884	-1.3497
IM	SF	B	MM	SF	A	-3.0123	-1.3599	-3.7203	-0.6519
IM	SF	B	MM	SF	B	-1.2313	-0.7586	-1.4338	-0.5561
IM	SF	B	MM	SF	C	-0.6749	-0.1580	-0.8964	0.06348
IM	SF	B	MM	SF	D	-2.1271	-1.6875	-2.3155	-1.4992
IM	SF	C	IM	SF	D	-1.9859	-1.5711	-2.1636	-1.3934
IM	SF	C	MM	SE	A	-3.5252	-1.0532	-4.5843	0.005881
IM	SF	C	MM	SE	B	-0.7587	-0.2657	-0.9696	-0.05490
IM	SF	C	MM	SE	C	-0.8182	-0.2186	-1.0749	0.03812
IM	SF	C	MM	SE	D	-2.0327	-1.6127	-2.2120	-1.4334
IM	SF	C	MM	SF	A	-3.0618	-1.4175	-3.7664	-0.7130
IM	SF	C	MM	SF	B	-1.2682	-0.8288	-1.4565	-0.6406
IM	SF	C	MM	SF	C	-0.7138	-0.2262	-0.9228	-0.01733
IM	SF	C	MM	SF	D	-2.1629	-1.7589	-2.3360	-1.5858
IM	SF	D	MM	SE	A	-1.7458	0.7244	-2.8042	1.7828
IM	SF	D	MM	SE	B	1.0156	1.5170	0.8011	1.7314
IM	SF	D	MM	SE	C	0.9560	1.5642	0.6957	1.8245
IM	SF	D	MM	SE	D	-0.2598	0.1714	-0.4439	0.3556
IM	SF	D	MM	SF	A	-1.2850	0.3626	-1.9909	1.0685
IM	SF	D	MM	SF	B	0.5051	0.9548	0.3124	1.1475
IM	SF	D	MM	SF	C	1.0615	1.5554	0.8499	1.7670
IM	SF	D	MM	SF	D	-0.3896	0.02479	-0.5672	0.2023
MM	SE	A	MM	SE	B	0.5364	3.0176	-0.5266	4.0806
MM	SE	A	MM	SE	C	0.5173	3.0244	-0.5569	4.0985
MM	SE	A	MM	SE	D	-0.7663	1.6994	-1.8227	2.7558
MM	SE	A	MM	SF	A	-1.3270	1.4261	-2.5066	2.6057

*Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	Cultivar	HARVEST	_MAT	Cultivar	HARVEST	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P	Alpha
MM	SE	A	MM	SF	B	1.2407	0.6325	2659	1.96	0.0499	0.9565	0.05
MM	SE	A	MM	SF	C	1.8192	0.6325	2659	2.88	0.0041	0.3799	0.05
MM	SE	A	MM	SF	D	0.3283	0.6308	2659	0.52	0.6028	1.0000	0.05
MM	SE	B	MM	SE	C	-0.00617	0.1621	2660	-0.04	0.9696	1.0000	0.05
MM	SE	B	MM	SE	D	-1.3104	0.1199	2657	-10.93	<.0001	<.0001	0.05
MM	SE	B	MM	SF	A	-1.7275	0.4239	2648	-4.08	<.0001	0.0103	0.05
MM	SE	B	MM	SF	B	-0.5363	0.1325	1062	-4.05	<.0001	0.0115	0.05
MM	SE	B	MM	SF	C	0.04219	0.1434	1264	0.29	0.7686	1.0000	0.05
MM	SE	B	MM	SF	D	-1.4487	0.1254	919.5	-11.56	<.0001	<.0001	0.05
MM	SE	C	MM	SE	D	-1.3043	0.1489	2660	-8.76	<.0001	<.0001	0.05
MM	SE	C	MM	SF	A	-1.7213	0.4350	2645	-3.96	<.0001	0.0163	0.05
MM	SE	C	MM	SF	B	-0.5301	0.1592	1534	-3.33	0.0009	0.1292	0.05
MM	SE	C	MM	SF	C	0.04836	0.1670	1654	0.29	0.7721	1.0000	0.05
MM	SE	C	MM	SF	D	-1.4425	0.1527	1424	-9.45	<.0001	<.0001	0.05
MM	SE	D	MM	SF	A	-0.4170	0.4200	2645	-0.99	0.3208	1.0000	0.05
MM	SE	D	MM	SF	B	0.7741	0.1148	741.8	6.74	<.0001	<.0001	0.05
MM	SE	D	MM	SF	C	1.3526	0.1265	942	10.69	<.0001	<.0001	0.05
MM	SE	D	MM	SF	D	-0.1383	0.1068	580.8	-1.29	0.1961	0.9999	0.05
MM	SF	A	MM	SF	B	1.1912	0.4214	2649	2.83	0.0047	0.4169	0.05
MM	SF	A	MM	SF	C	1.7697	0.4260	2654	4.15	<.0001	0.0075	0.05
MM	SF	A	MM	SF	D	0.2788	0.4187	2653	0.67	0.5056	1.0000	0.05
MM	SF	B	MM	SF	C	0.5785	0.1312	2658	4.41	<.0001	0.0026	0.05
MM	SF	B	MM	SF	D	-0.9124	0.1117	2659	-8.17	<.0001	<.0001	0.05
MM	SF	C	MM	SF	D	-1.4909	0.1237	2657	-12.05	<.0001	<.0001	0.05

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Differences of MAT*Cultivar*HARVEST Least Squares Means*
Adjustment for Multiple Comparisons: Tukey-Kramer

MAT	*Cultivar*	*HARVEST*	*_MAT*	*Cultivar*	*HARVEST*	*Lower*	*Upper*	*Adj Lower*	*Adj Upper*
MM	SE	A	MM	SF	B	0.000507	2.4809	-1.0622	3.5436
MM	SE	A	MM	SF	C	0.5790	3.0594	-0.4837	4.1221
MM	SE	A	MM	SF	D	-0.9085	1.5651	-1.9684	2.6250
MM	SE	B	MM	SE	C	-0.3239	0.3116	-0.5962	0.5839
MM	SE	B	MM	SE	D	-1.5456	-1.0752	-1.7472	-0.8737
MM	SE	B	MM	SF	A	-2.5587	-0.8962	-3.2710	-0.1839
MM	SE	B	MM	SF	B	-0.7963	-0.2763	-1.0187	-0.05390
MM	SE	B	MM	SF	C	-0.2391	0.3234	-0.4798	0.5642
MM	SE	B	MM	SF	D	-1.6947	-1.2027	-1.9052	-0.9922
MM	SE	C	MM	SE	D	-1.5963	-1.0122	-1.8466	-0.7619
MM	SE	C	MM	SF	A	-2.5743	-0.8683	-3.3052	-0.1374
MM	SE	C	MM	SF	B	-0.8423	-0.2179	-1.1097	0.04939
MM	SE	C	MM	SF	C	-0.2791	0.3758	-0.5596	0.6563
MM	SE	C	MM	SF	D	-1.7420	-1.1431	-1.9984	-0.8867
MM	SE	D	MM	SF	A	-1.2406	0.4065	-1.9463	1.1123
MM	SE	D	MM	SF	B	0.5487	0.9996	0.3560	1.1923
MM	SE	D	MM	SF	C	1.1043	1.6010	0.8919	1.8134
MM	SE	D	MM	SF	D	-0.3481	0.07154	-0.5272	0.2507
MM	SF	A	MM	SF	B	0.3649	2.0174	-0.3431	2.7255
MM	SF	A	MM	SF	C	0.9343	2.6050	0.2185	3.3208
MM	SF	A	MM	SF	D	-0.5422	1.0997	-1.2457	1.8032
MM	SF	B	MM	SF	C	0.3212	0.8358	0.1007	1.0562
MM	SF	B	MM	SF	D	-1.1314	-0.6934	-1.3191	-0.5057
MM	SF	C	MM	SF	D	-1.7334	-1.2483	-1.9413	-1.0405

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Conservative Tukey-Kramer Grouping for MAT*Cultivar*HARVEST Least Squares Means (Alpha=0.05)*

LS-means with the same letter are not significantly different.

MAT	*Cultivar*	*HARVEST*	*Estimate*	
MM	SE	A	5.3099	A
				A
MM	SF	A	5.2604	A
				A
MM	SF	D	4.9816	A
				A
IM	SF	A	4.8545	A
				A
MM	SE	D	4.8433	A
				A
IM	SE	D	4.8314	A
				A
IM	SF	D	4.7992	A
				A
II	SE	D	4.6199	A
				A
IM	SE	A	4.5158	A
				A
II	SF	D	4.4667	A
				A
MM	SF	B	4.0692	A
				A
II	SF	A	3.7063	A
				A
II	SE	A	3.6322	A
				A
MM	SE	C	3.5391	A

The LINES display does not reflect all significant comparisons.
The following additional pairs are significantly different: (MM SF A,II SF A), (MM SF A,II SE A), (MM SF A,MM SE C), (MM SF A,MM SE B), (MM SF A,IM SE B), (MM SF A,MM SF C), (MM SF A,IM SF B), (MM SF A,IM SF C), (MM SF D,IM SE A), (MM SF D,MM SF B), (MM SF D,II SF A), (MM SF D,II SE A), (MM SF D,MM SE C), (MM SF D,MM SE B), (MM SF D,IM SE B), (MM SF D,MM SF C)...

Statistical Analysis: 06/05/2013

The GLIMMIX Procedure

*Conservative Tukey-Kramer Grouping for MAT*Cultivar*HARVEST Least Squares Means (Alpha=0.05)*

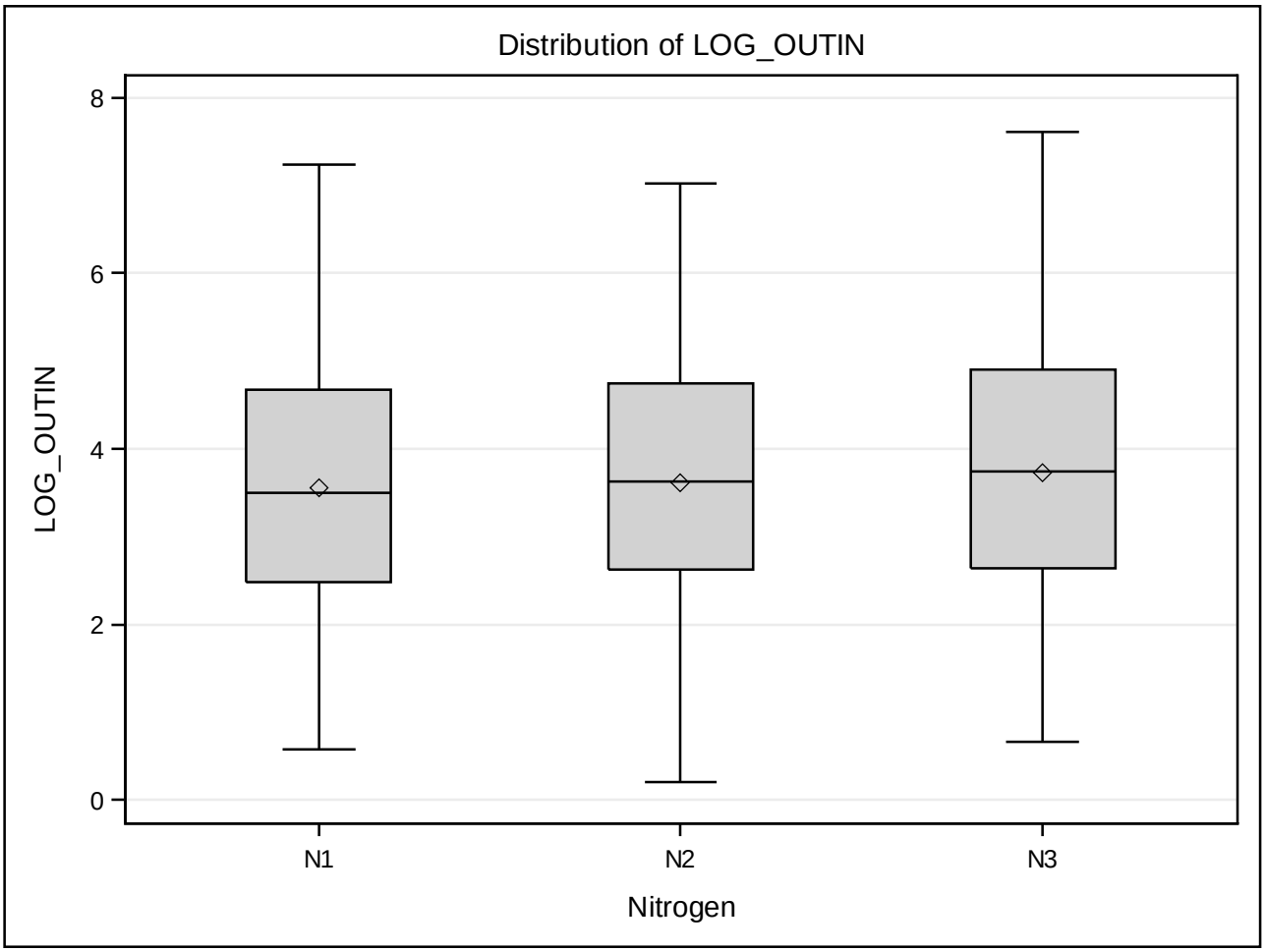
LS-means with the same letter are not significantly different.

MAT	*Cultivar*	*HARVEST*	*Estimate*		
					A
MM	SE	B	3.5329		A
					A
IM	SE	B	3.5267		A
					A
MM	SF	C	3.4907		A
					A
IM	SF	B	3.0742	B	A
				B	A
IM	SF	C	3.0207	B	A
				B	
IM	SE	C	2.8572	B	C
				B	C
II	SF	B	2.7588	B	C
					C
II	SE	C	2.5491		C
					C
II	SE	B	2.5312		C
					C
II	SF	C	2.5308		C

The LINES display does not reflect all significant comparisons.
The following additional pairs are significantly different: (MM SF A,II SF A), (MM SF A,II SE A), (MM SF A,MM SE C), (MM SF A,MM SE B), (MM SF A,IM SE B), (MM SF A,MM SF C), (MM SF A,IM SF B), (MM SF A,IM SF C), (MM SF D,IM SE A), (MM SF D,MM SF B), (MM SF D,II SF A), (MM SF D,II SE A), (MM SF D,MM SE C), (MM SF D,MM SE B), (MM SF D,IM SE B), (MM SF D,MM SF C)...

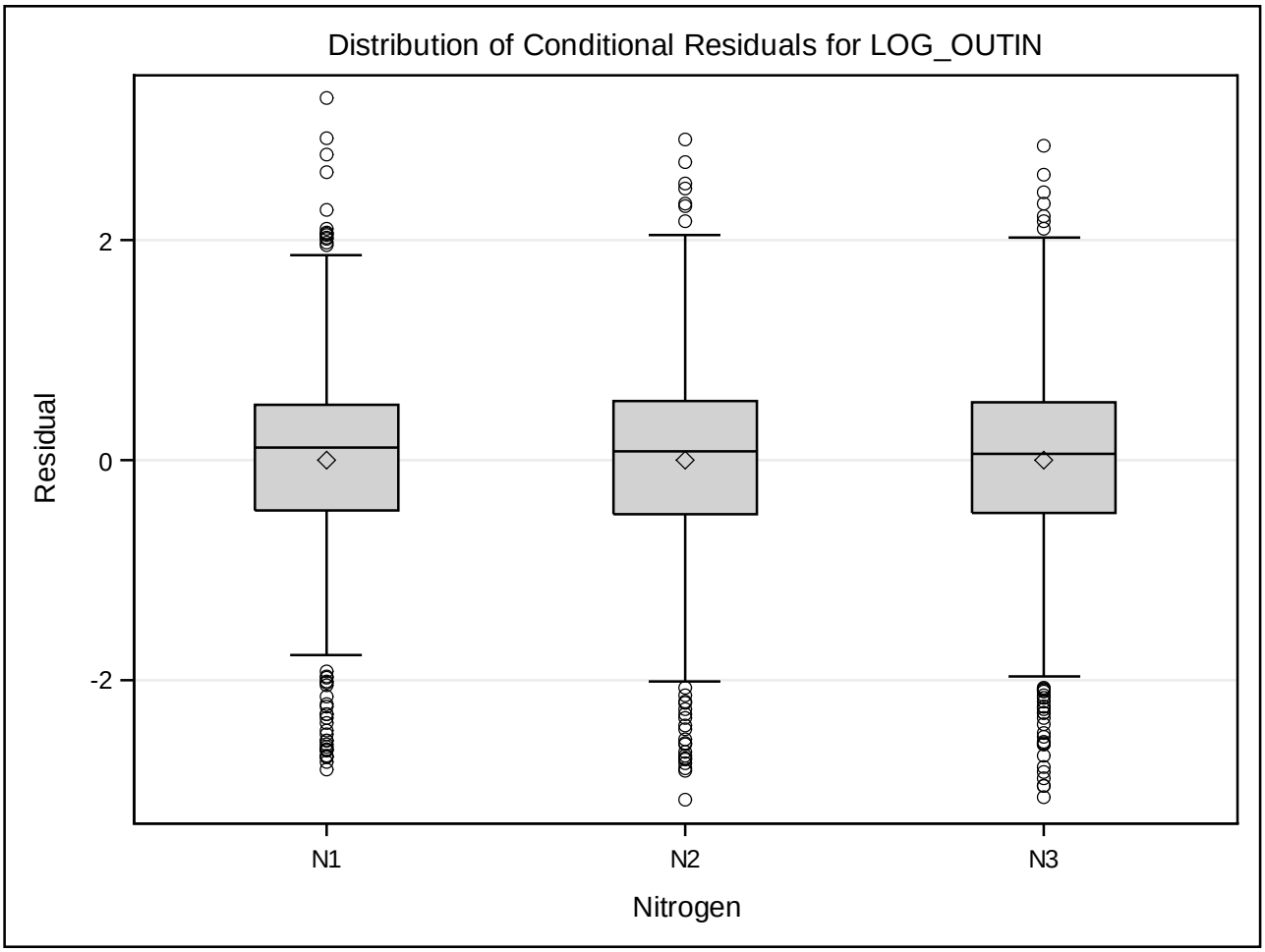
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



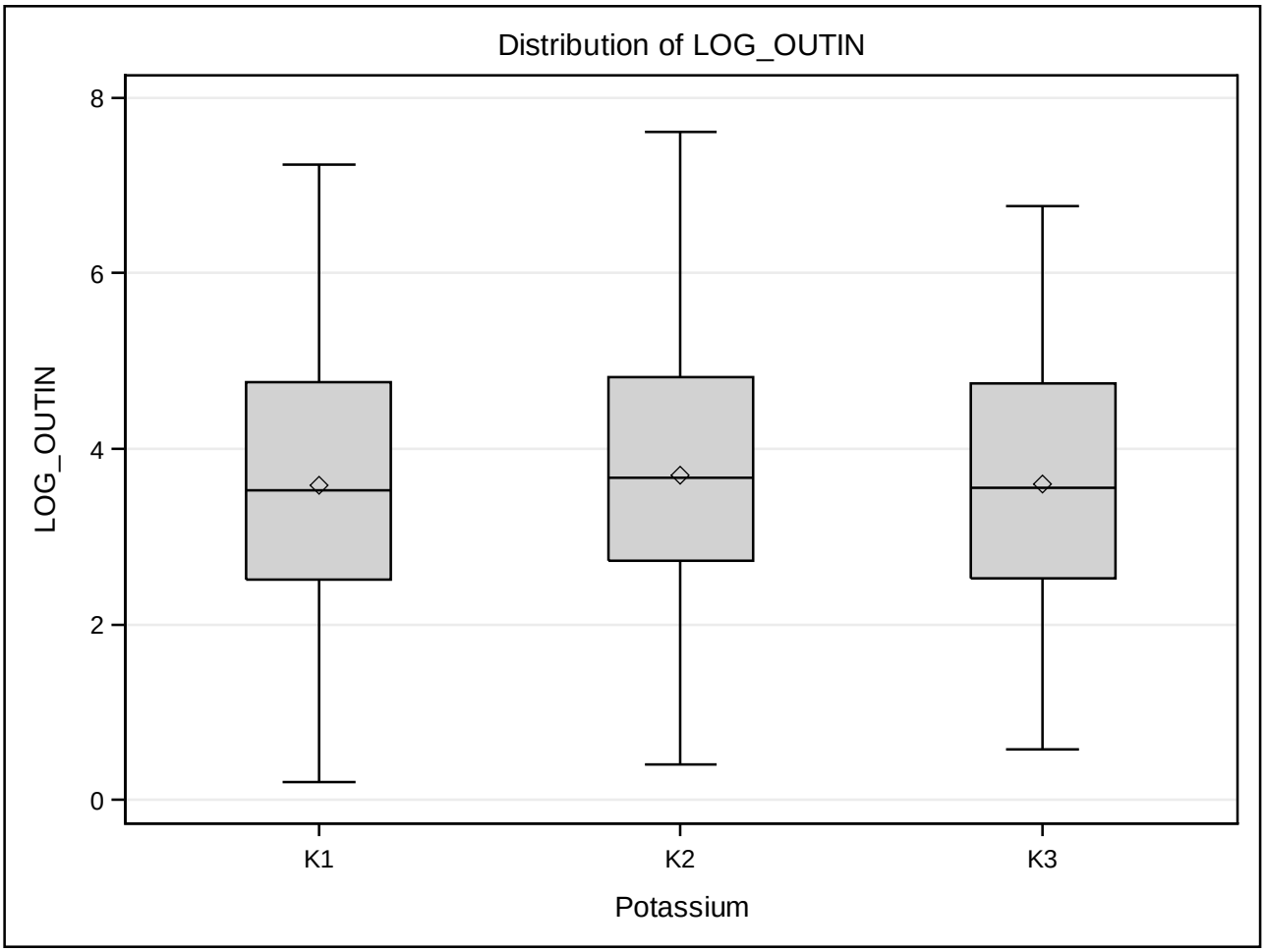
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



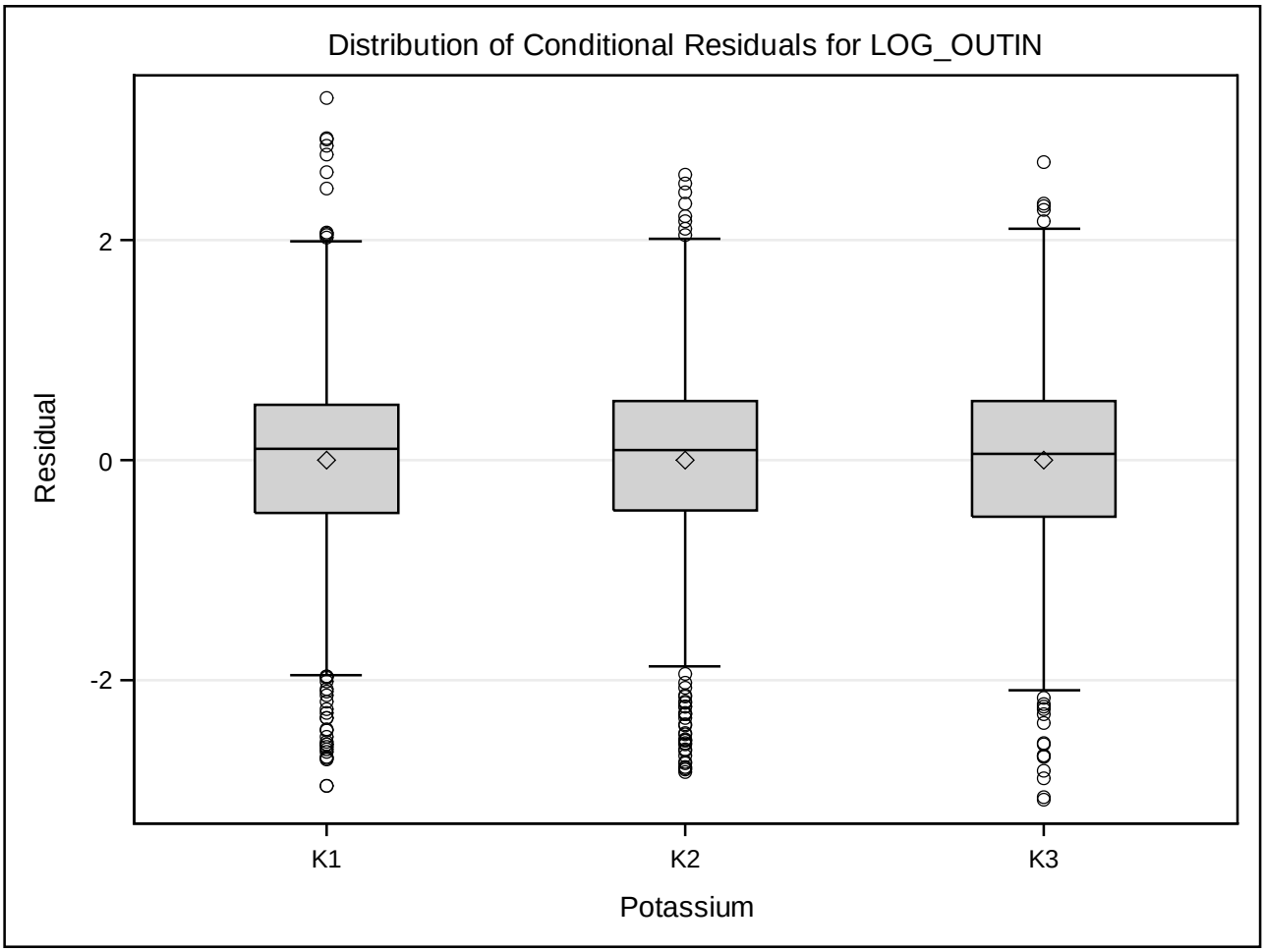
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



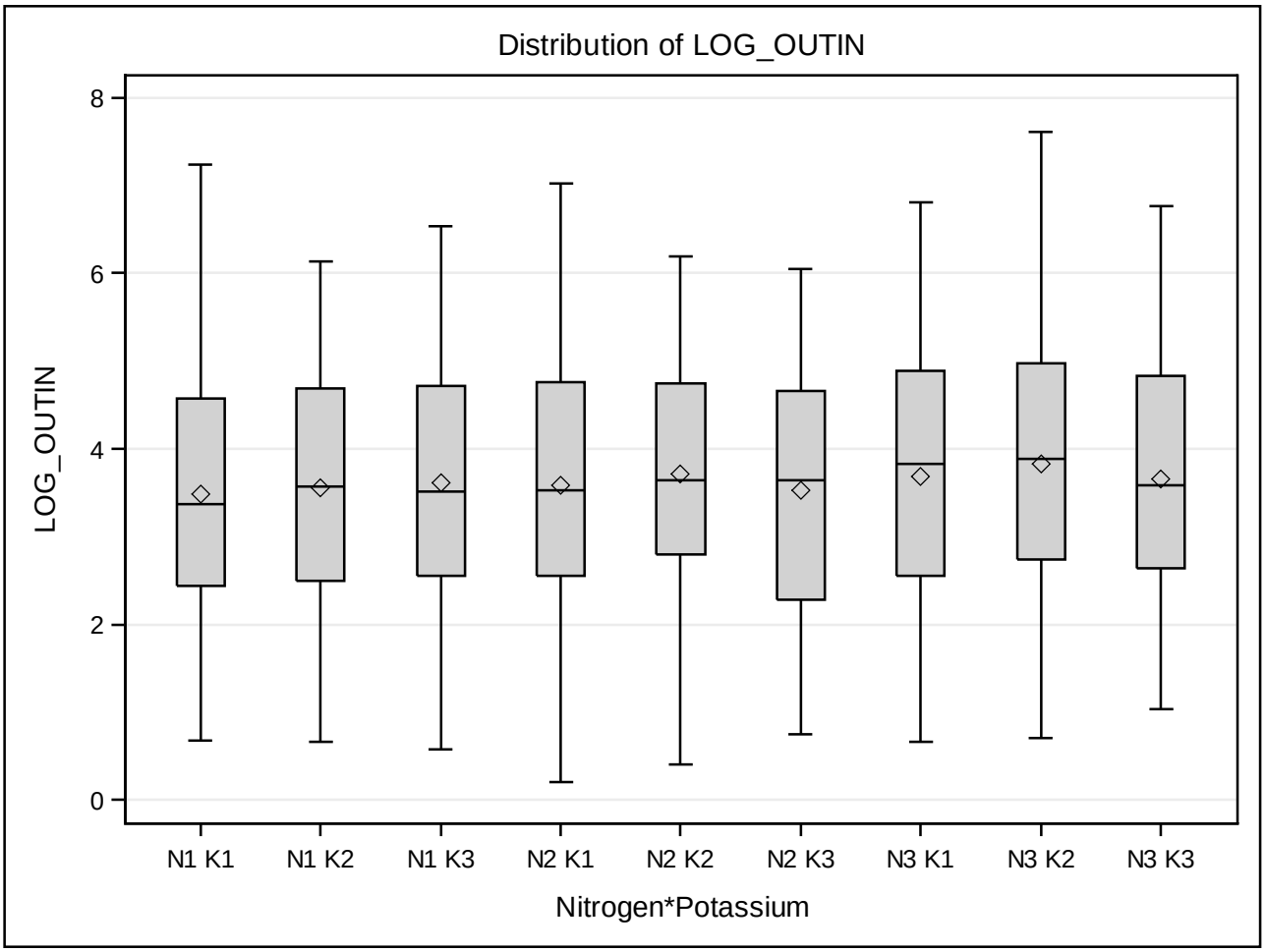
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



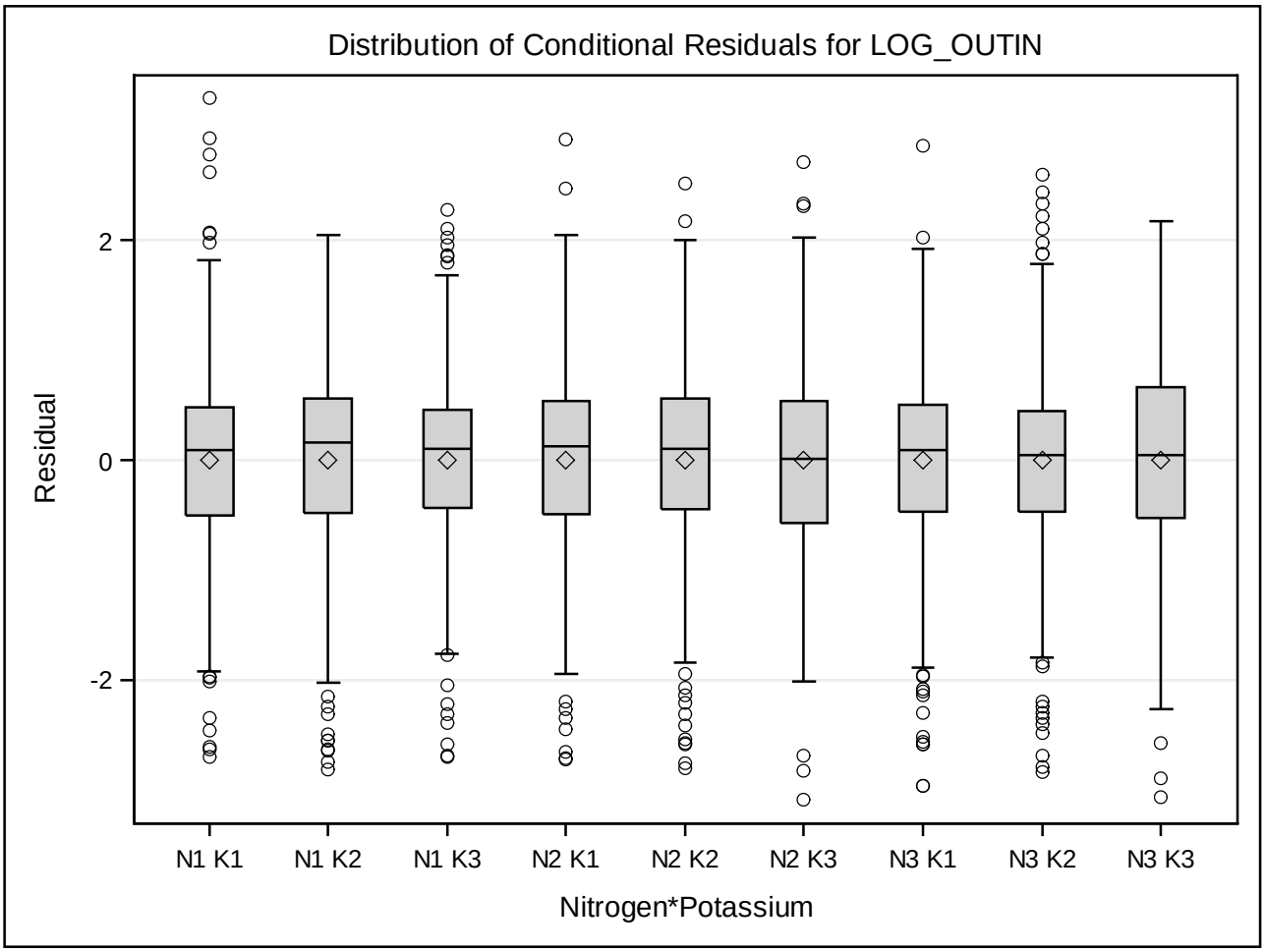
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



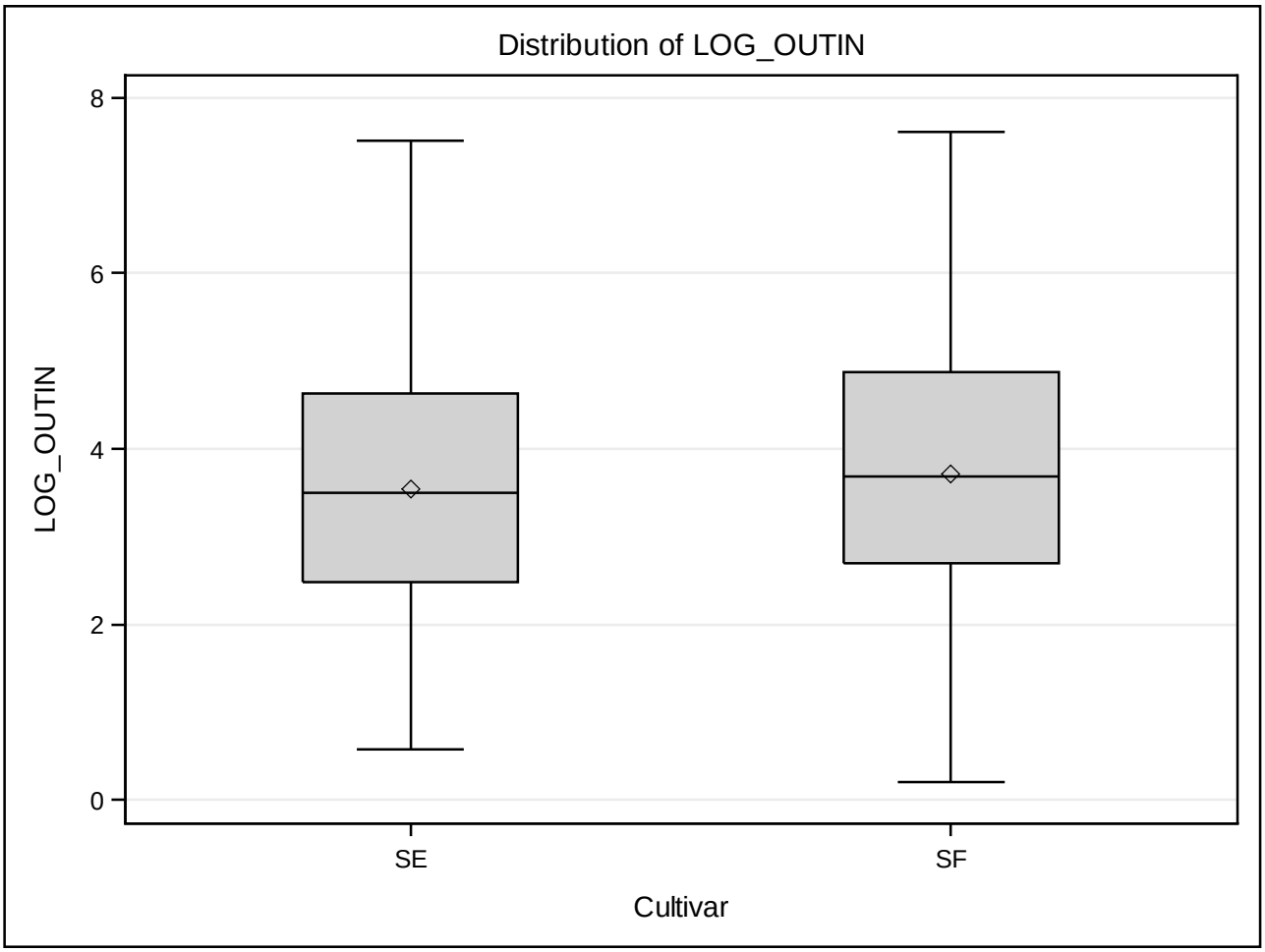
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



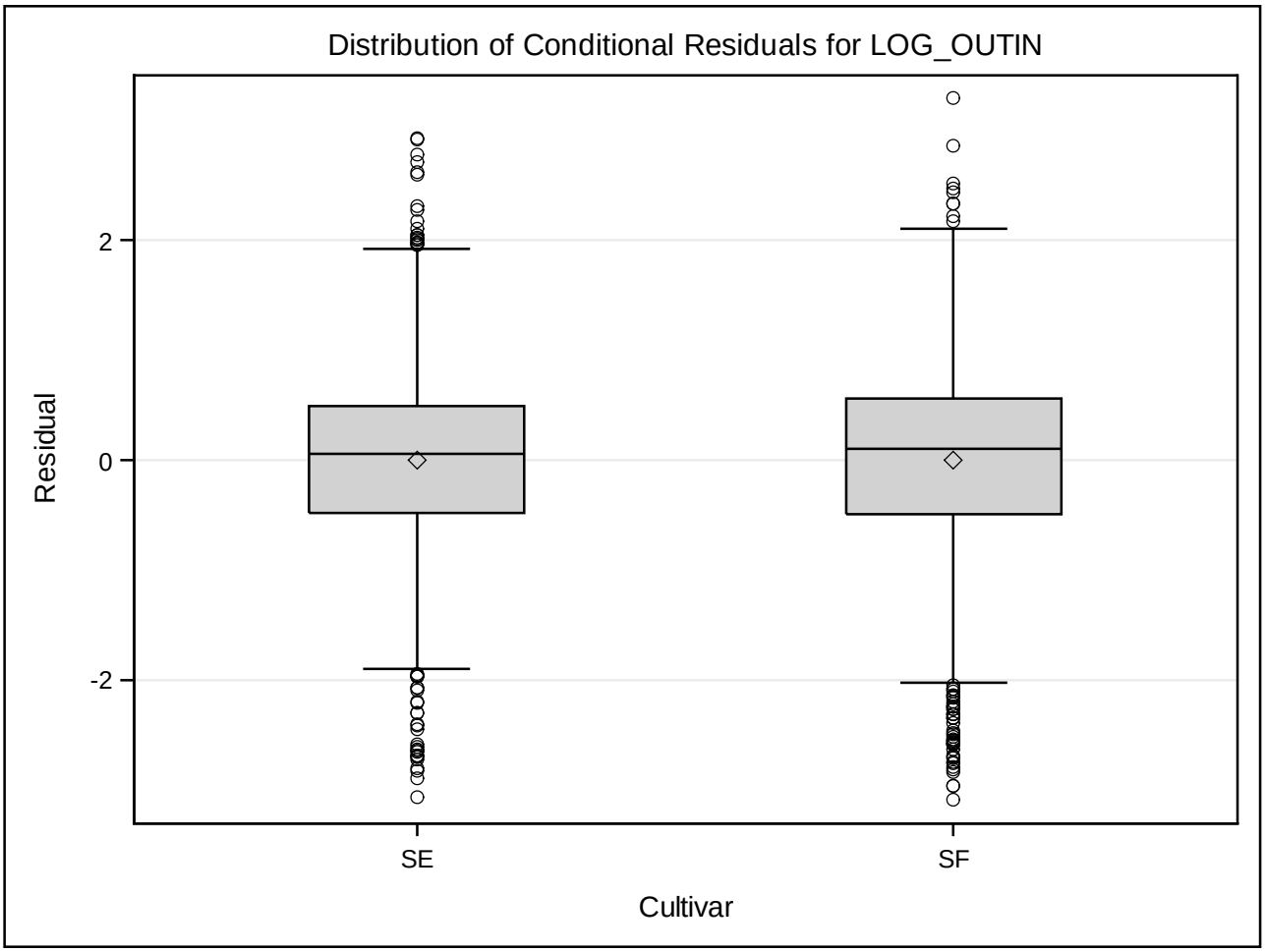
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



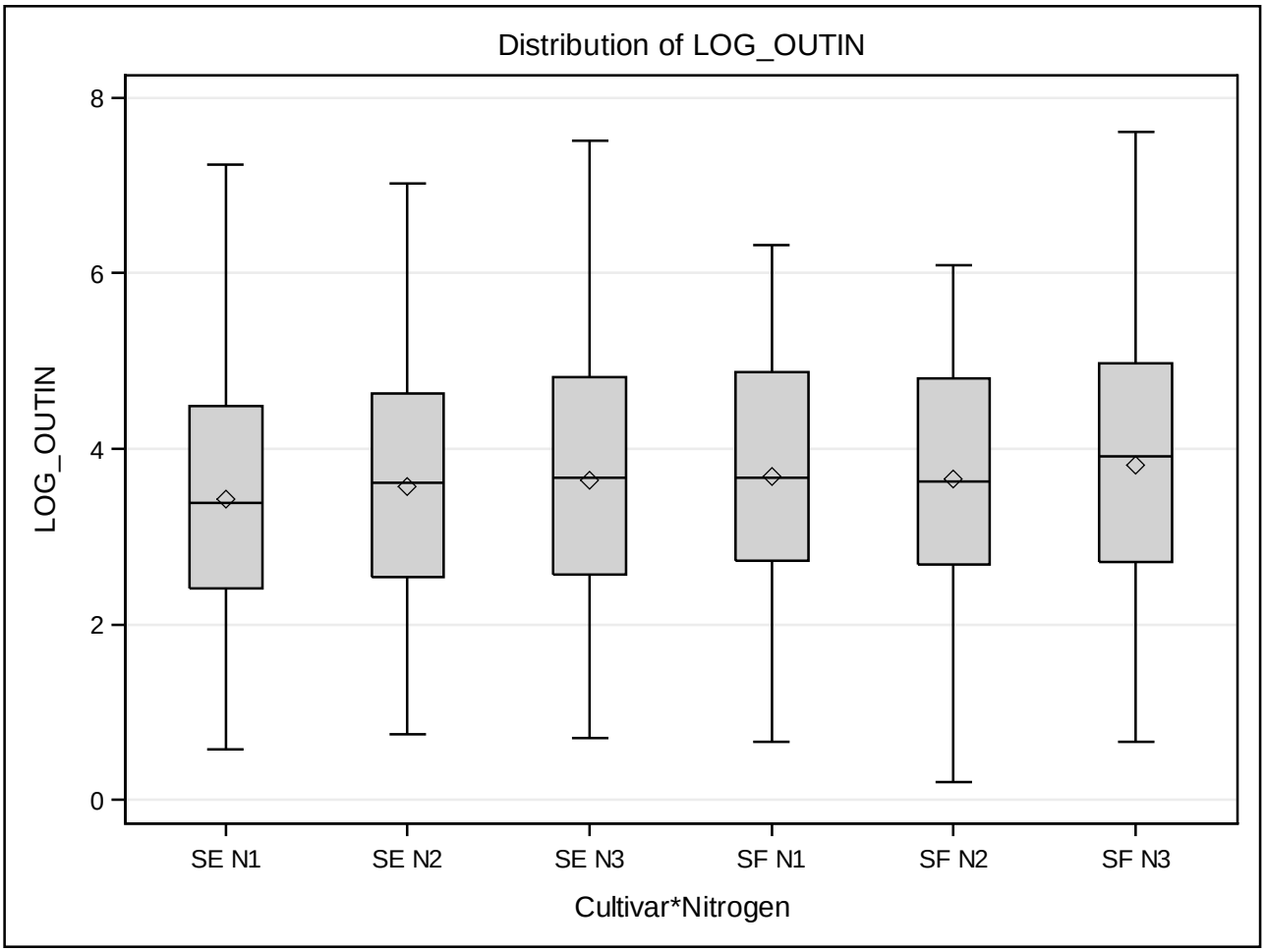
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



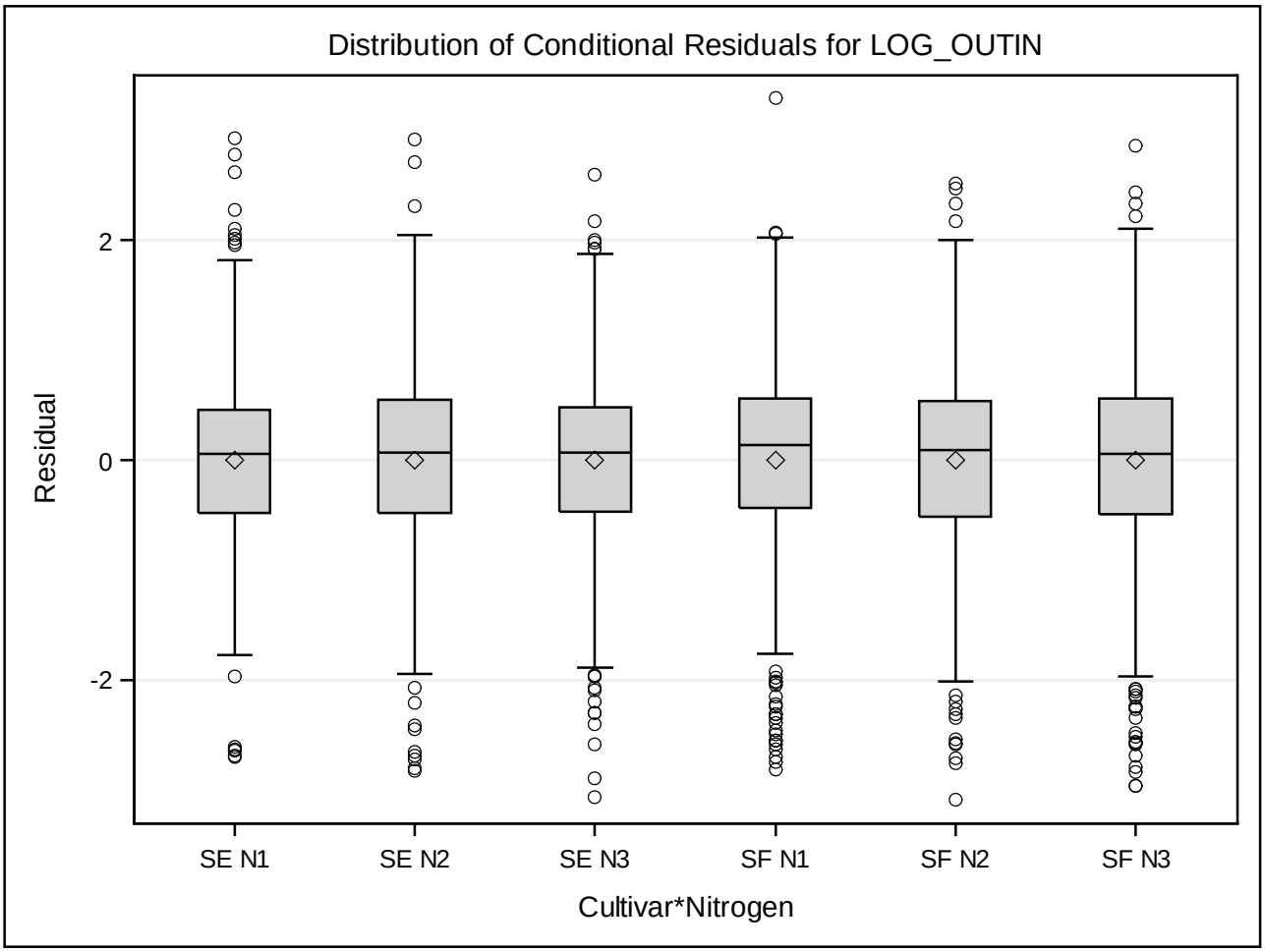
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



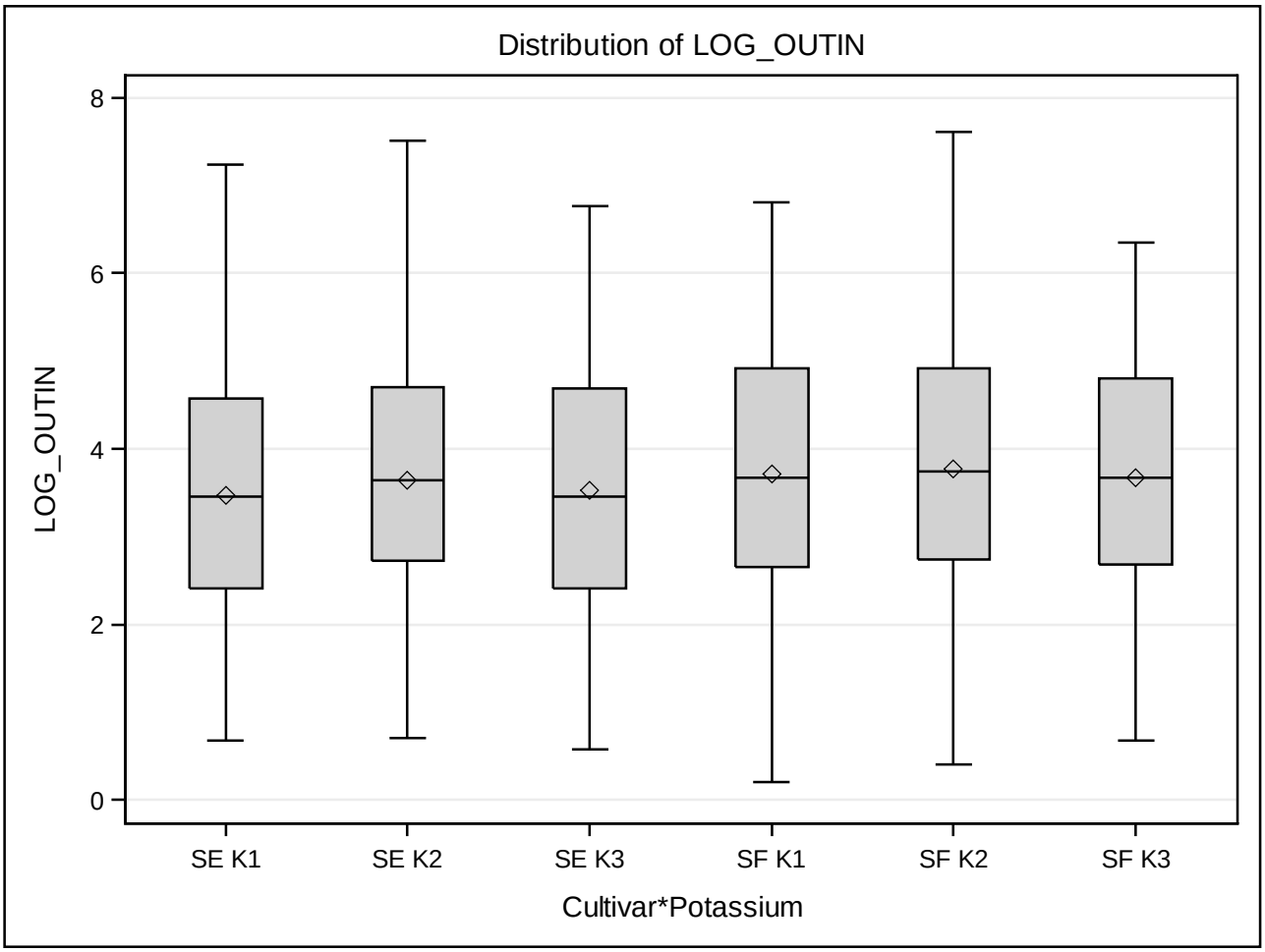
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



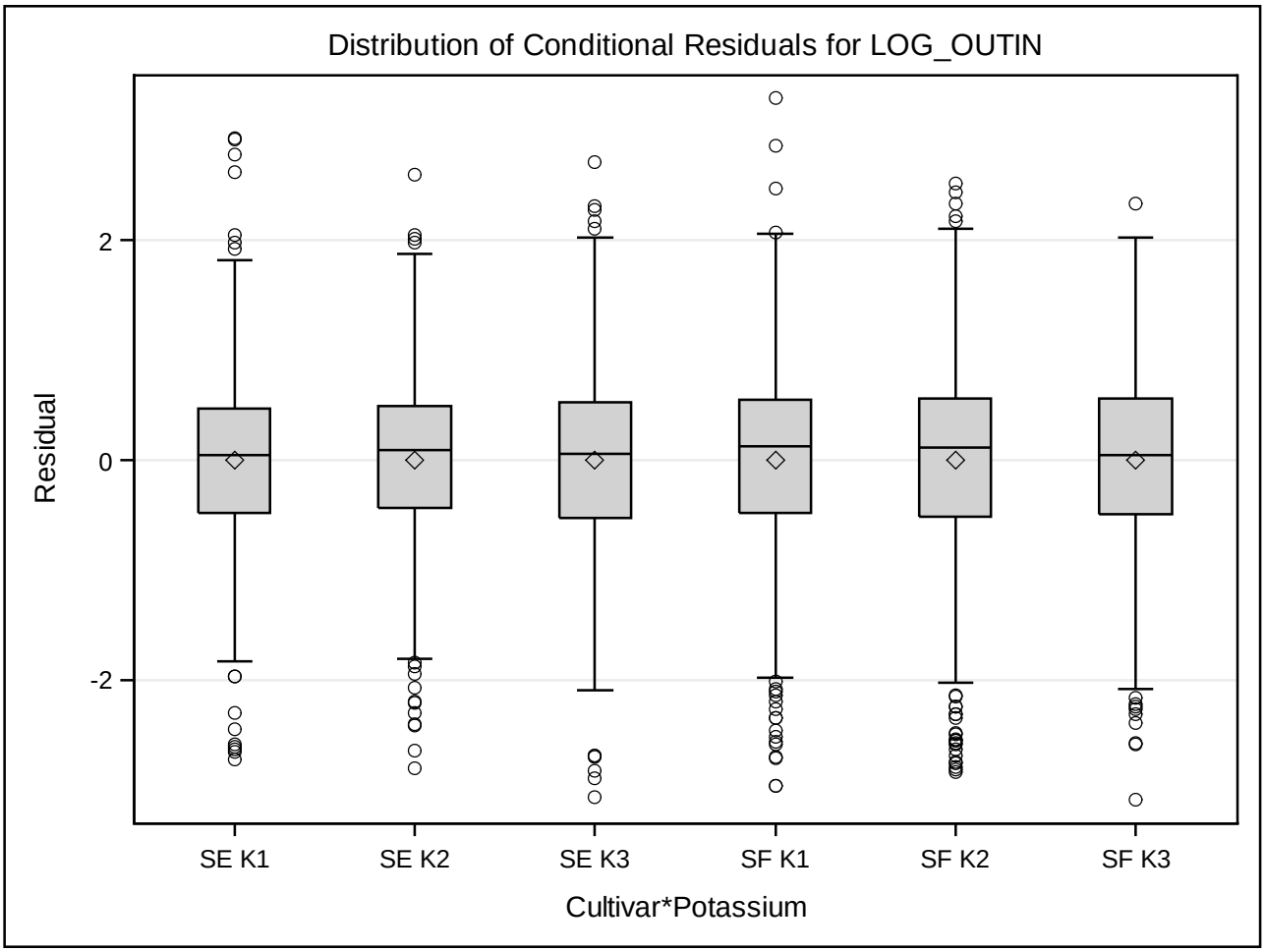
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



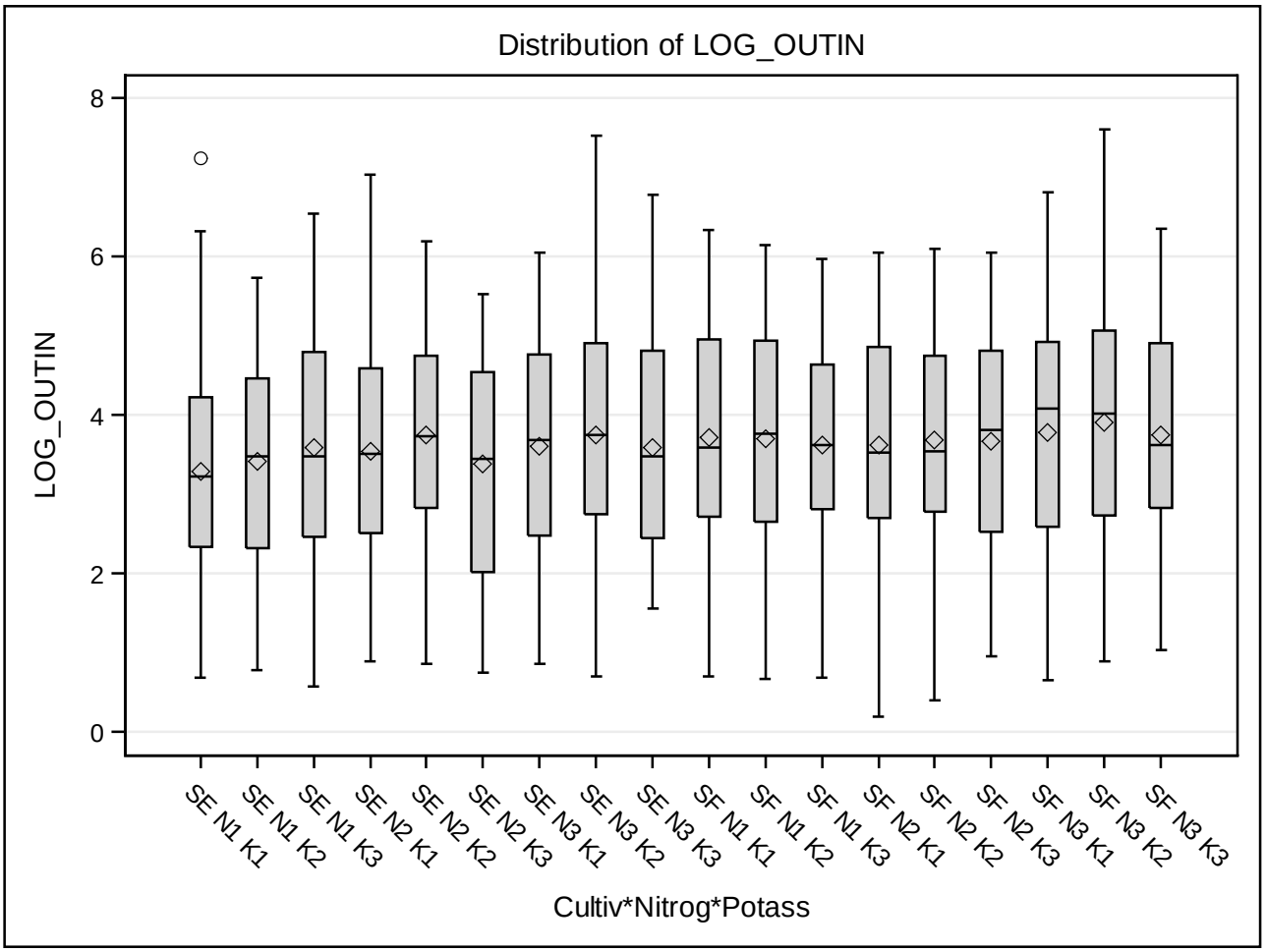
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



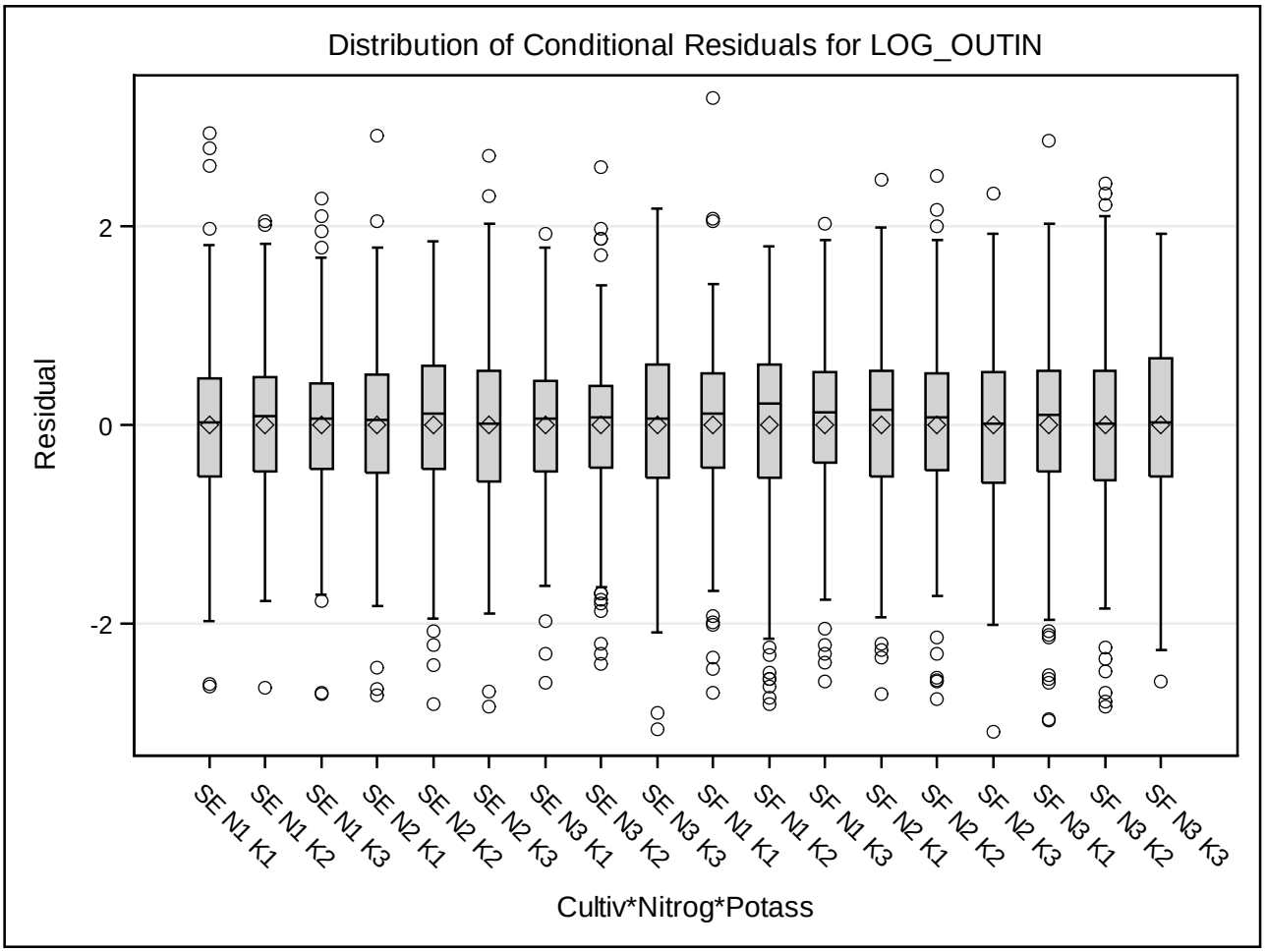
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



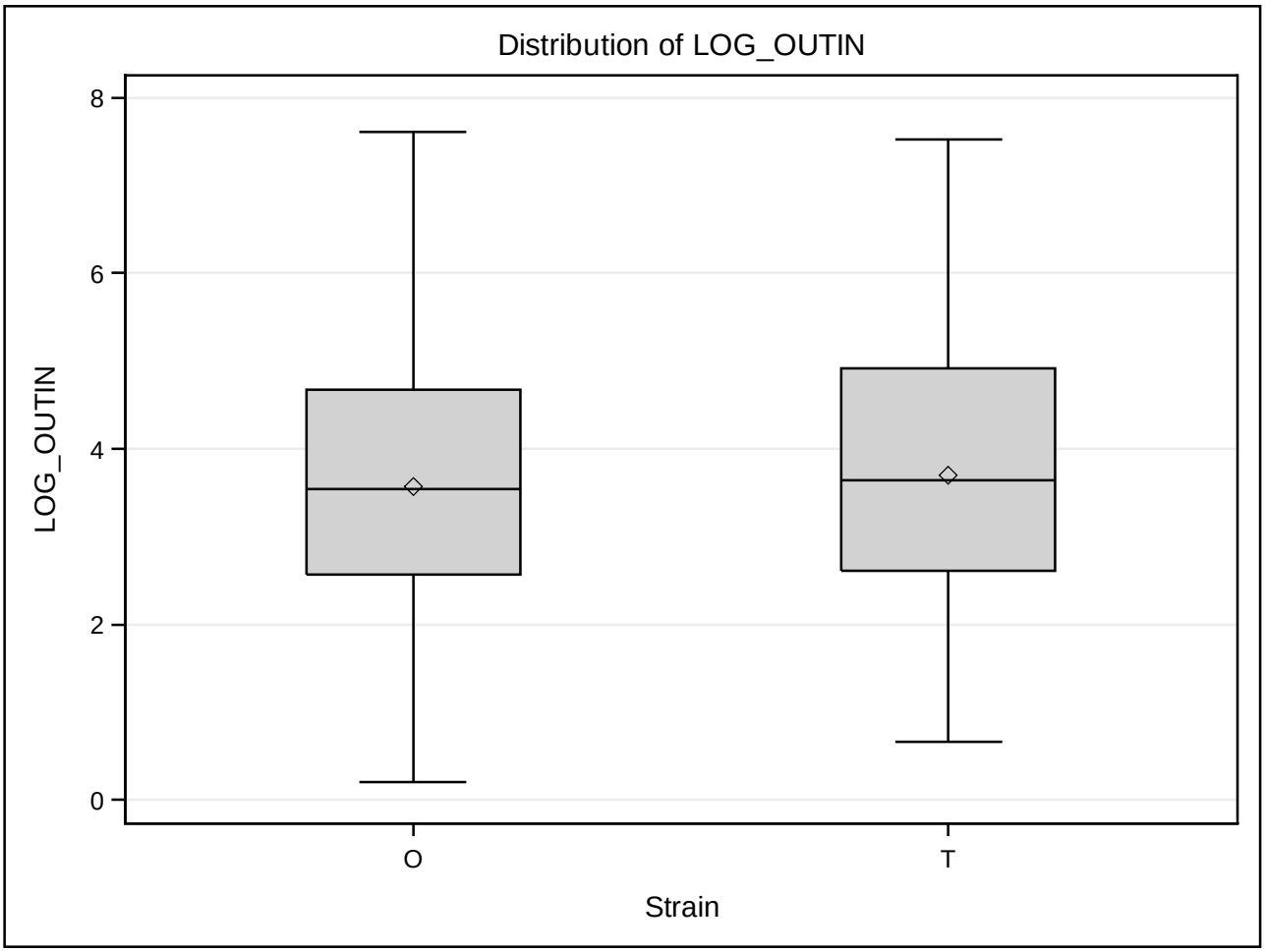
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



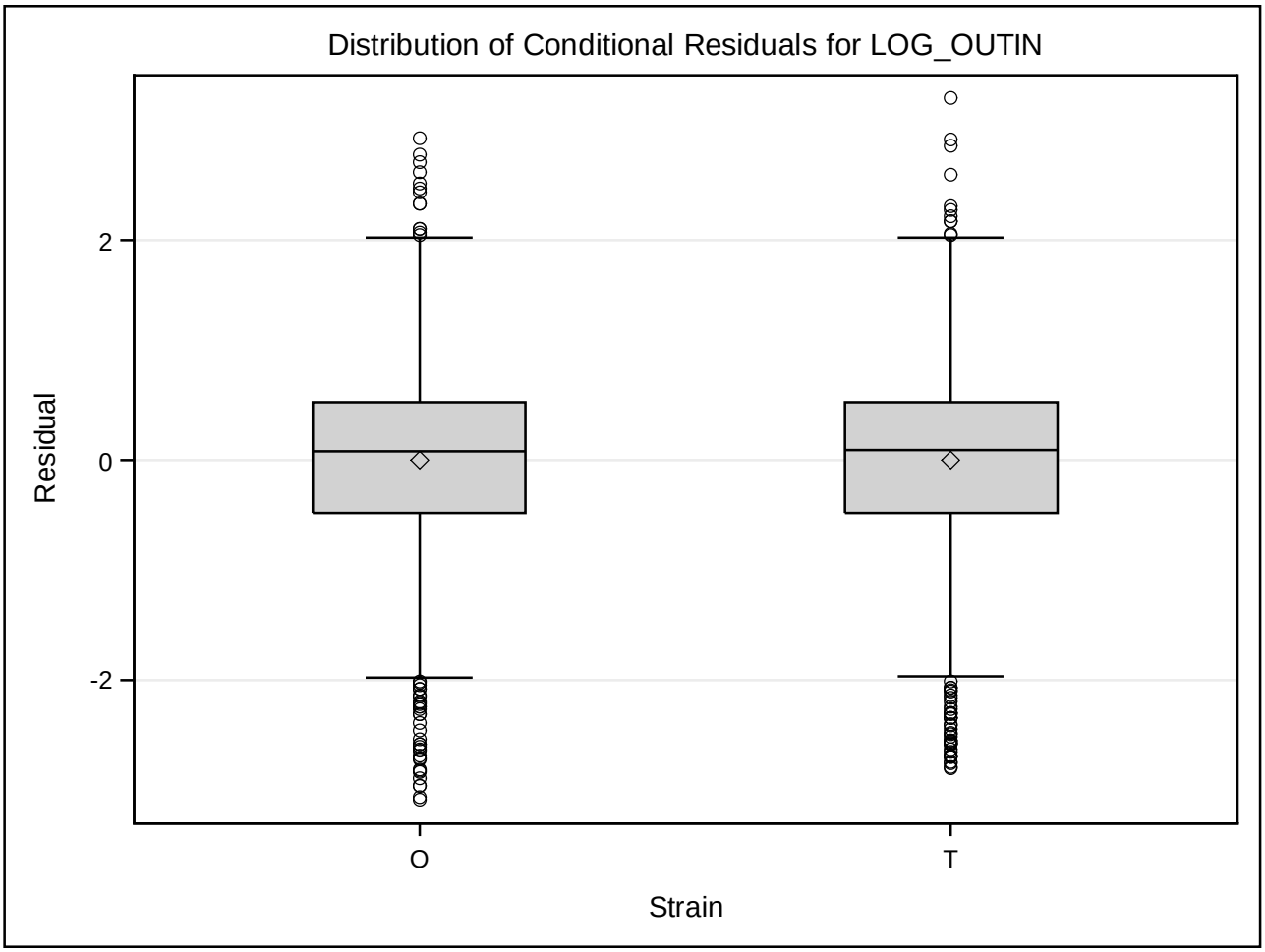
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



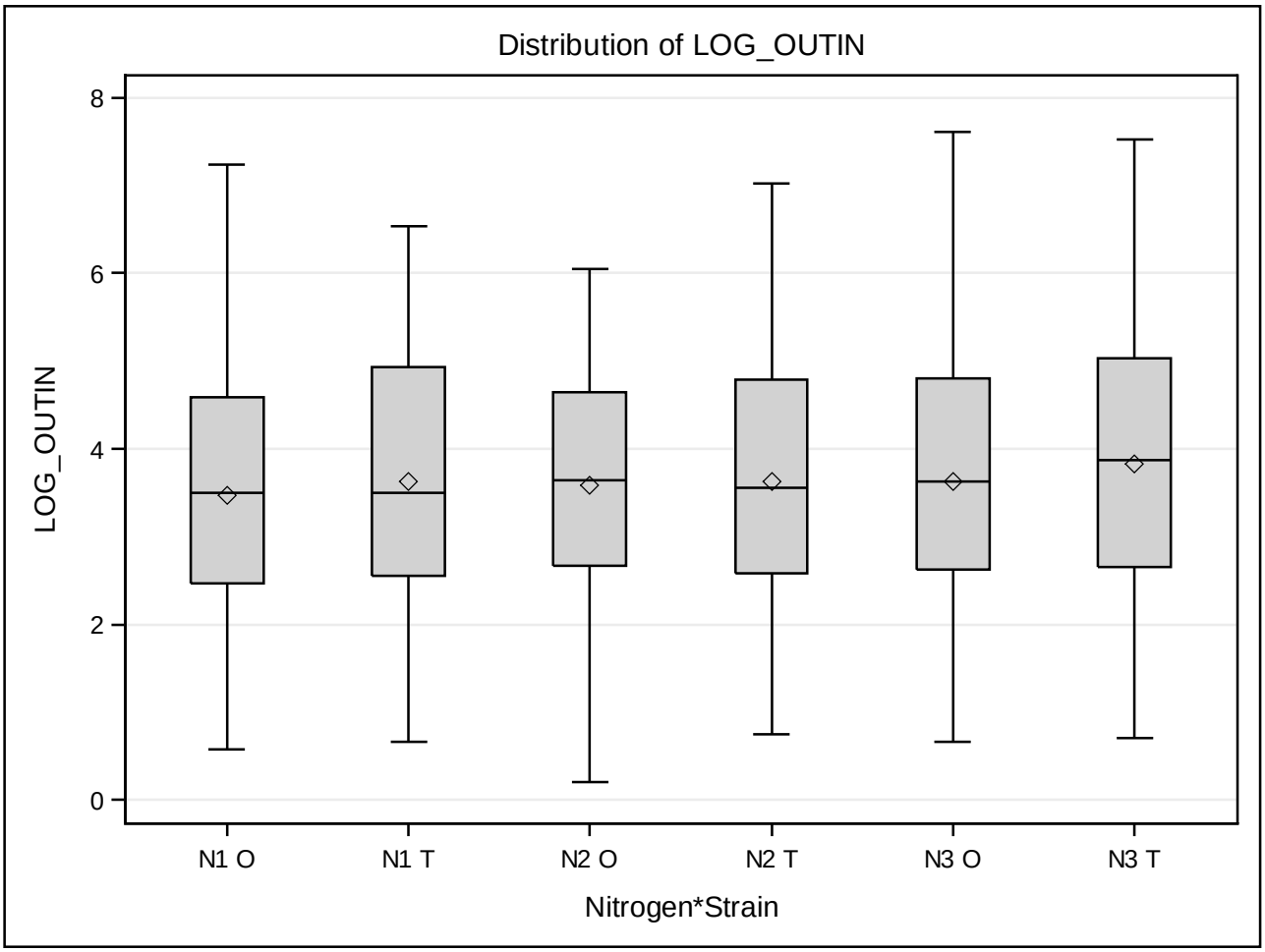
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



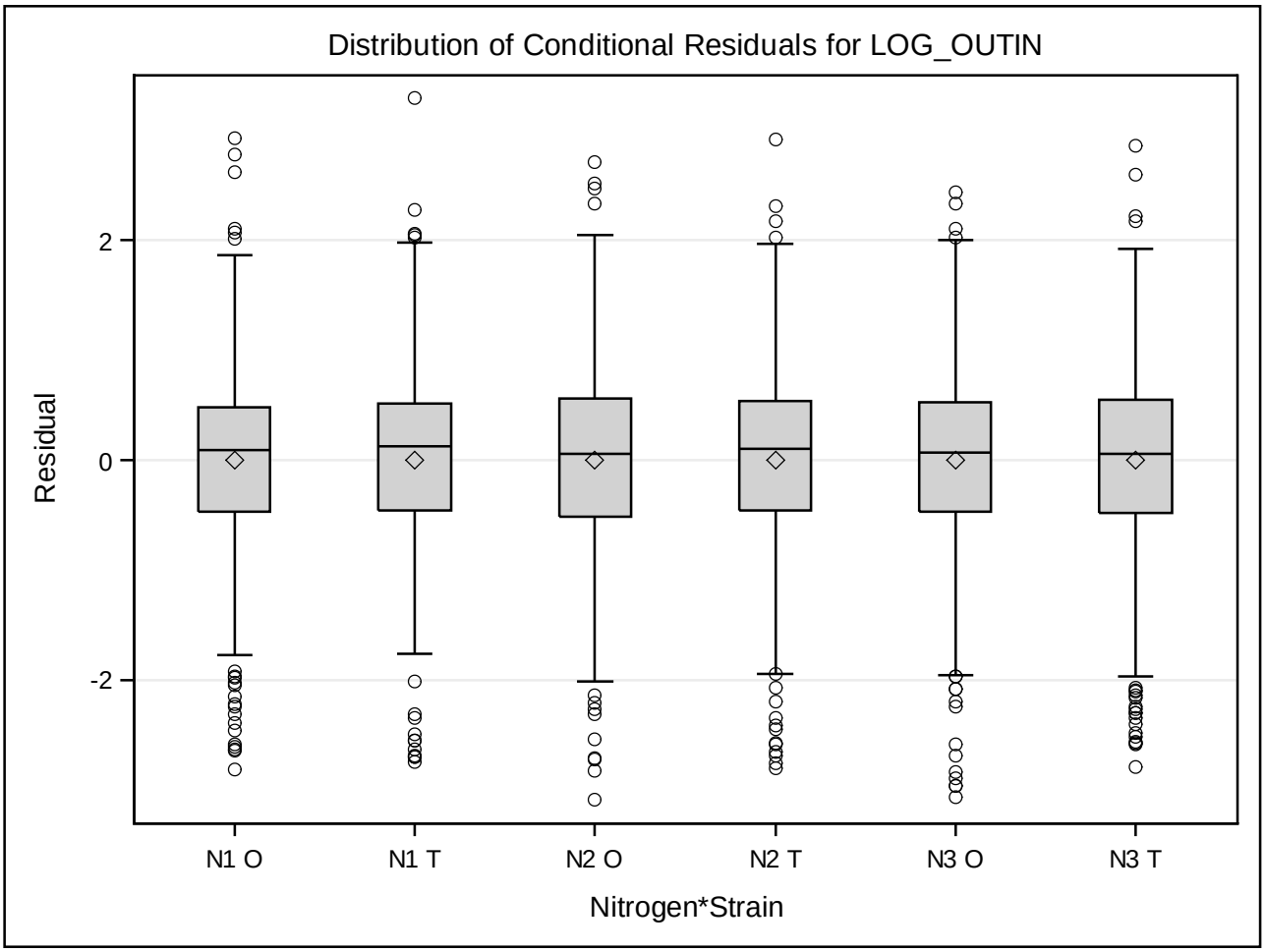
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



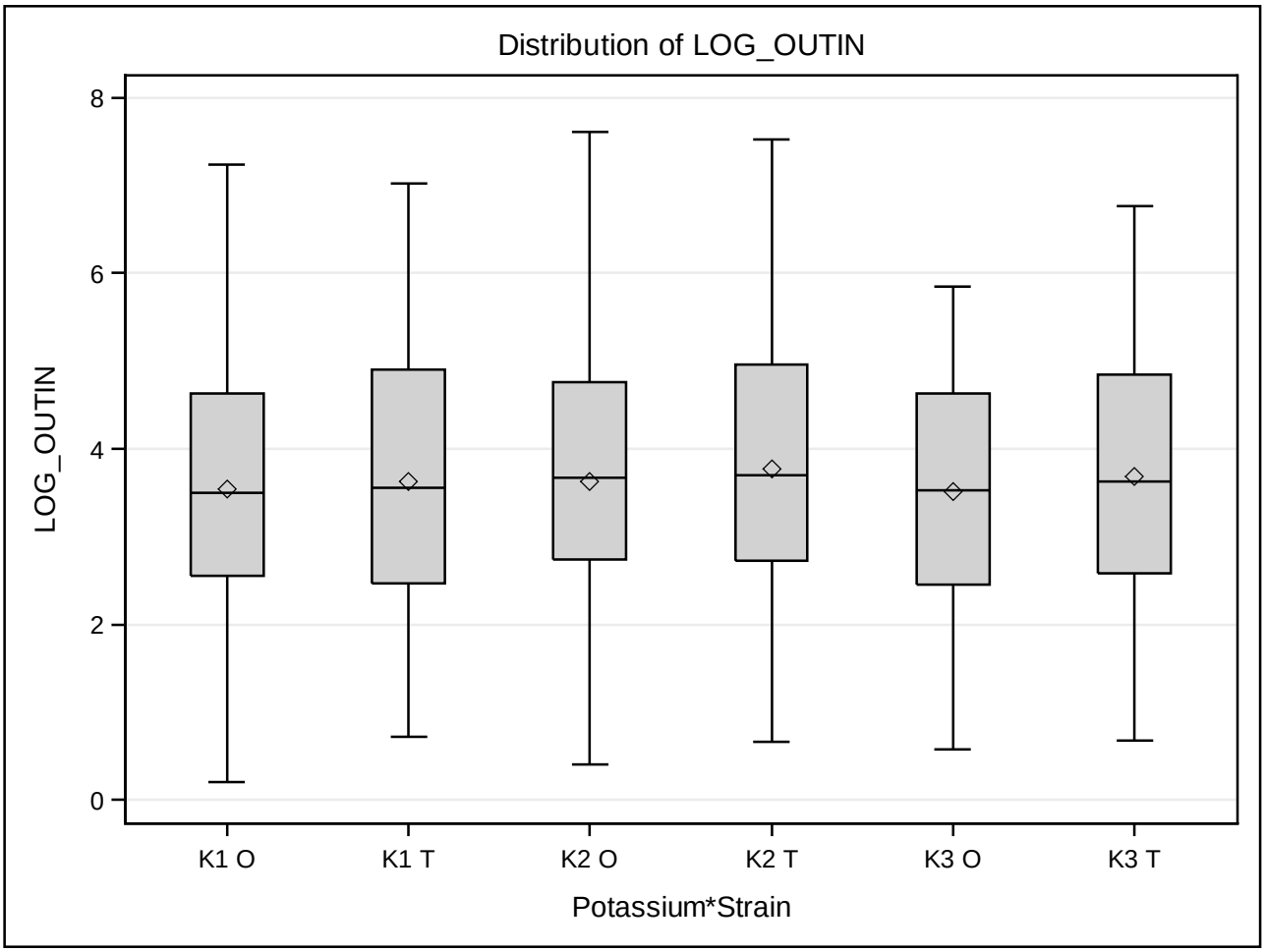
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



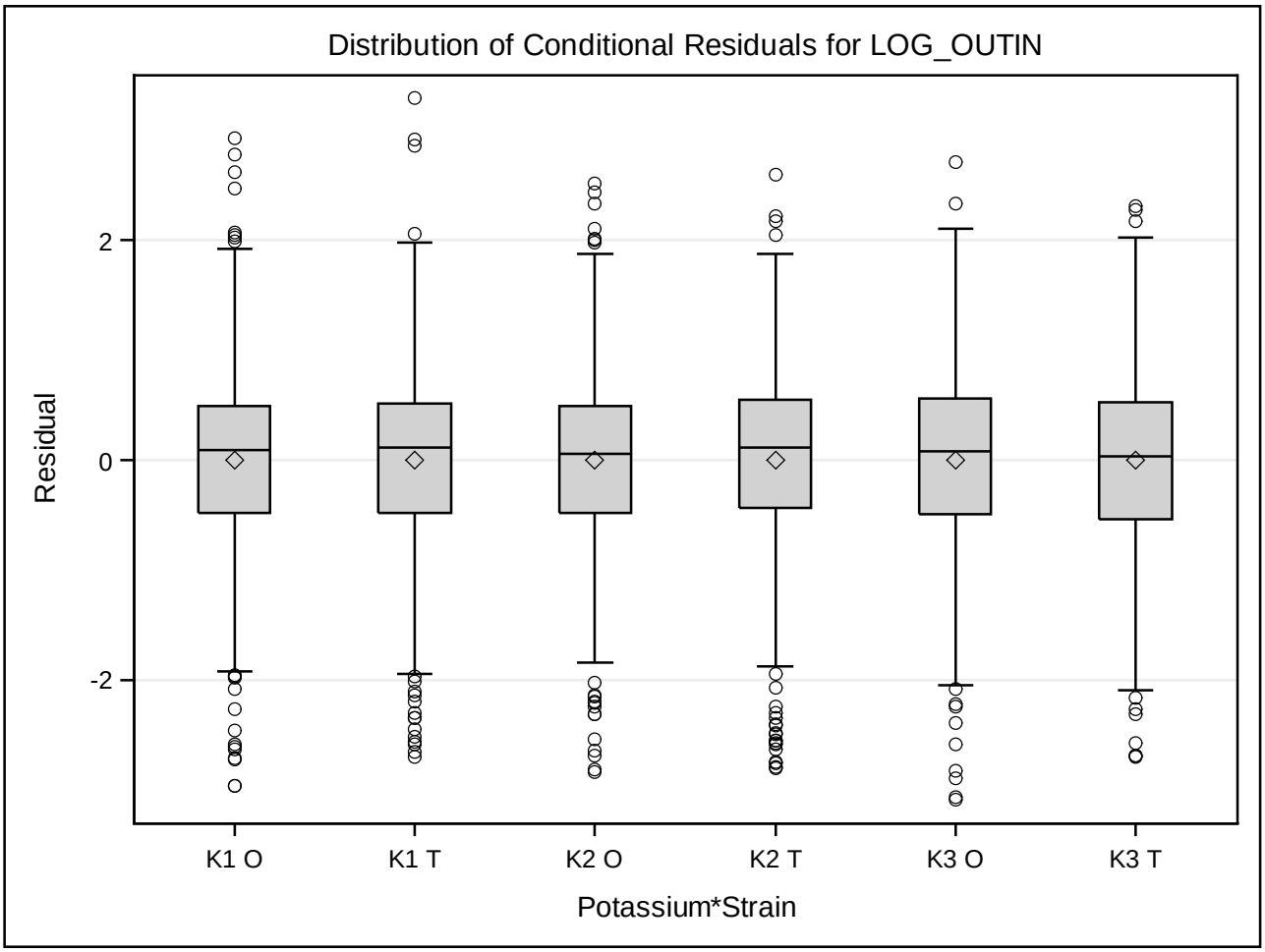
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



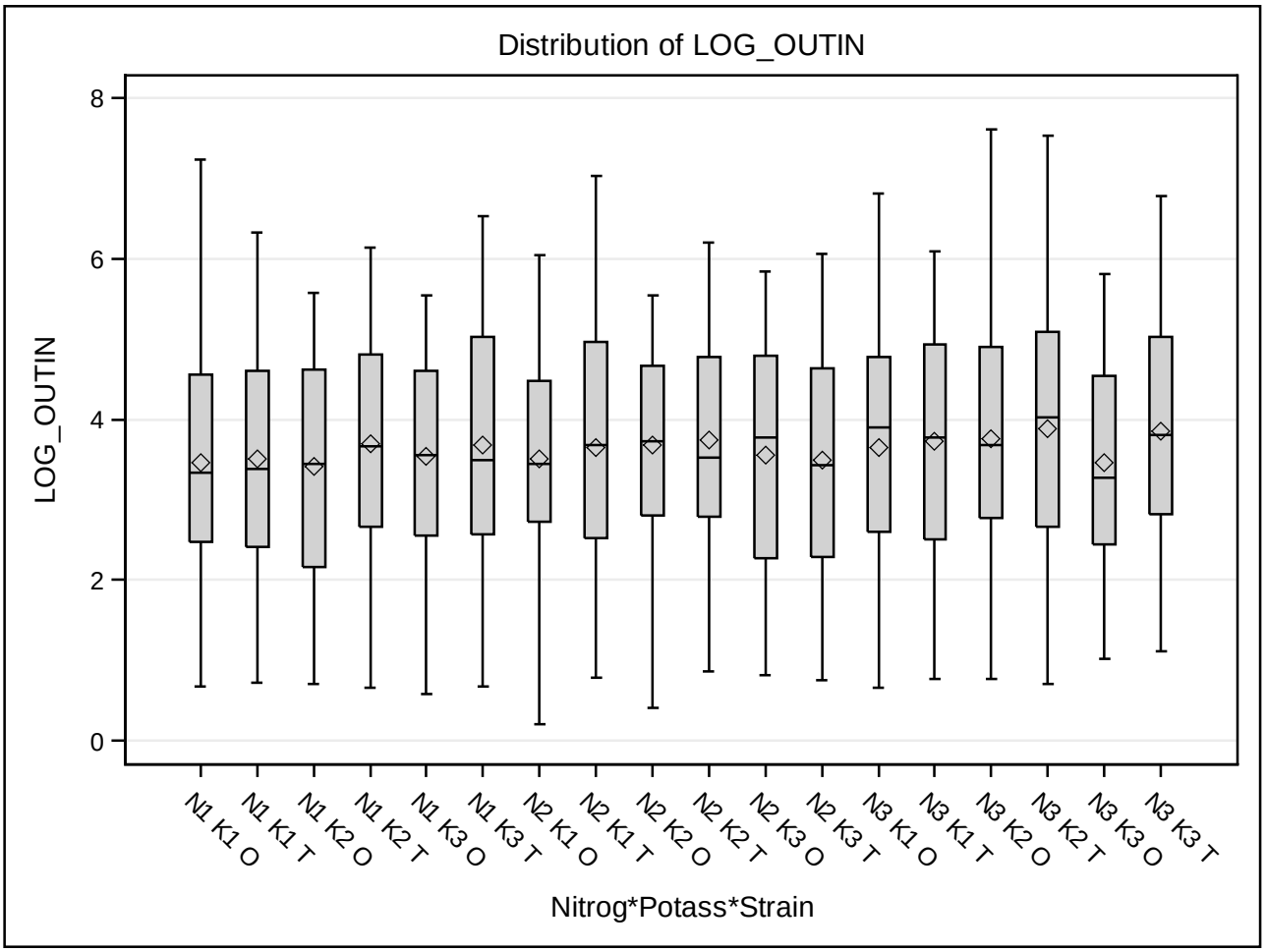
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



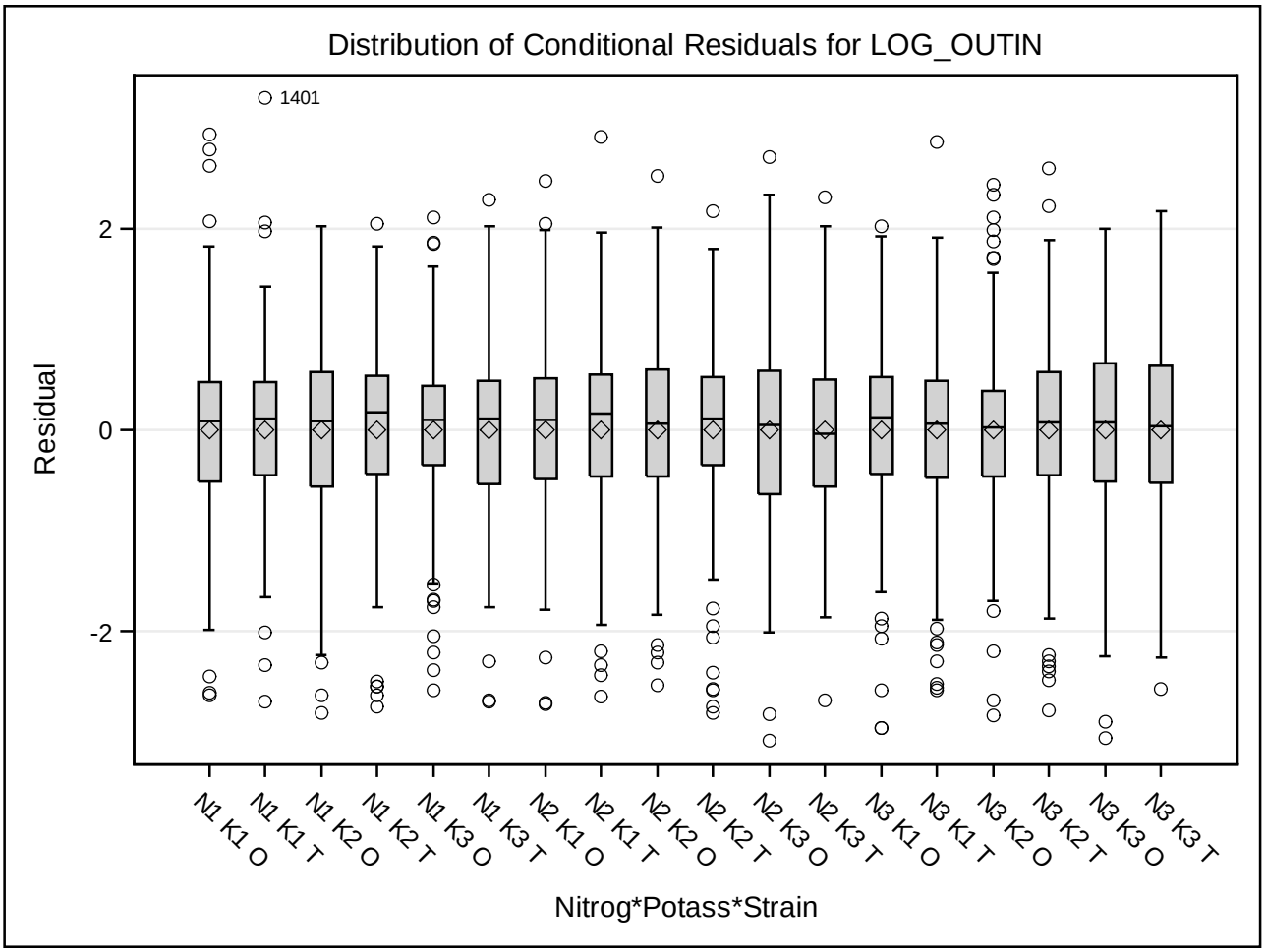
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



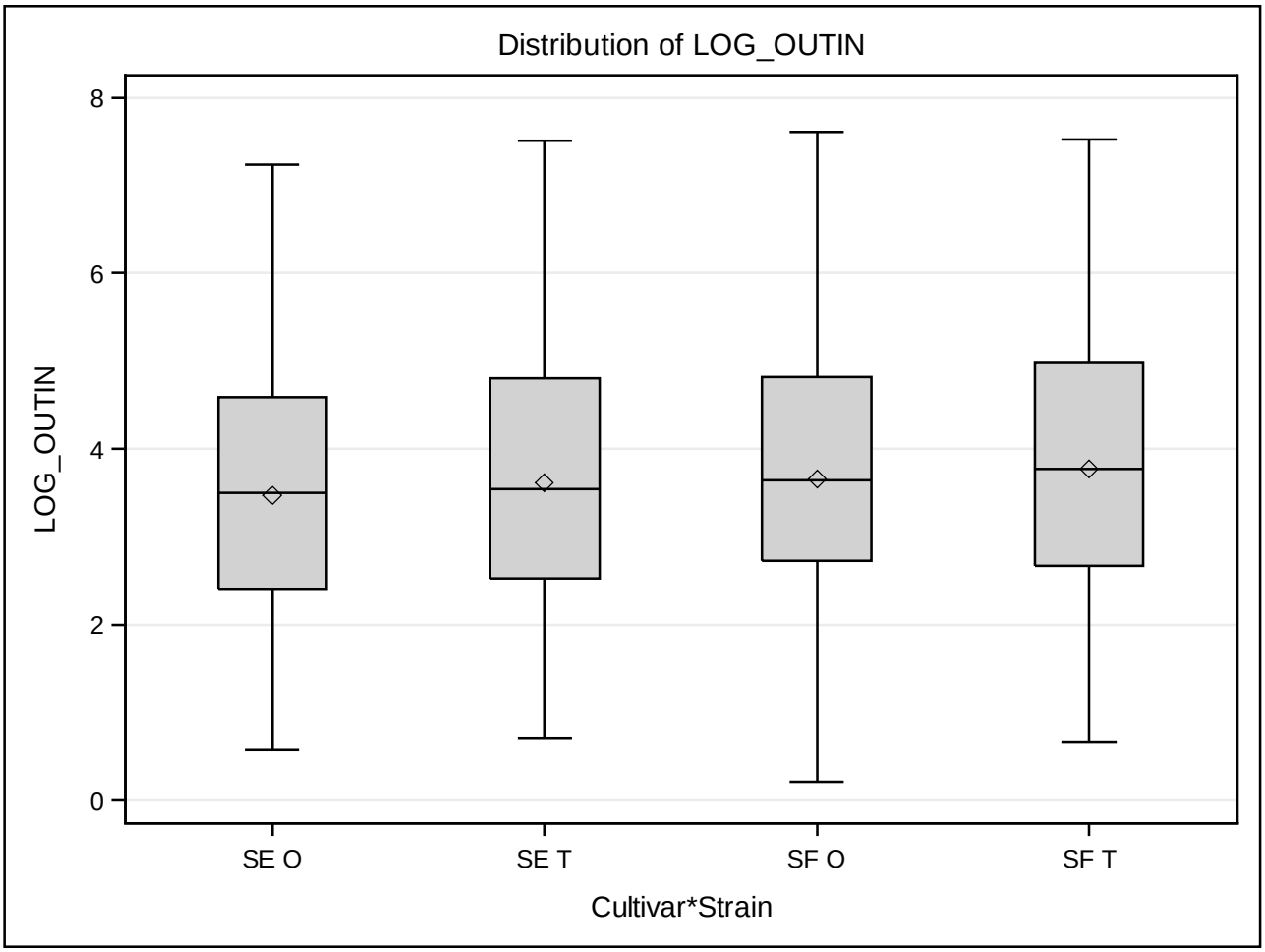
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



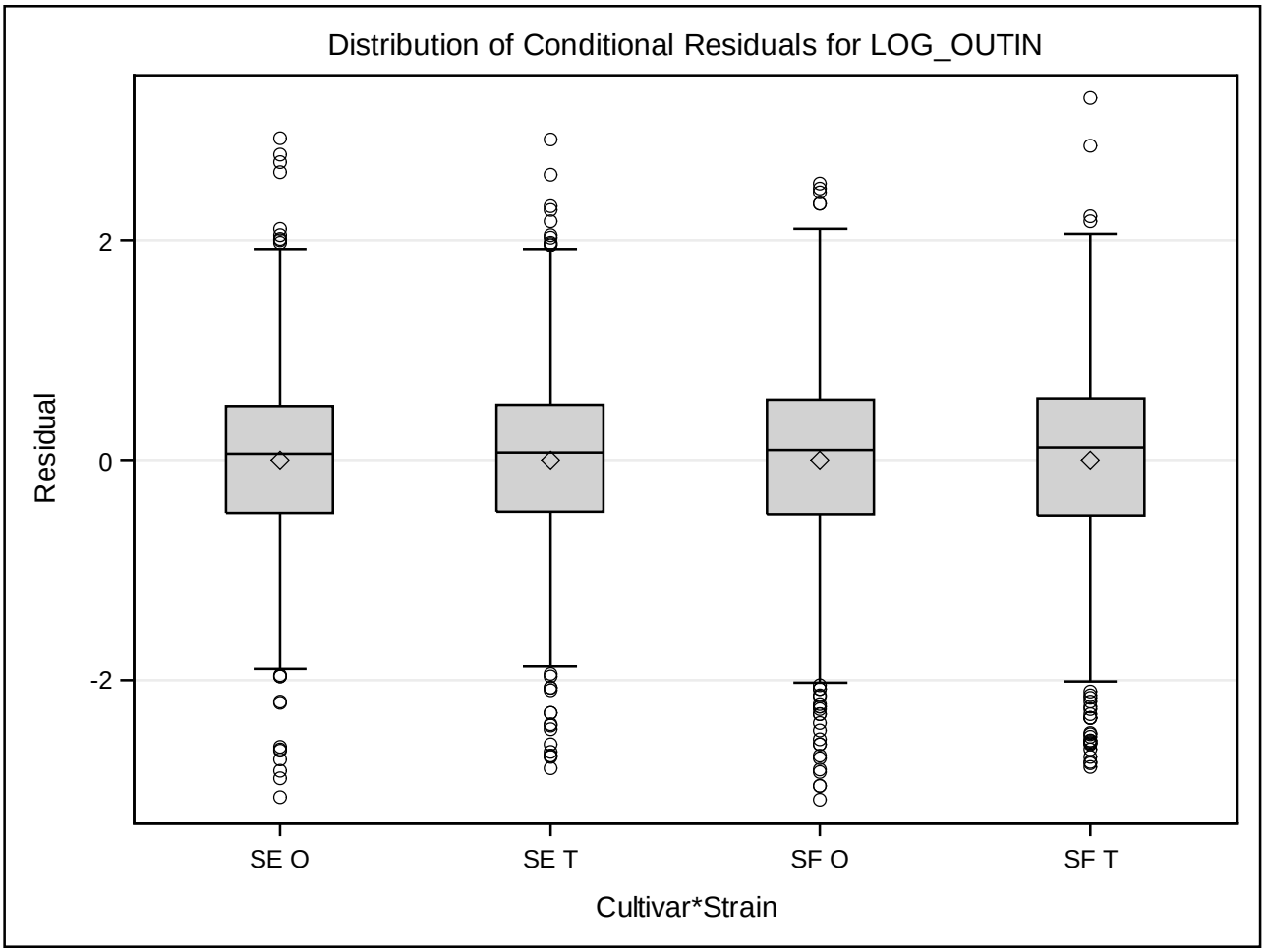
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



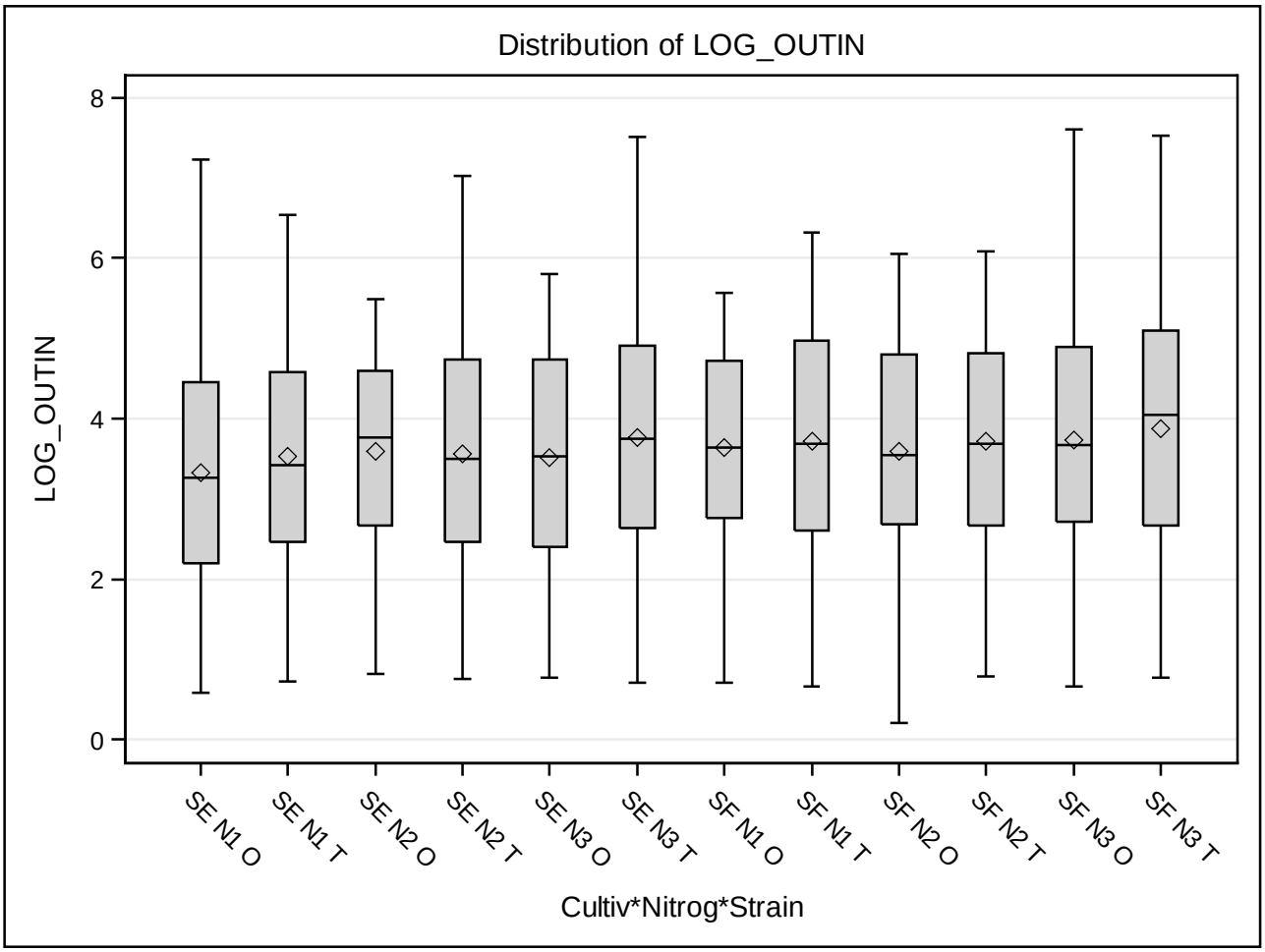
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



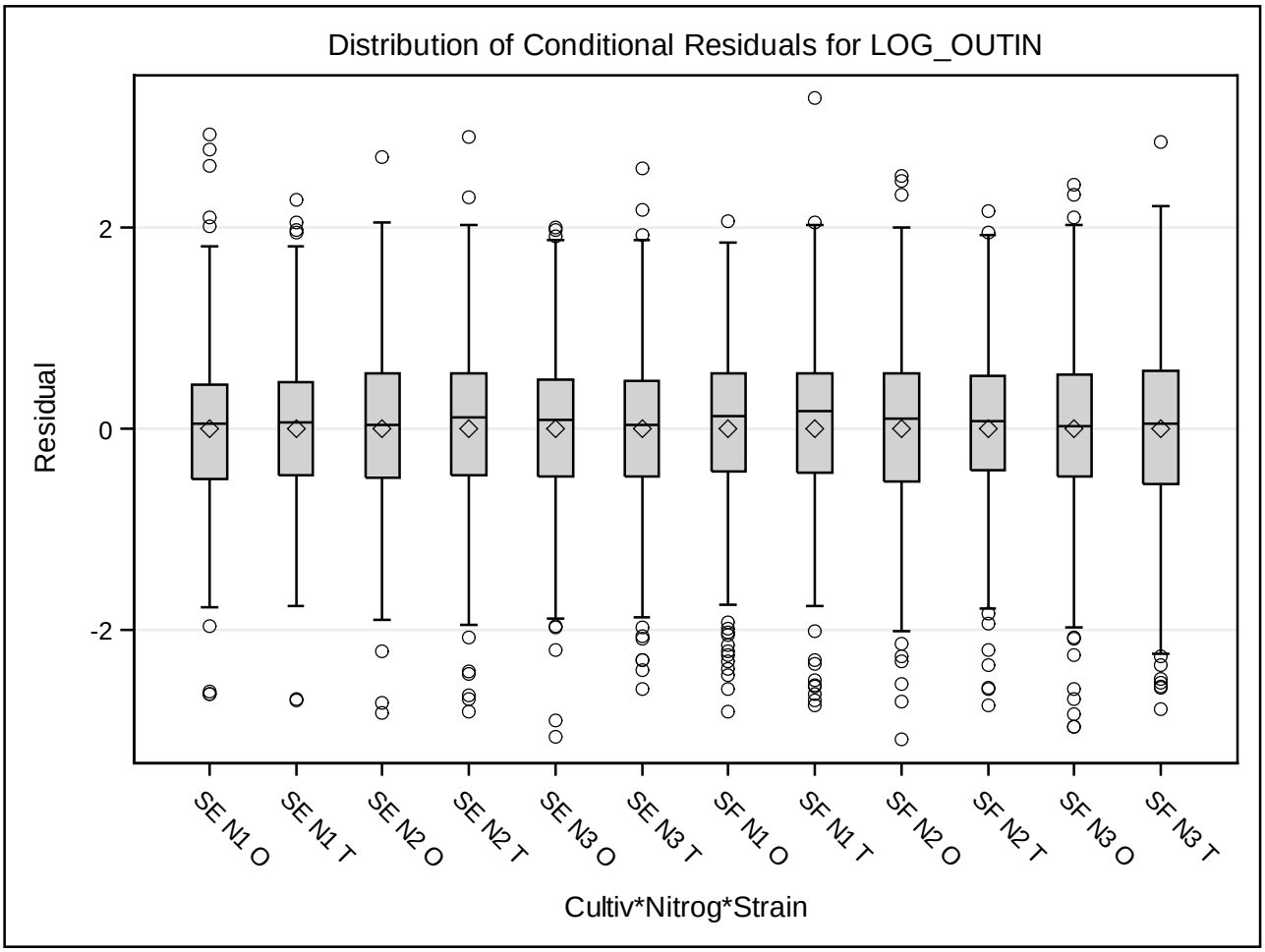
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



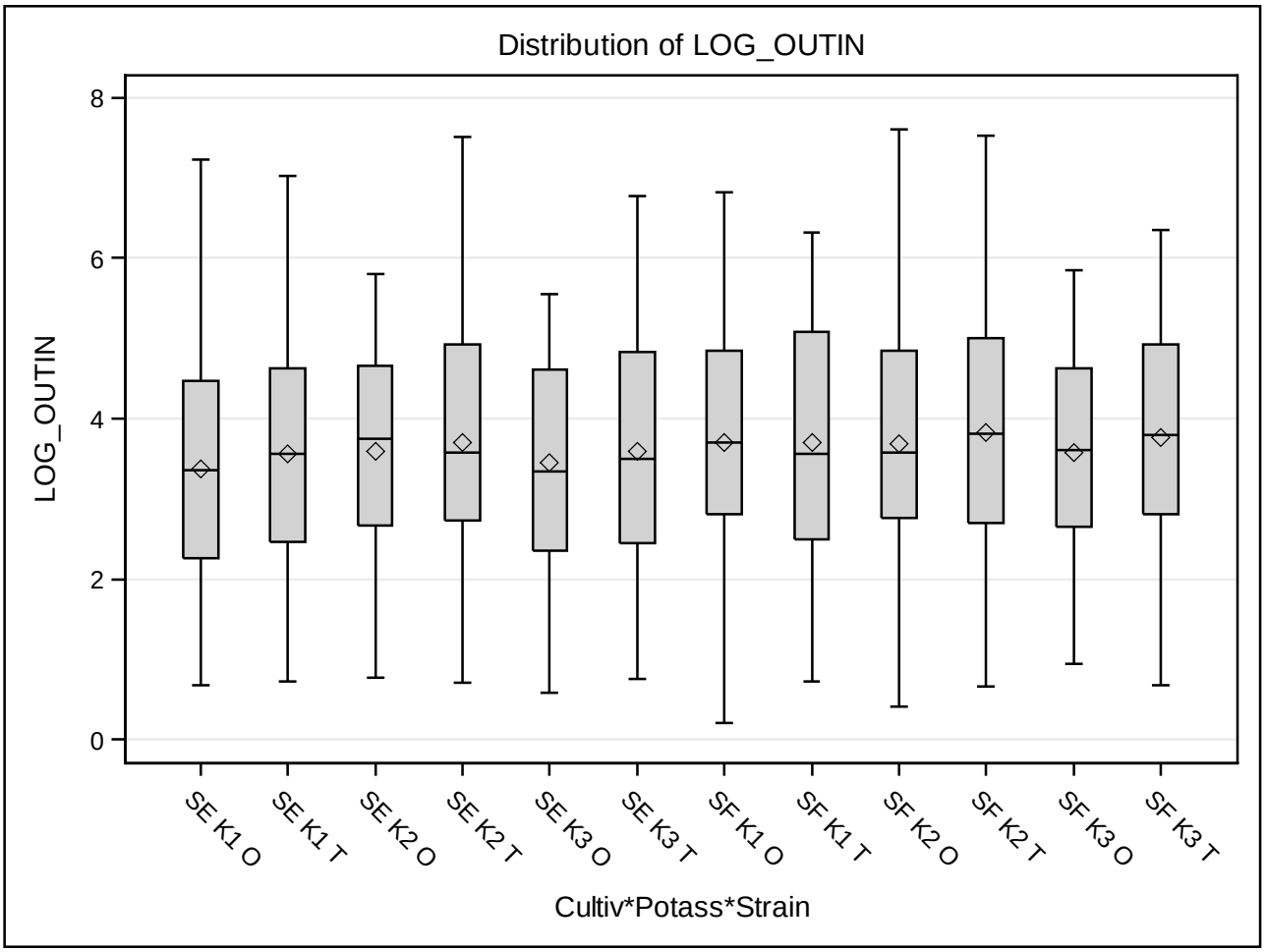
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



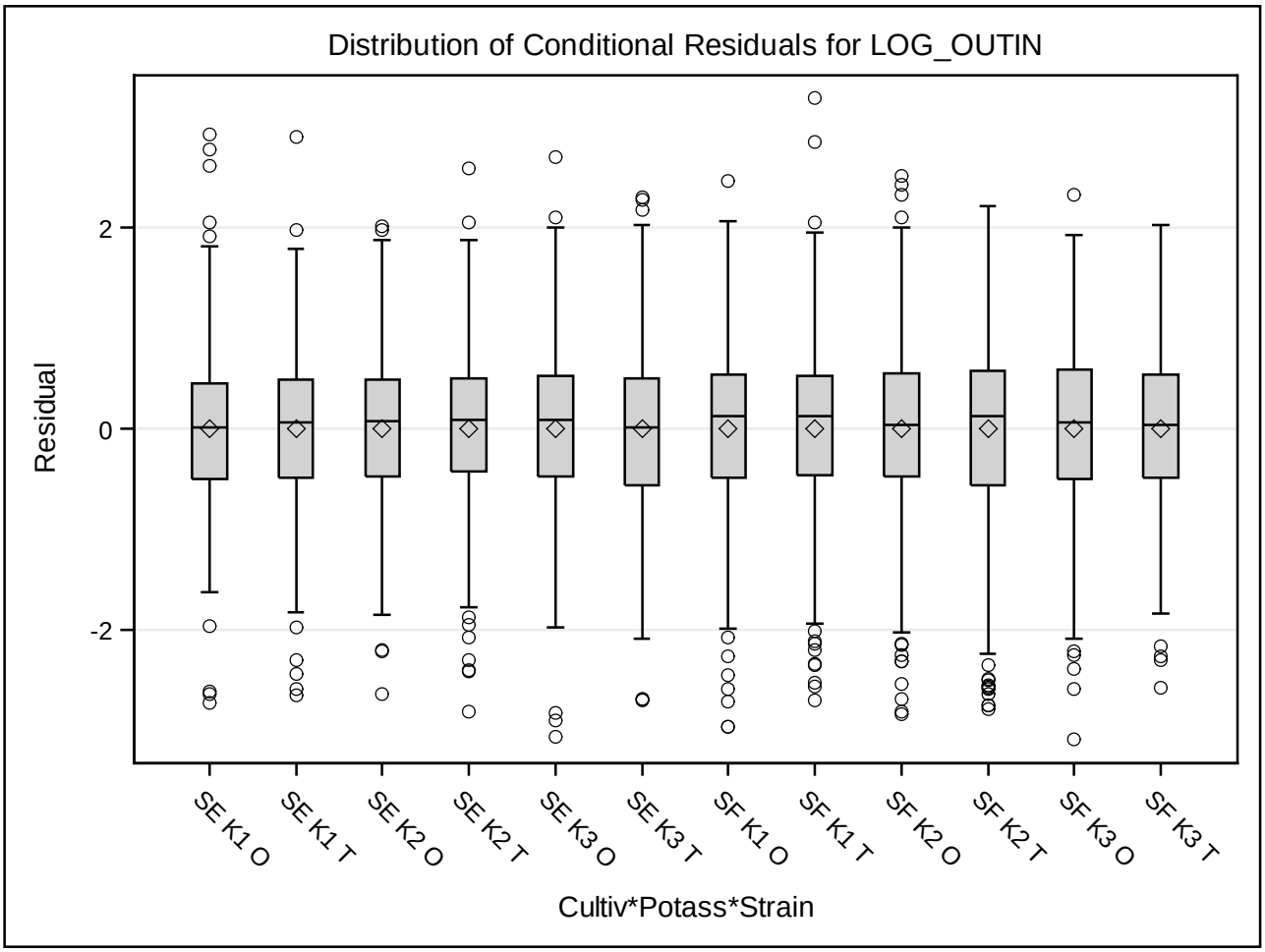
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



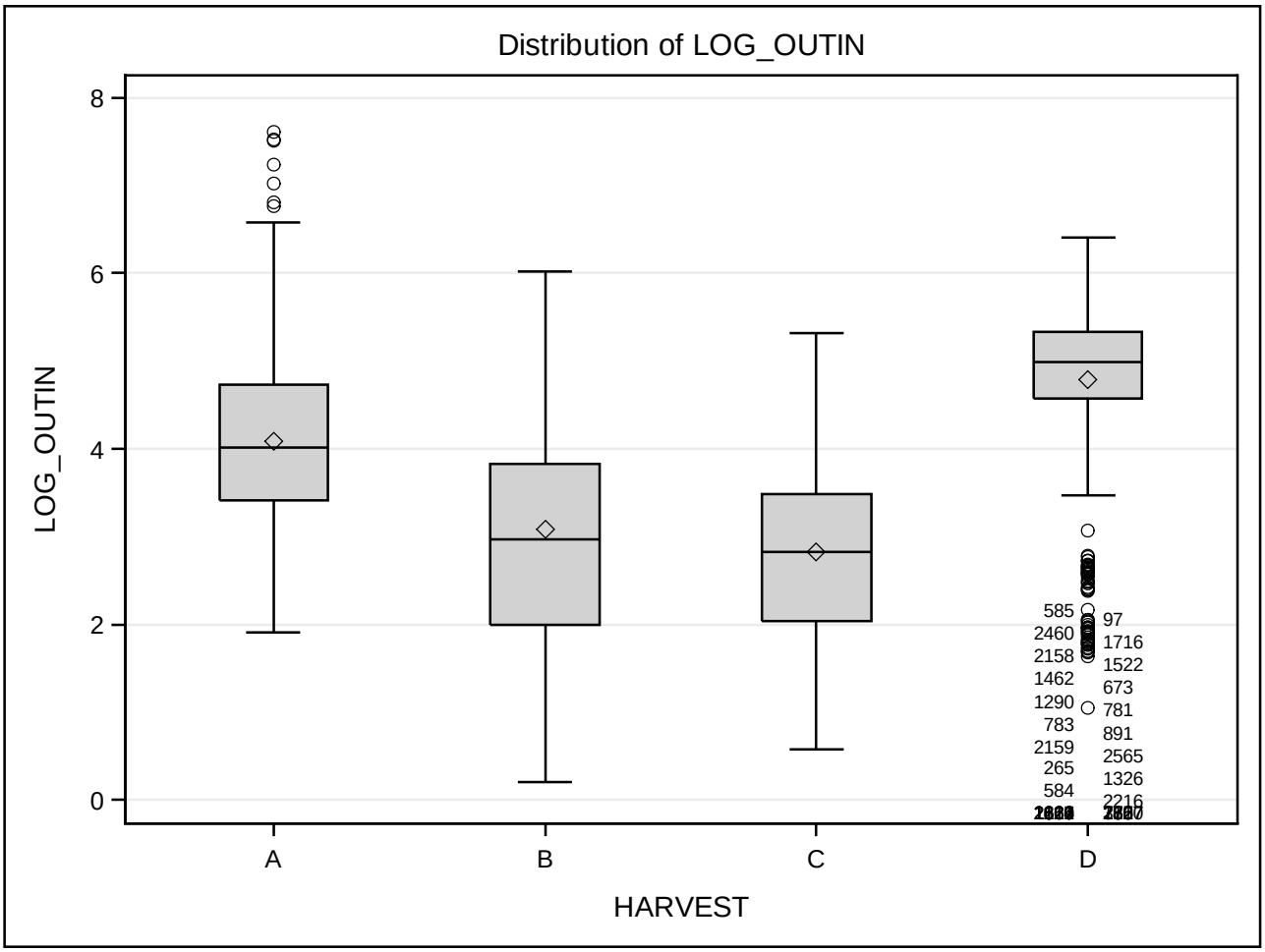
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



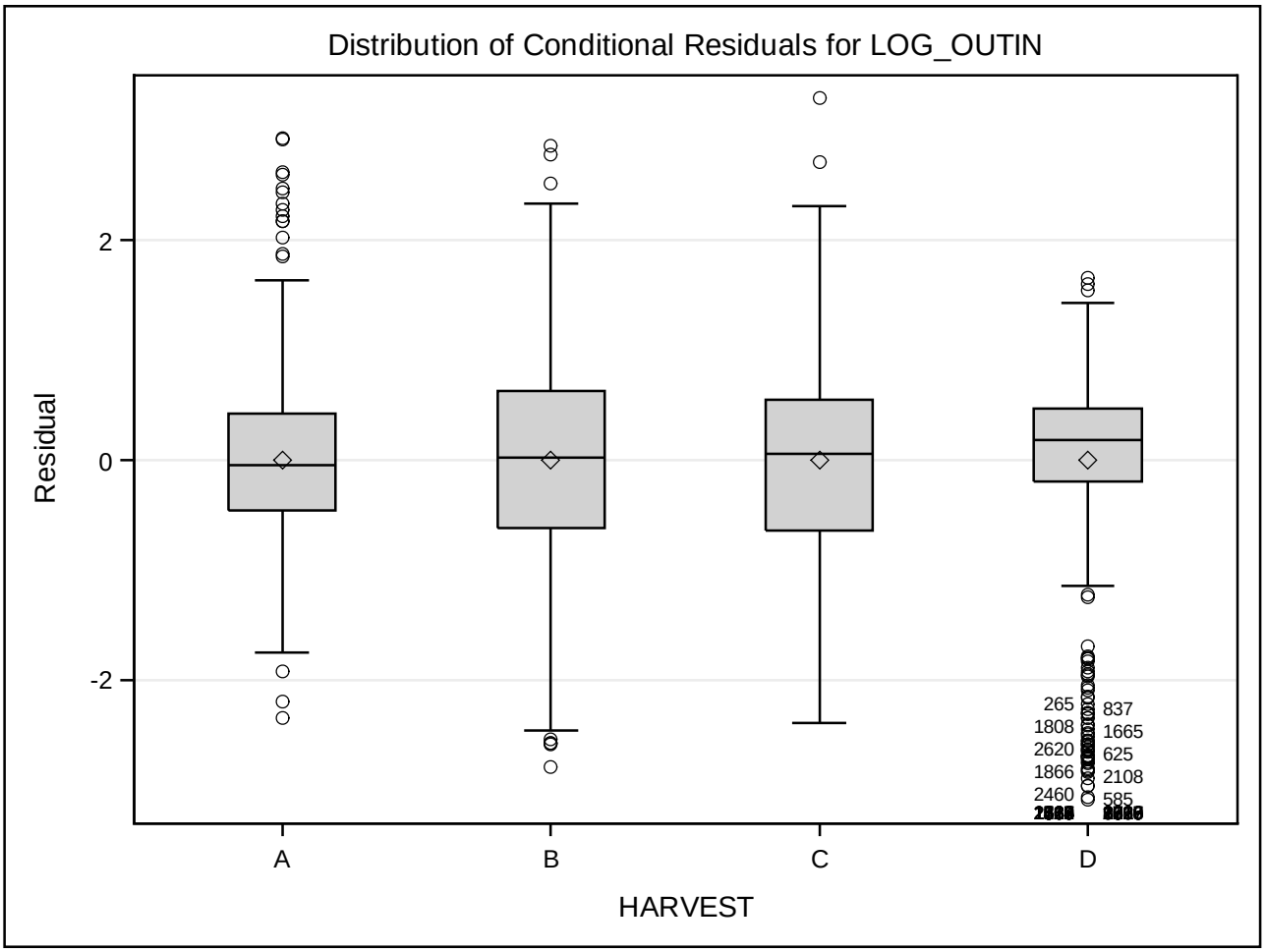
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



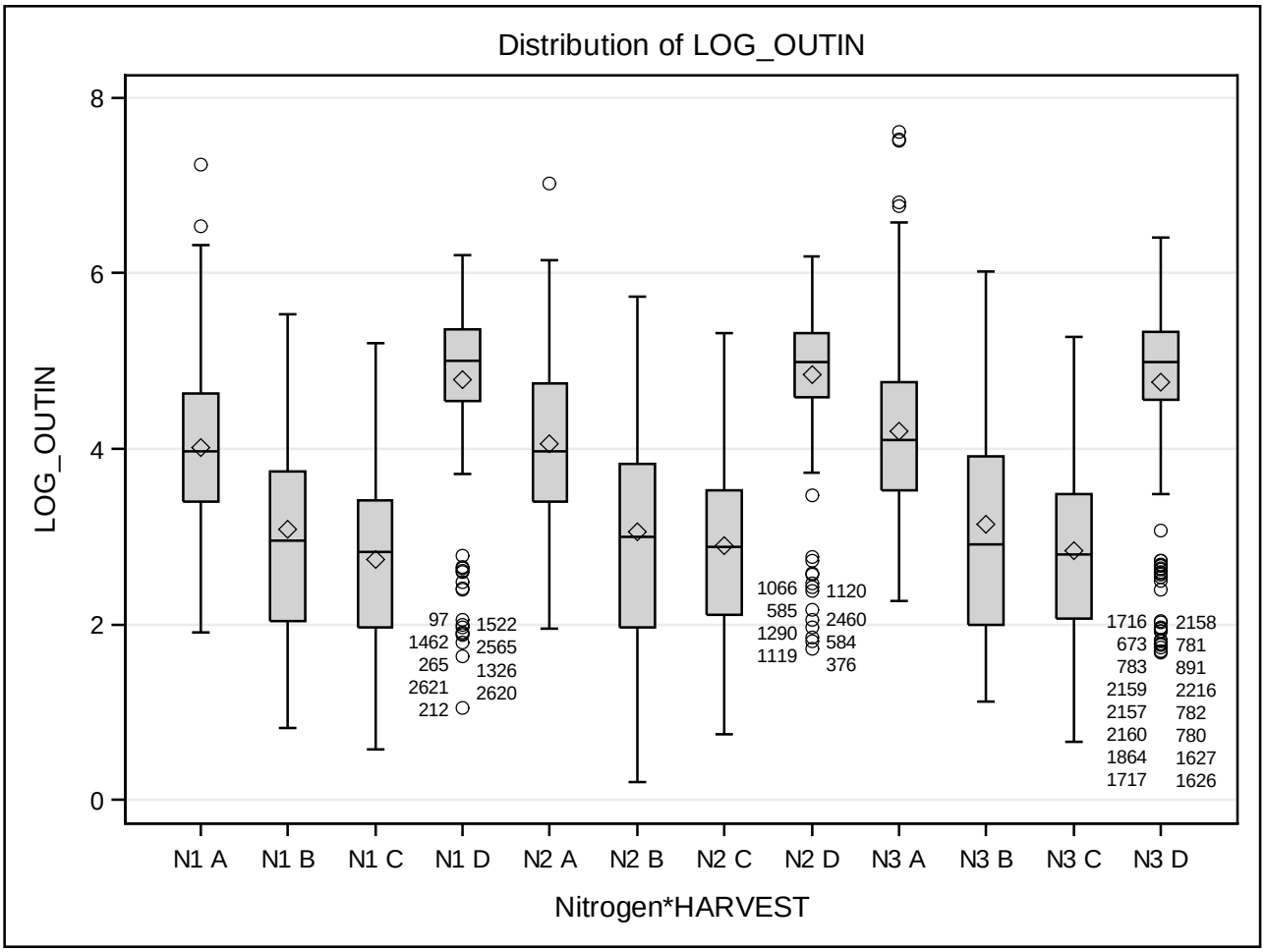
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



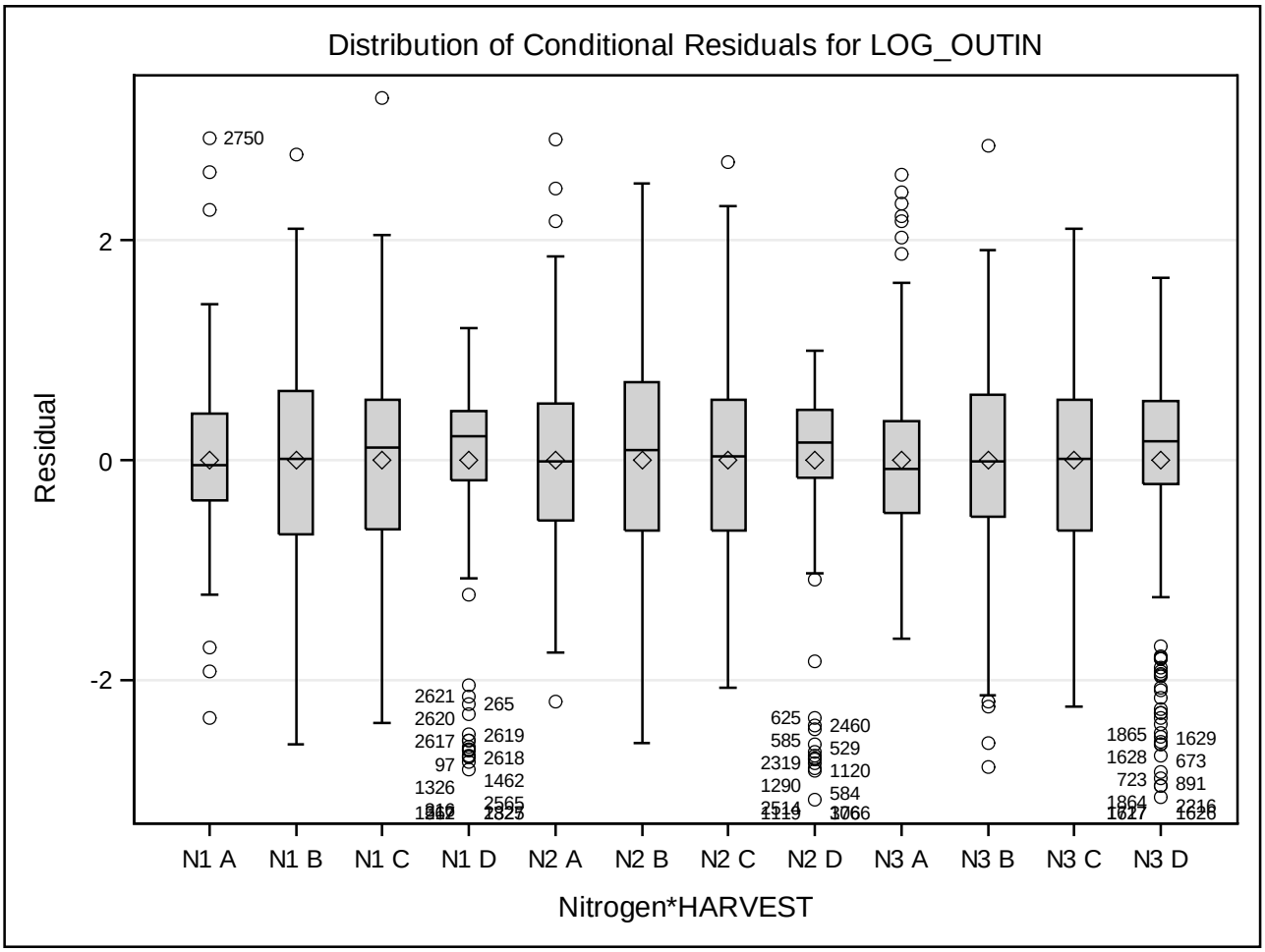
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



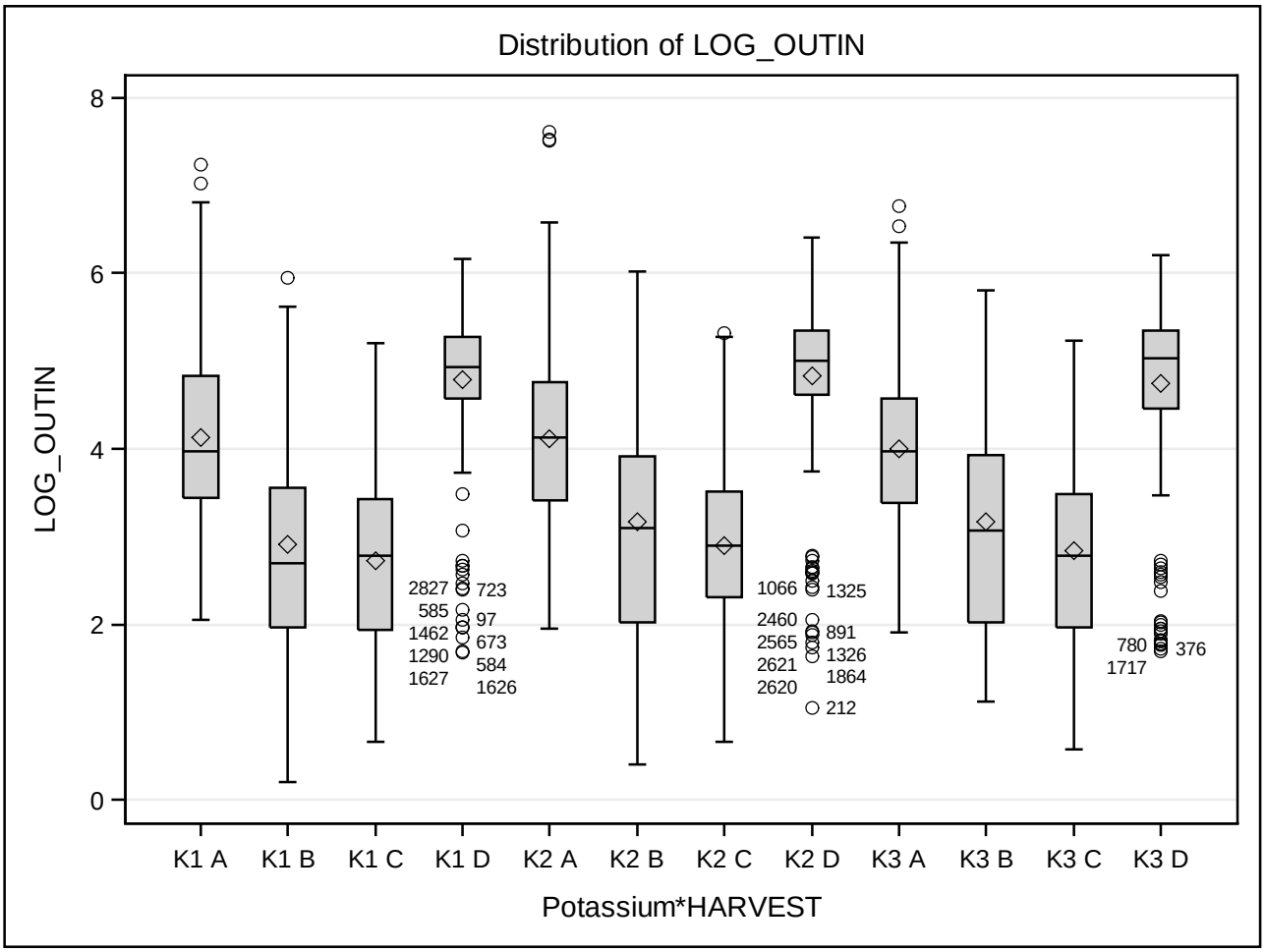
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



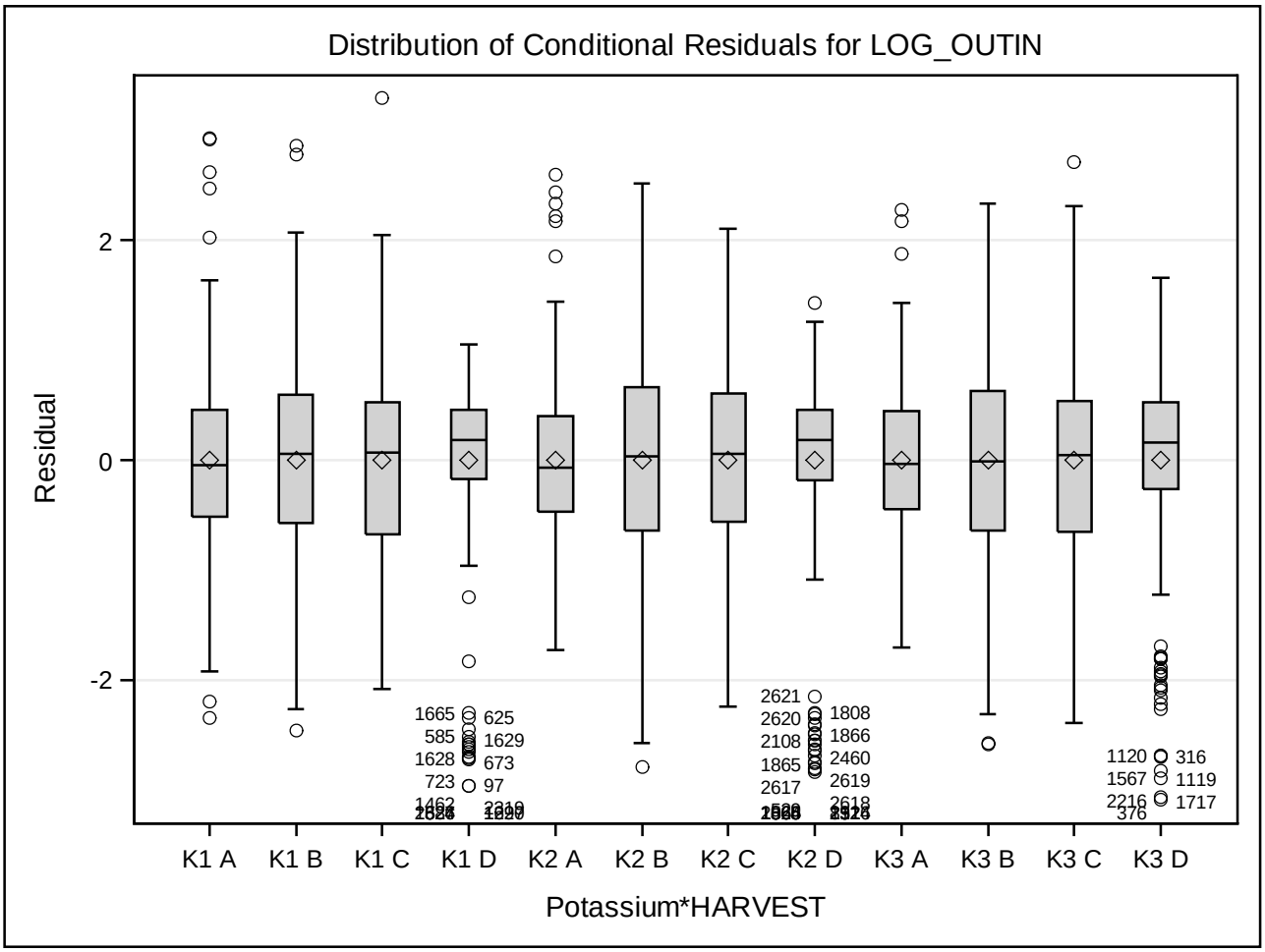
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



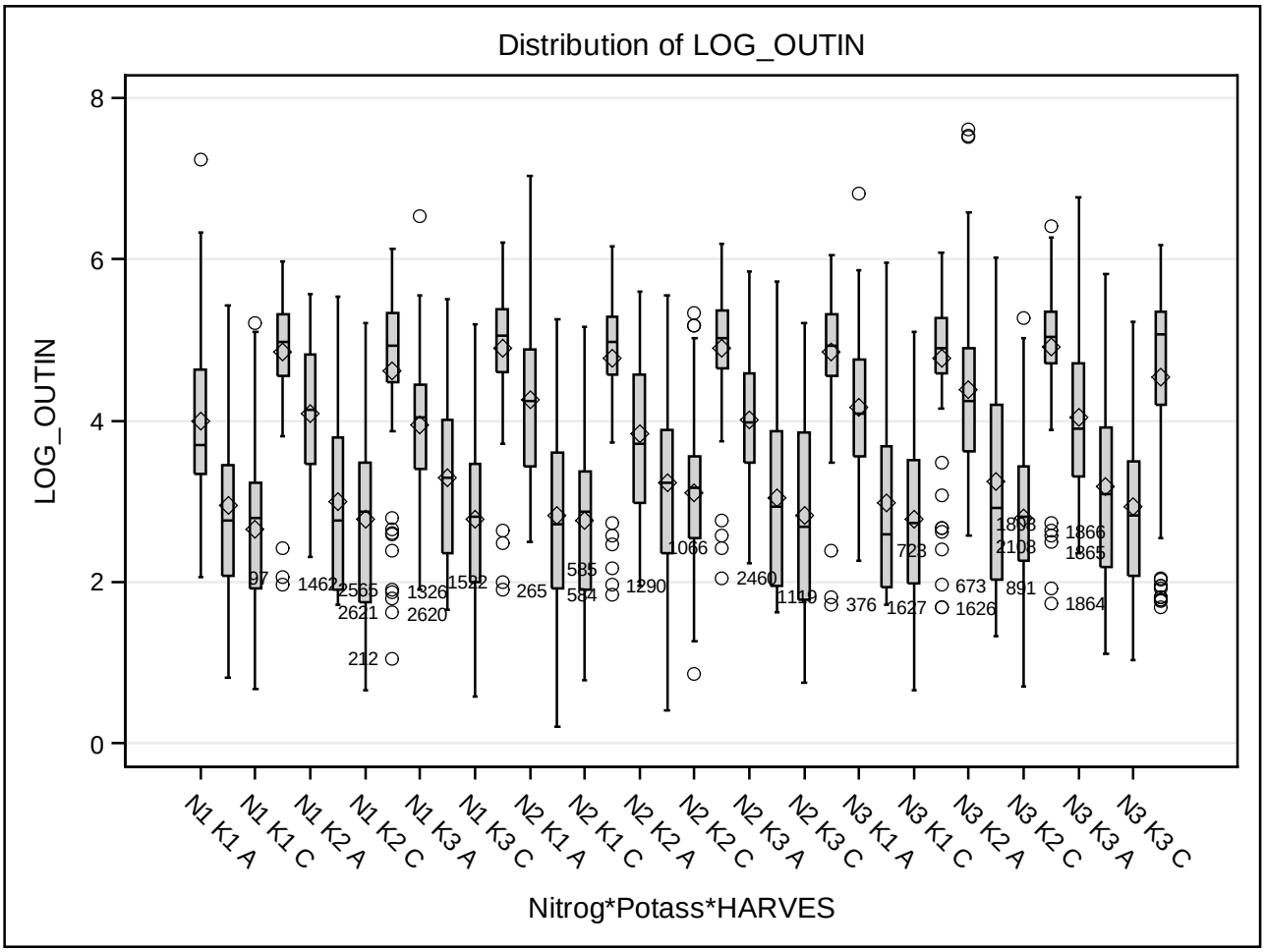
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



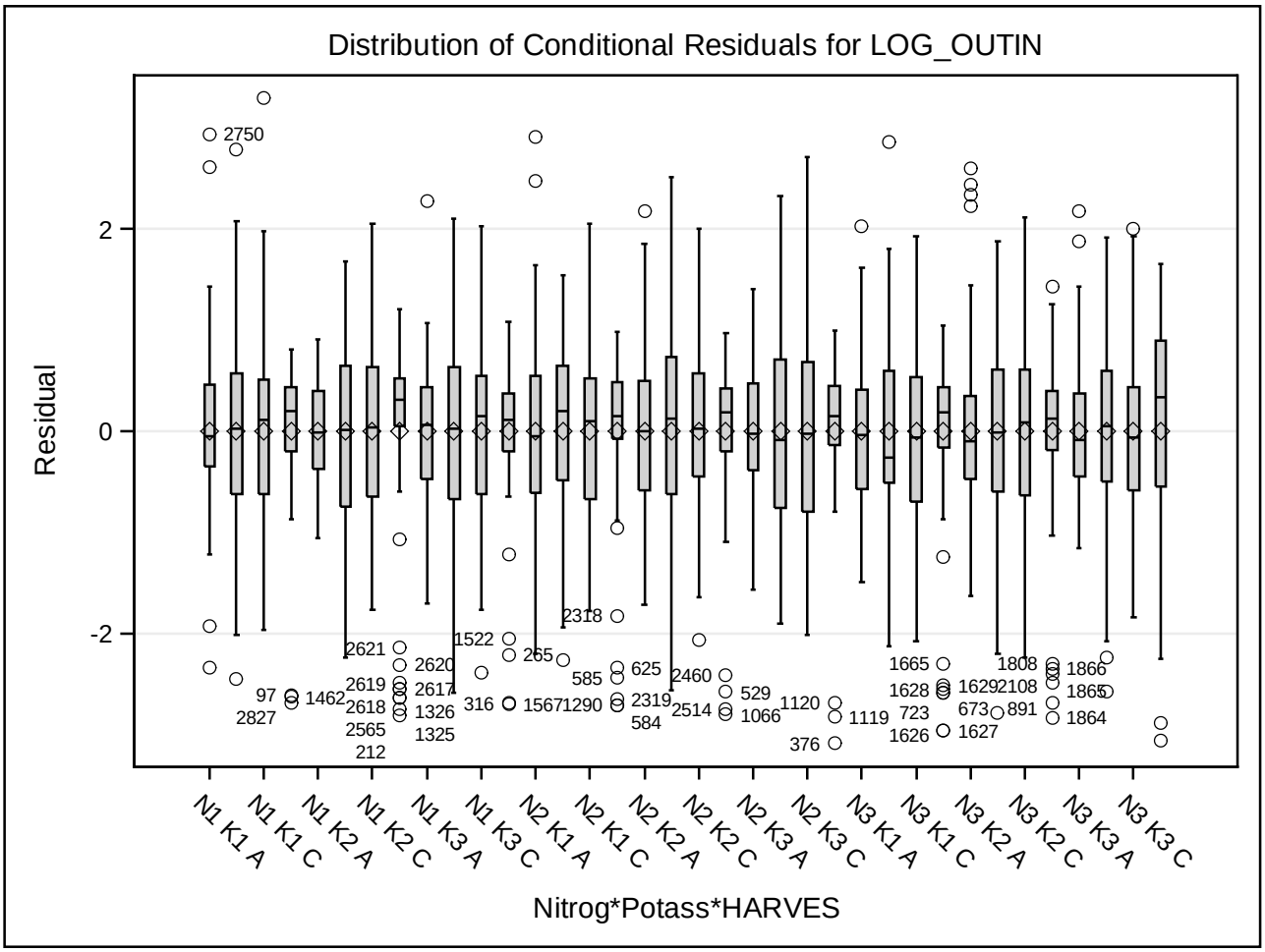
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



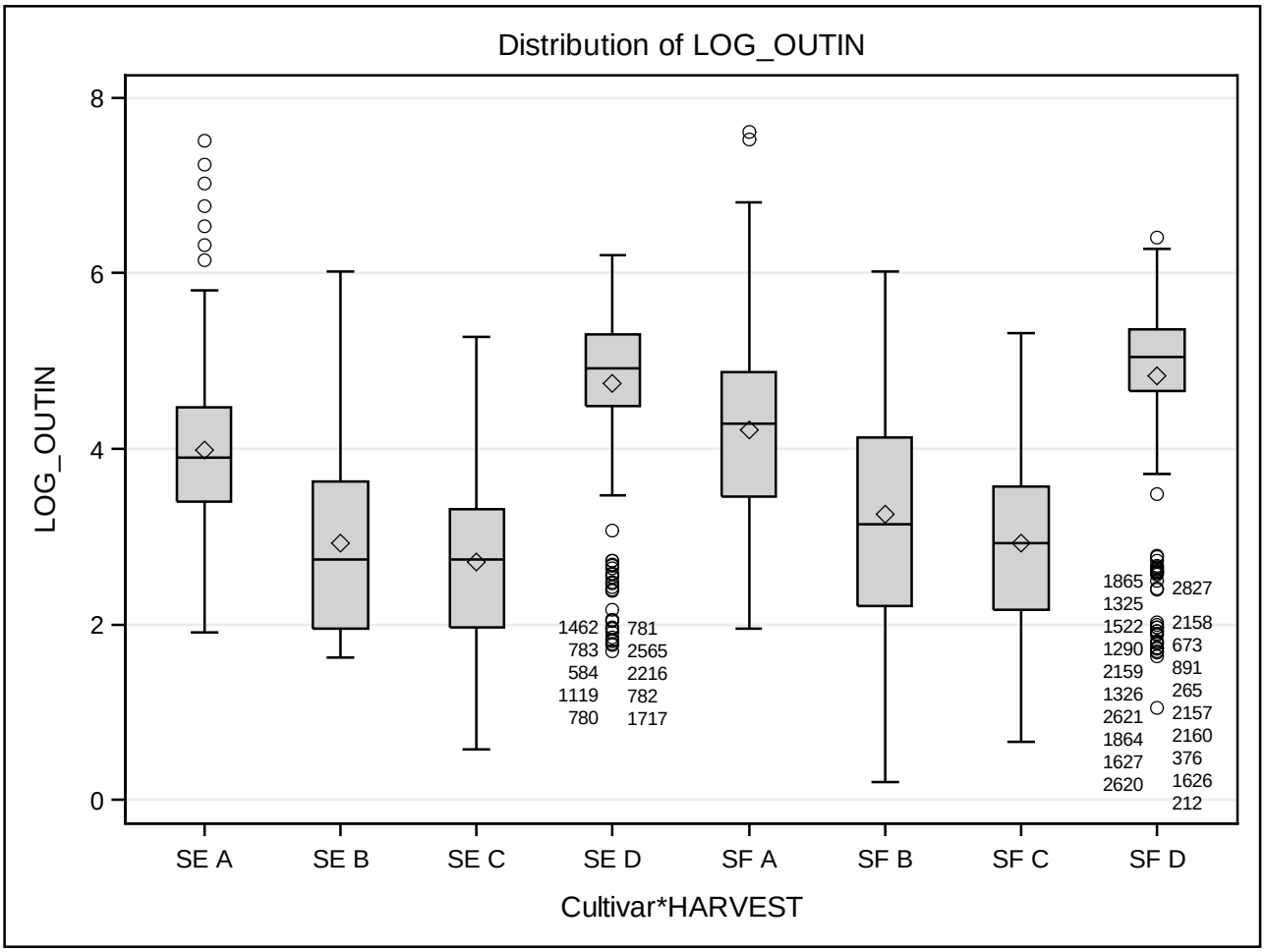
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



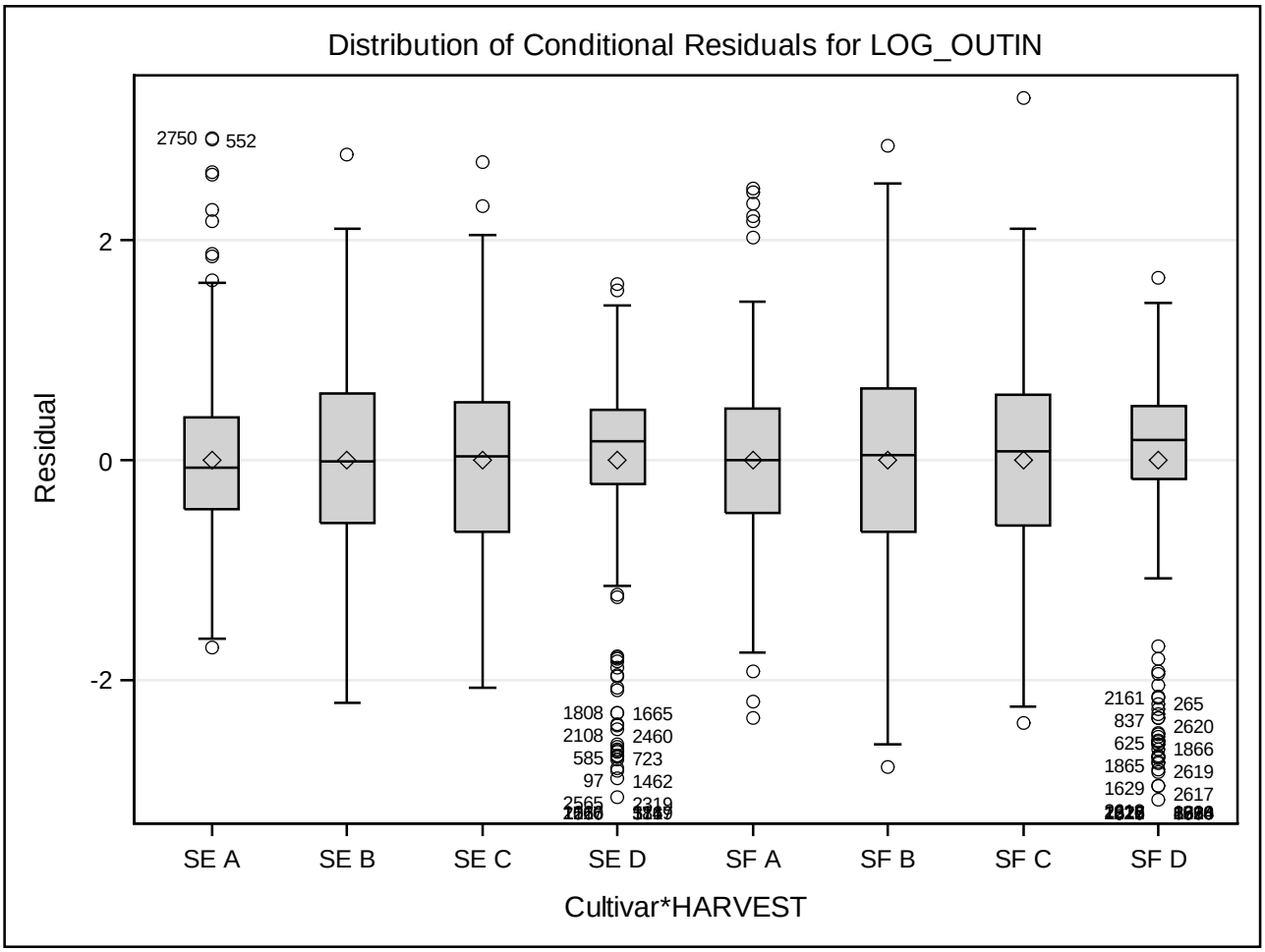
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



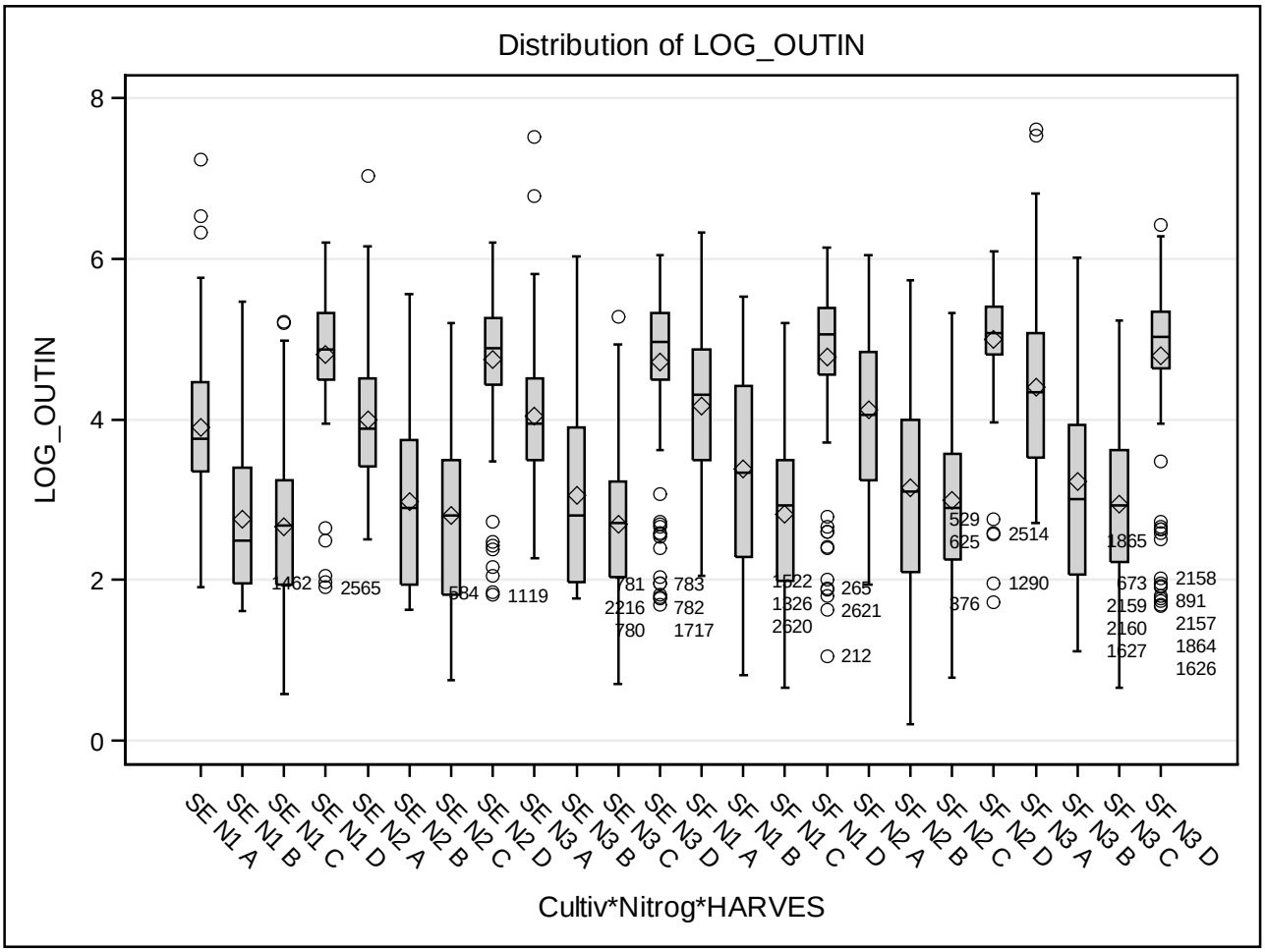
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



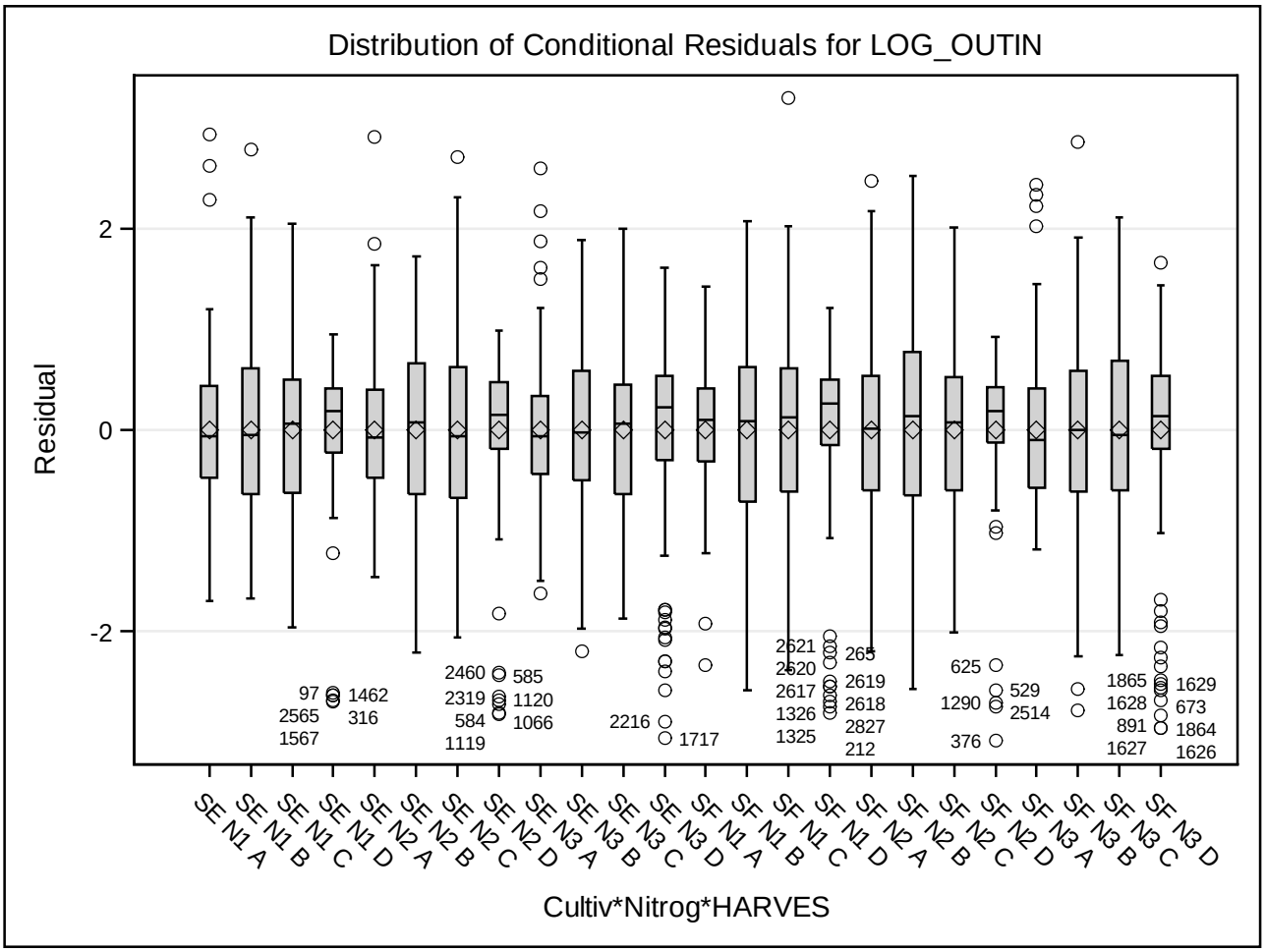
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



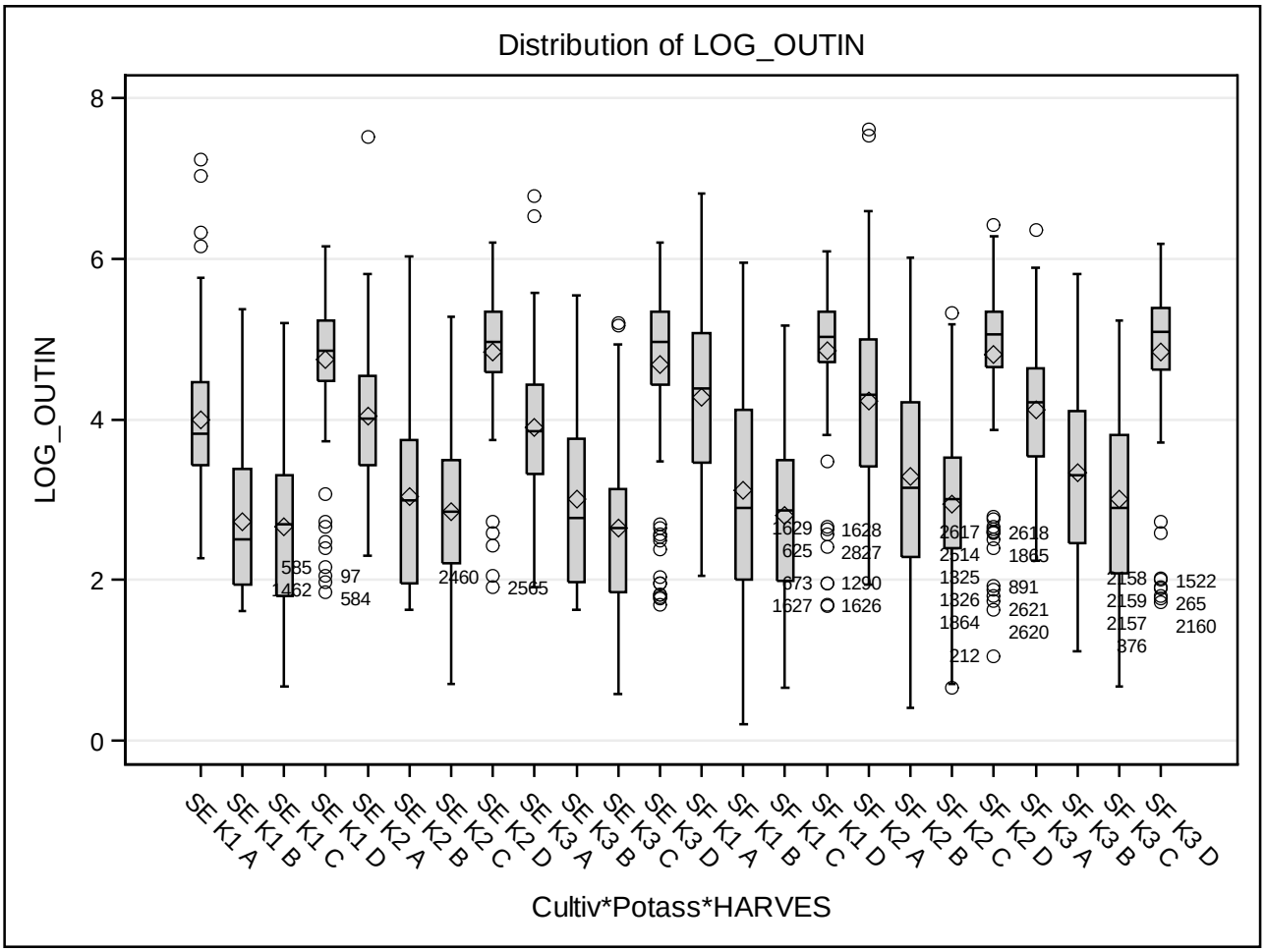
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



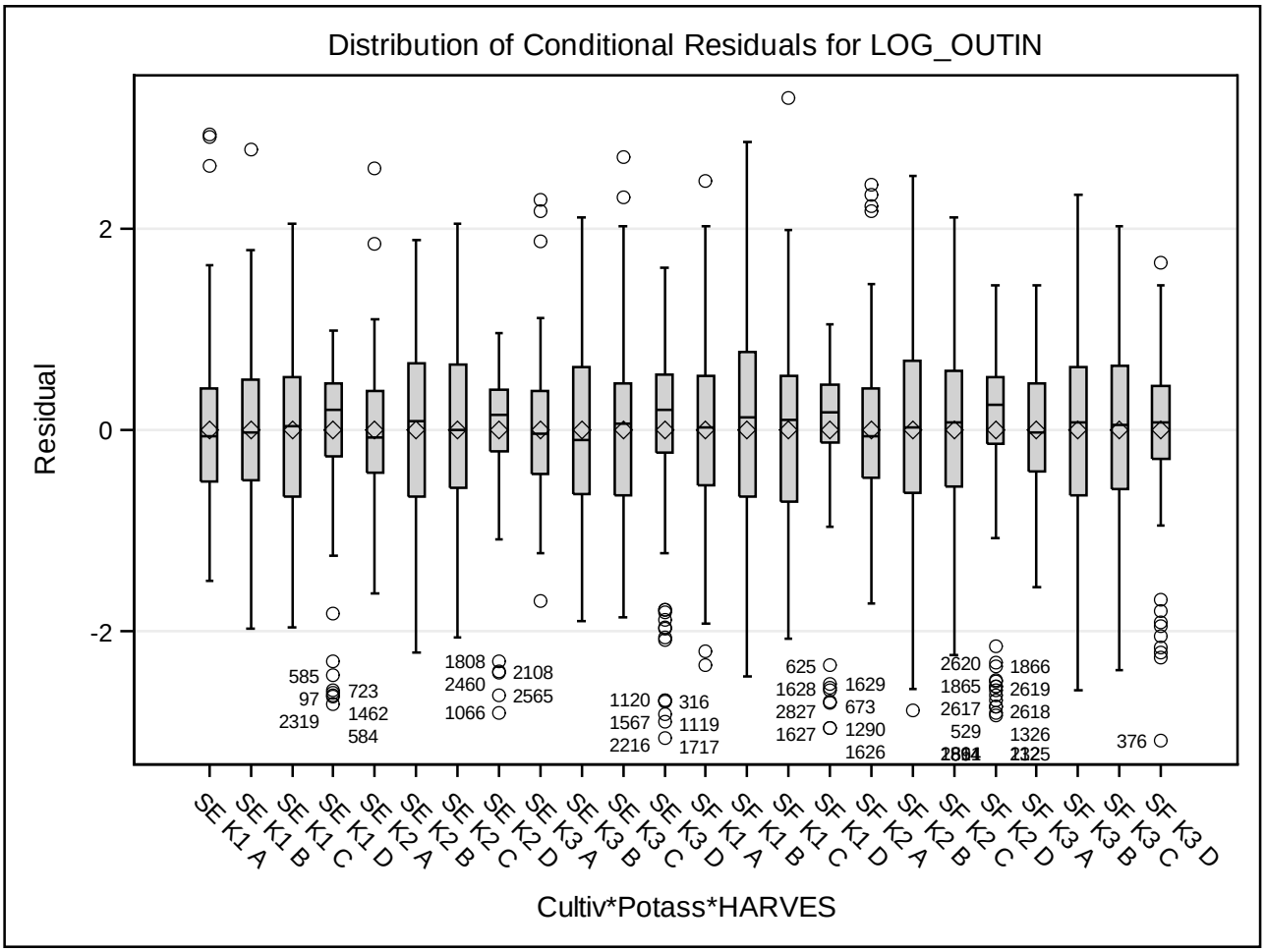
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



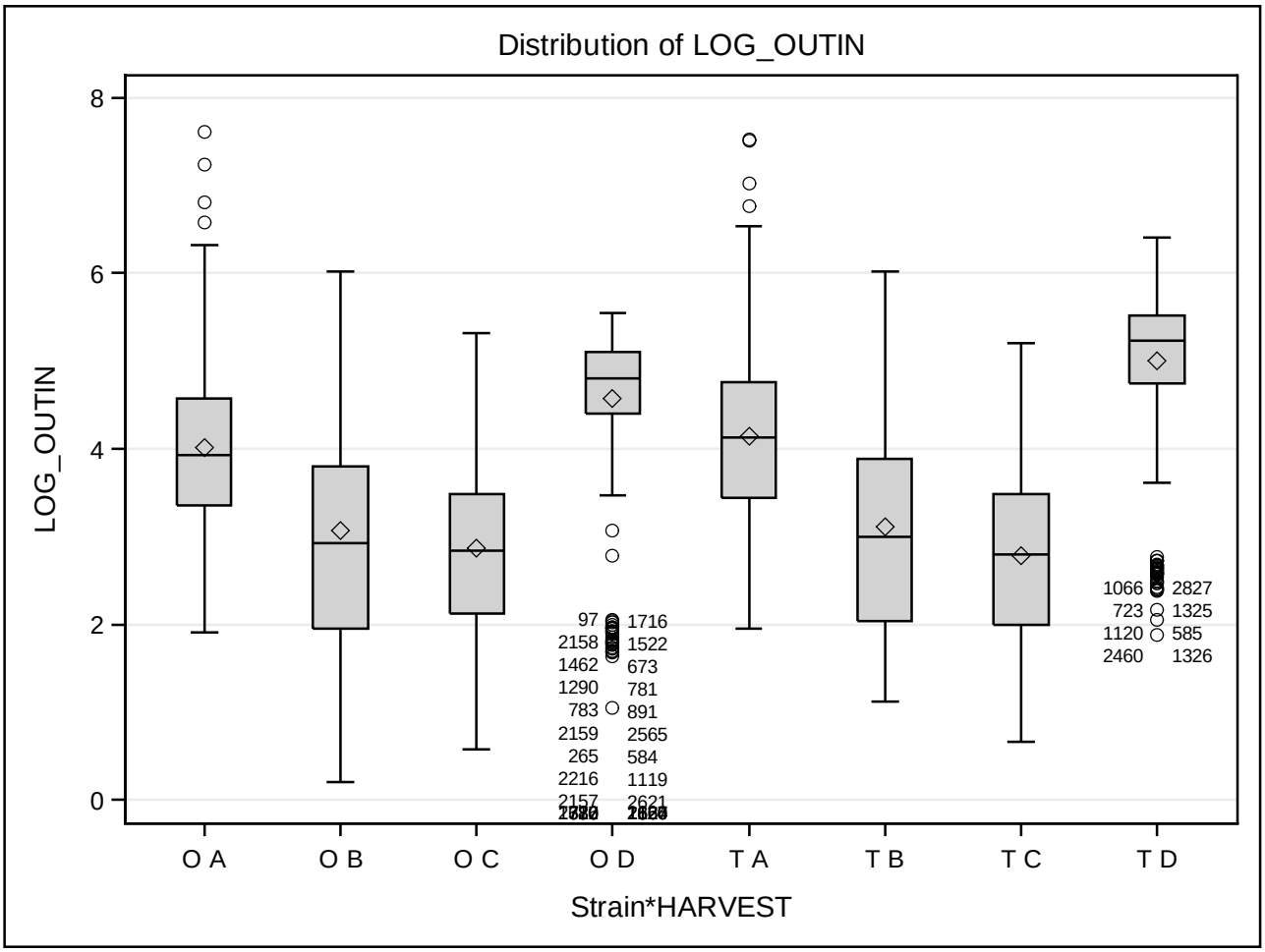
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



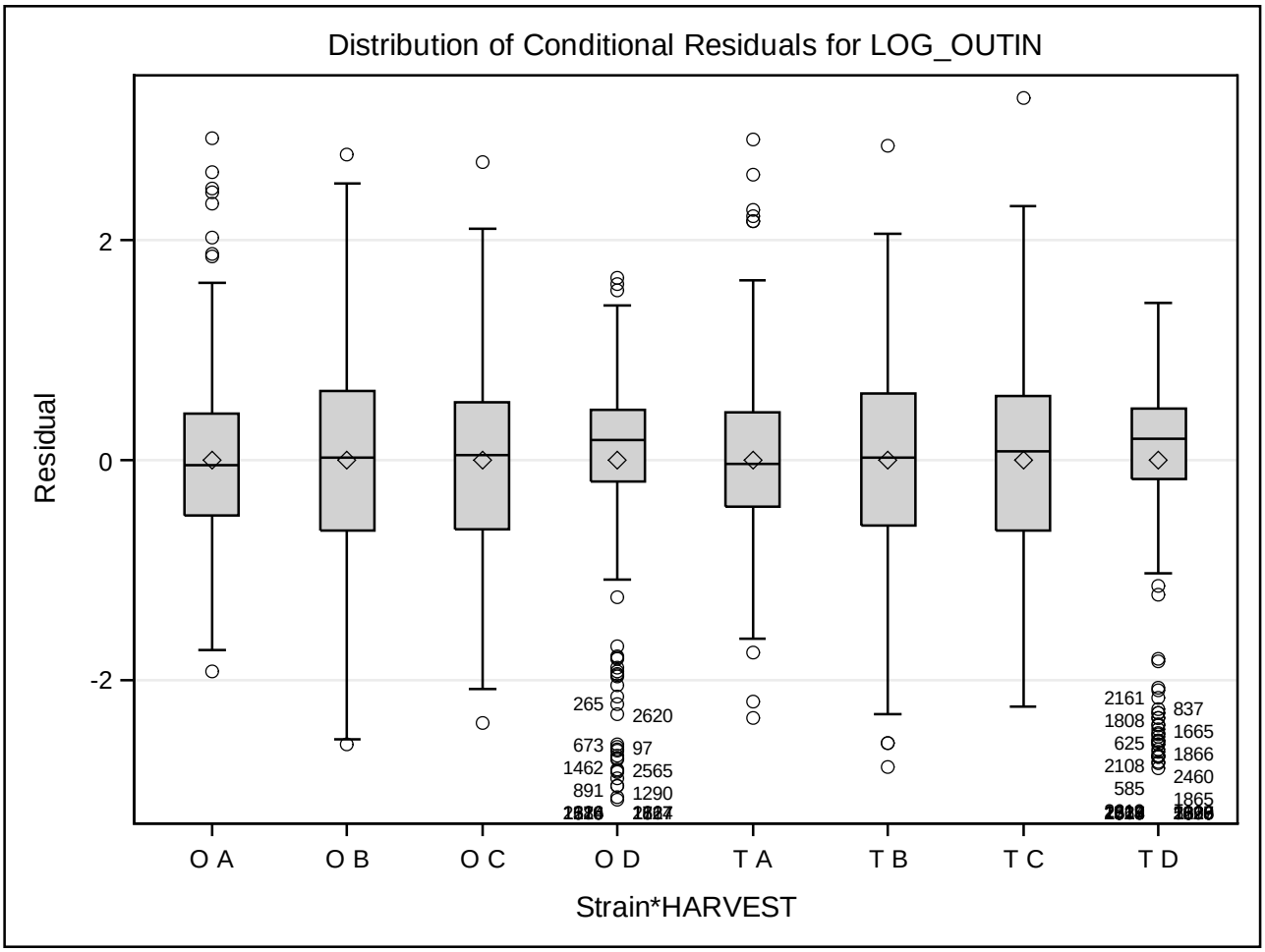
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



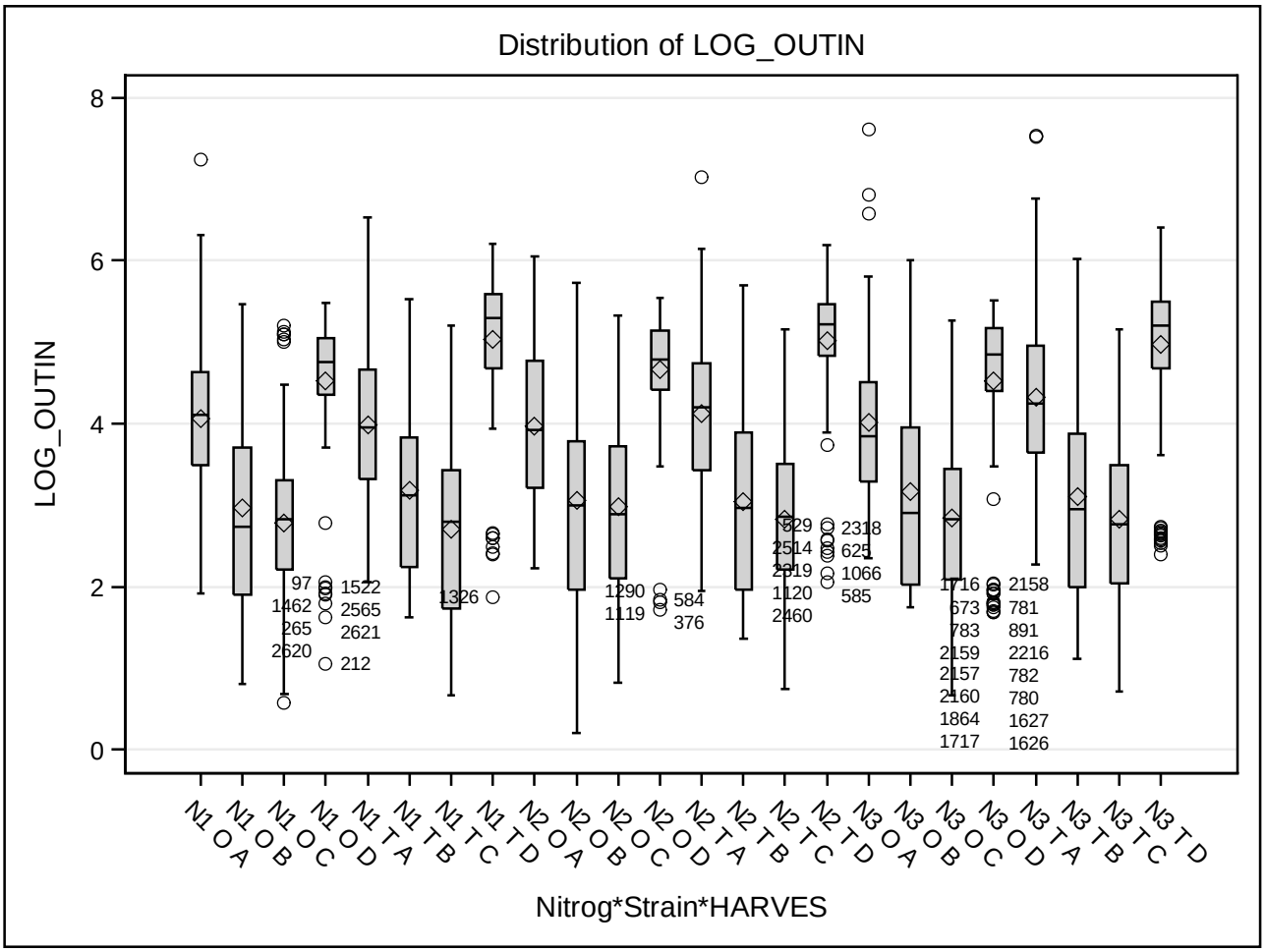
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



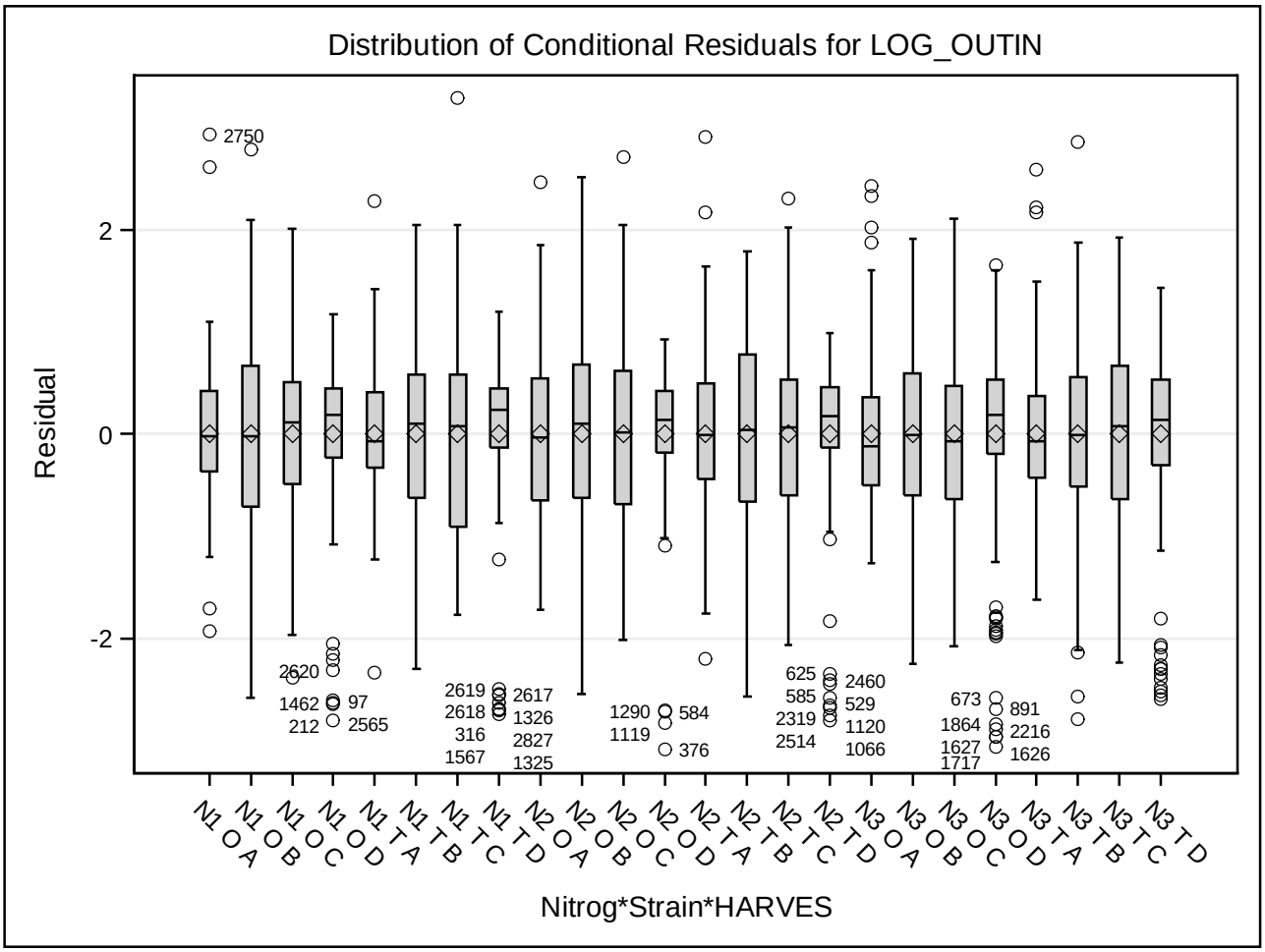
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



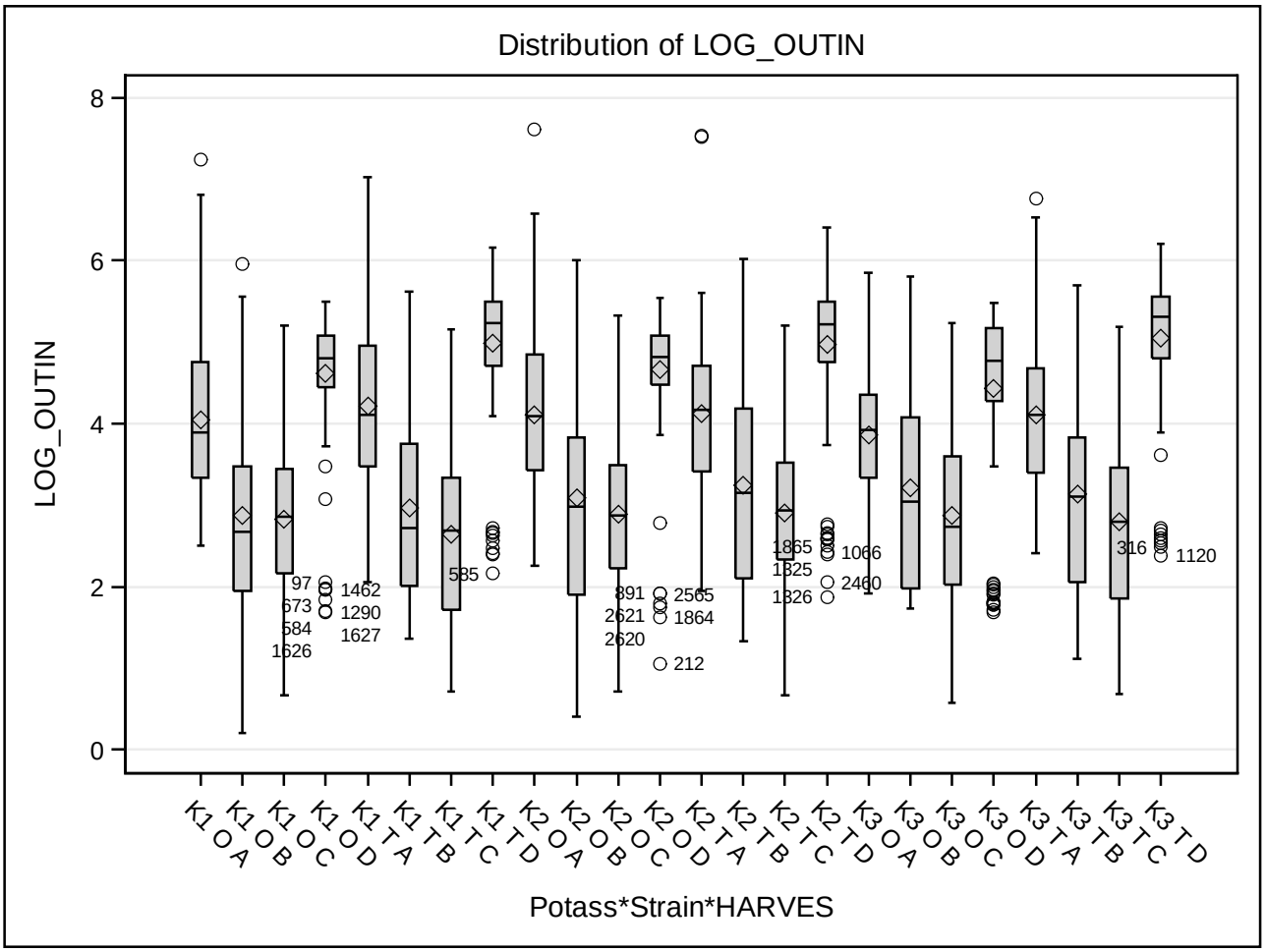
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



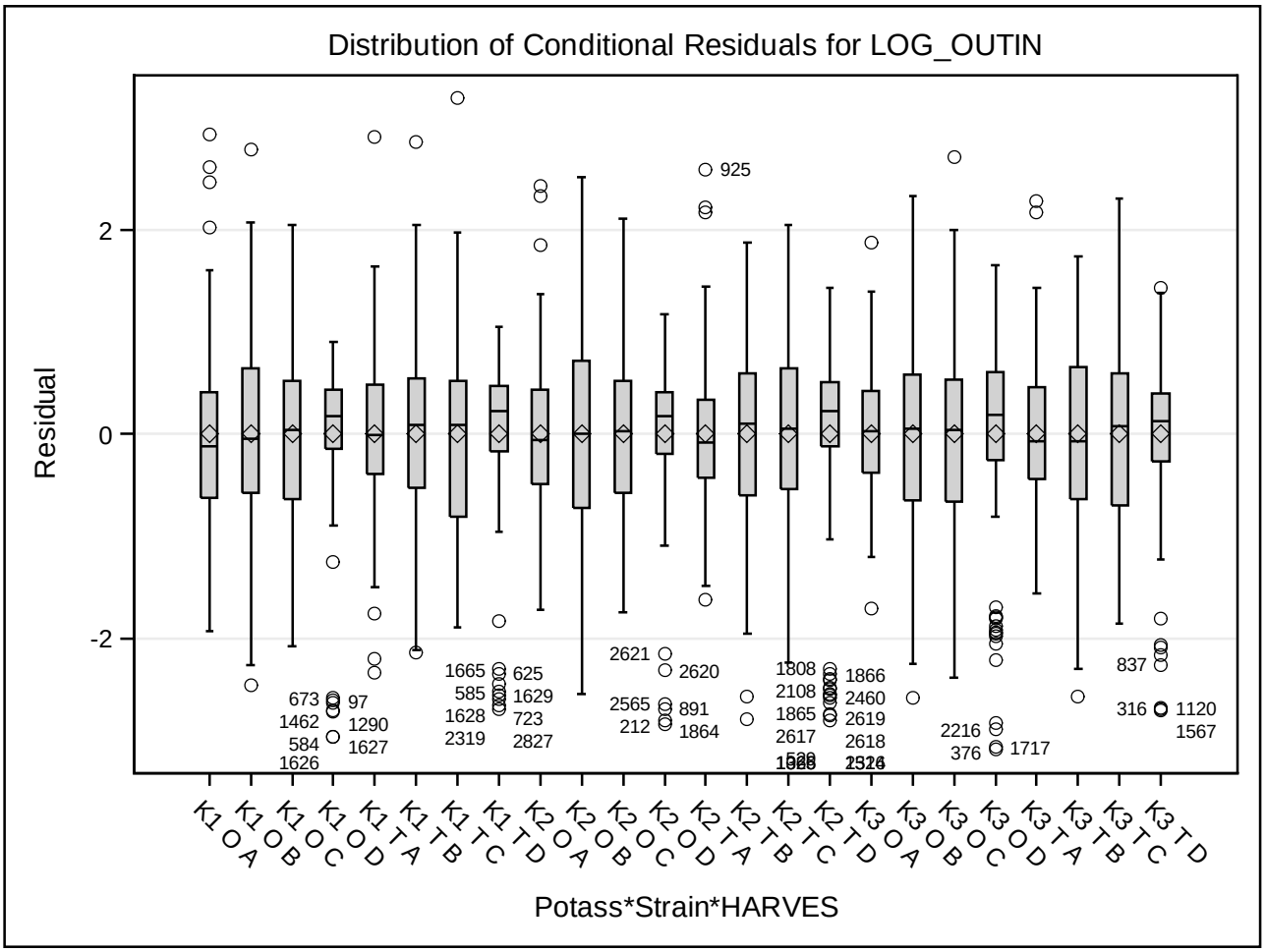
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



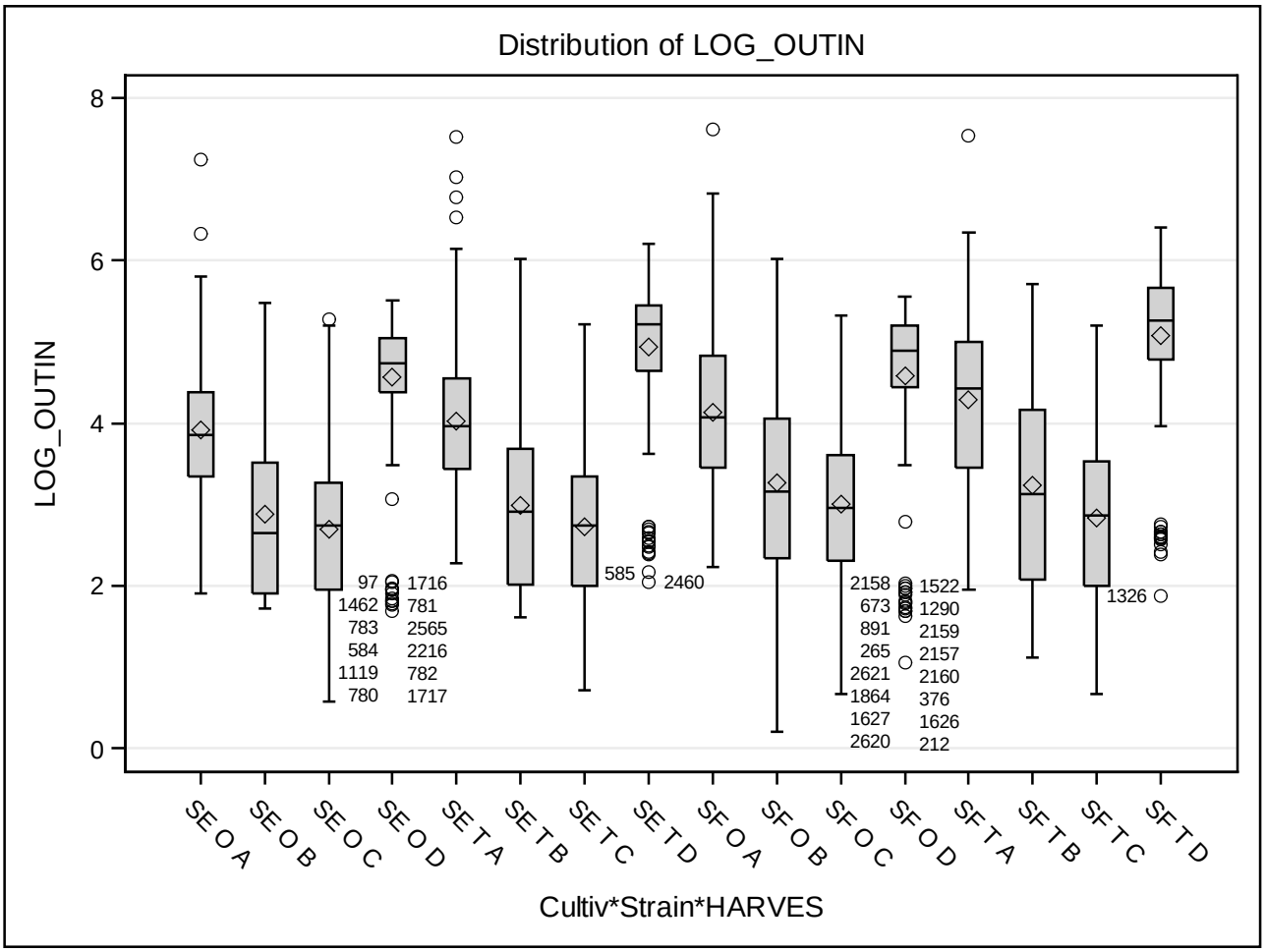
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



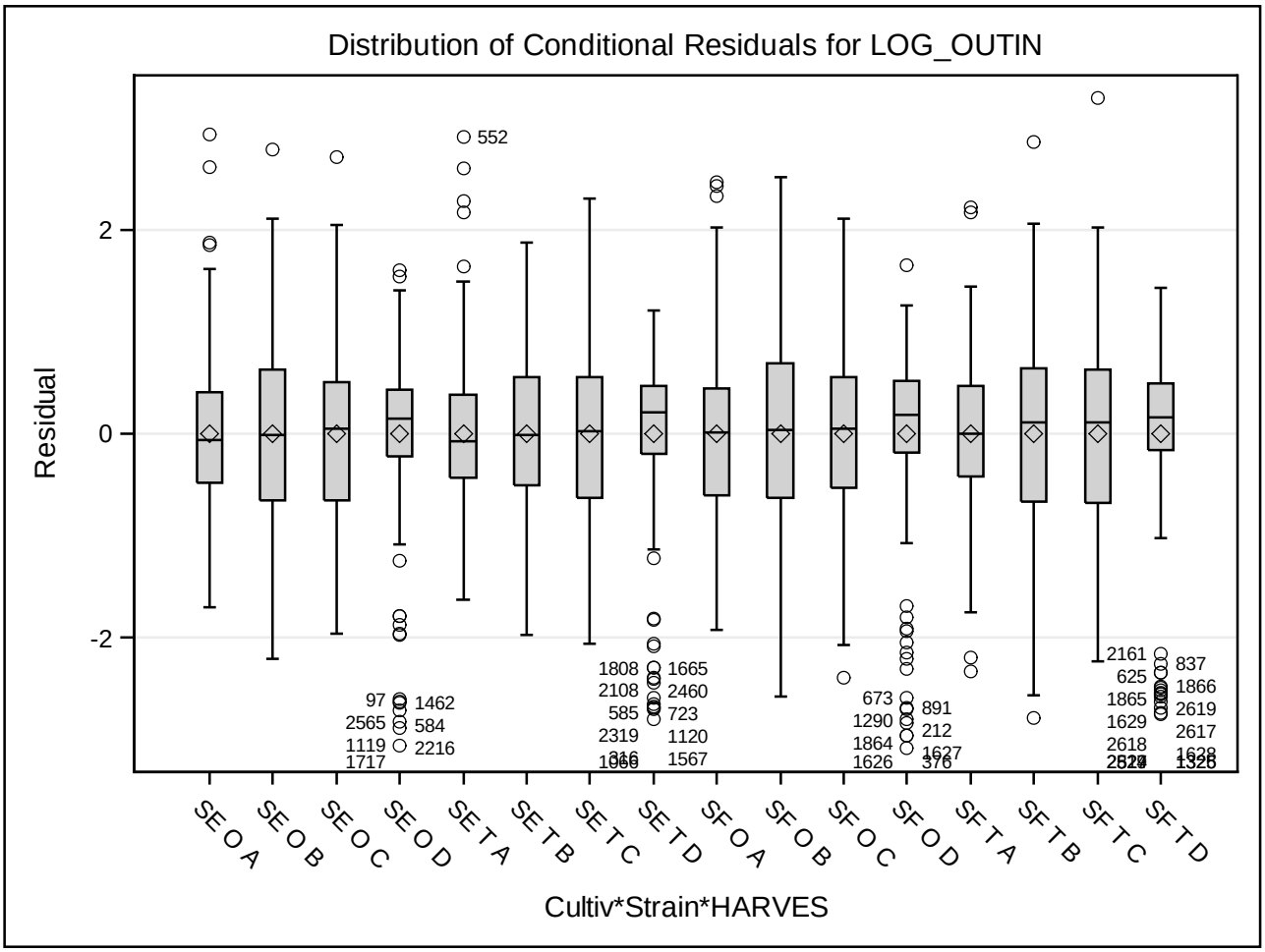
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



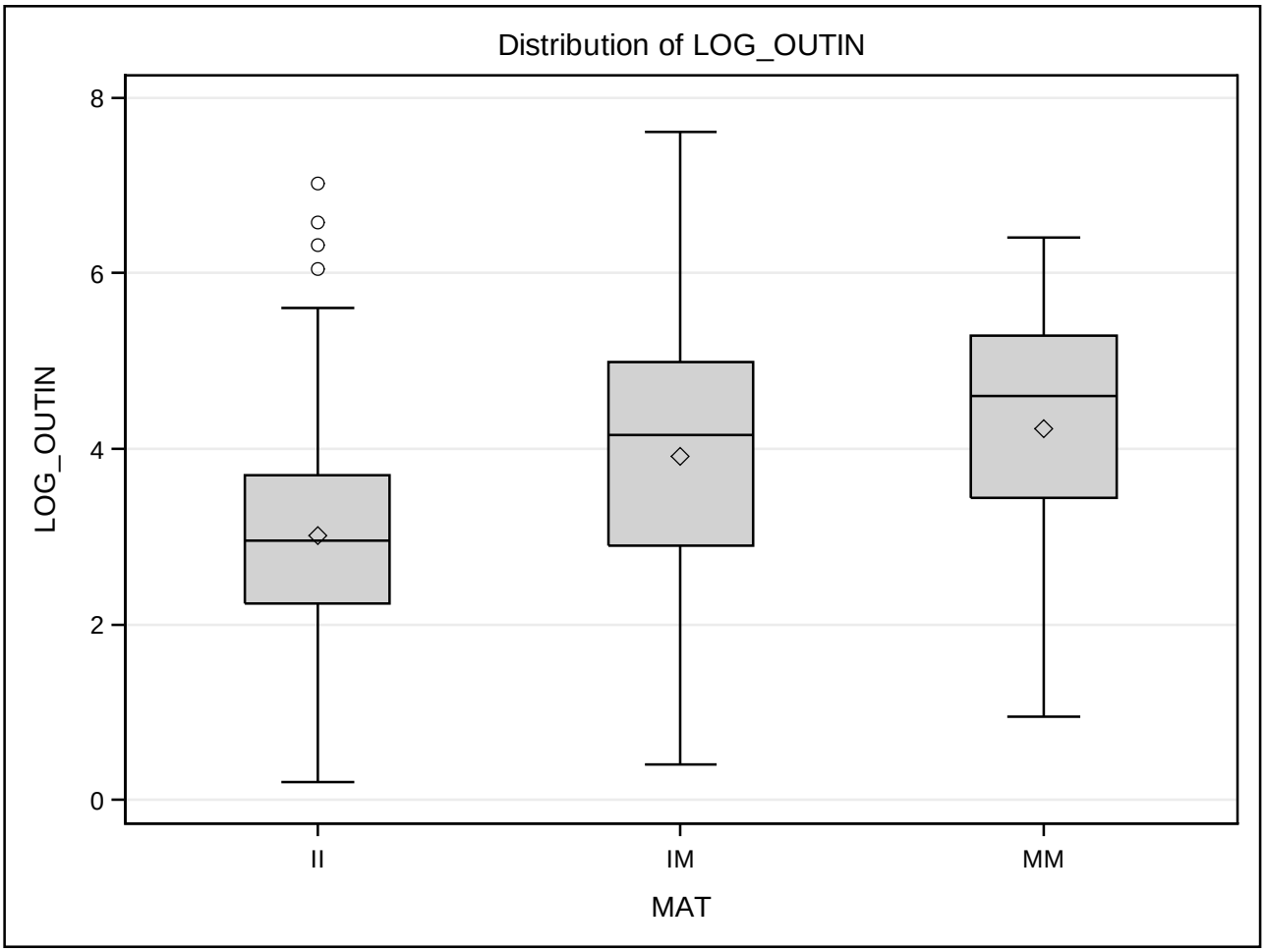
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



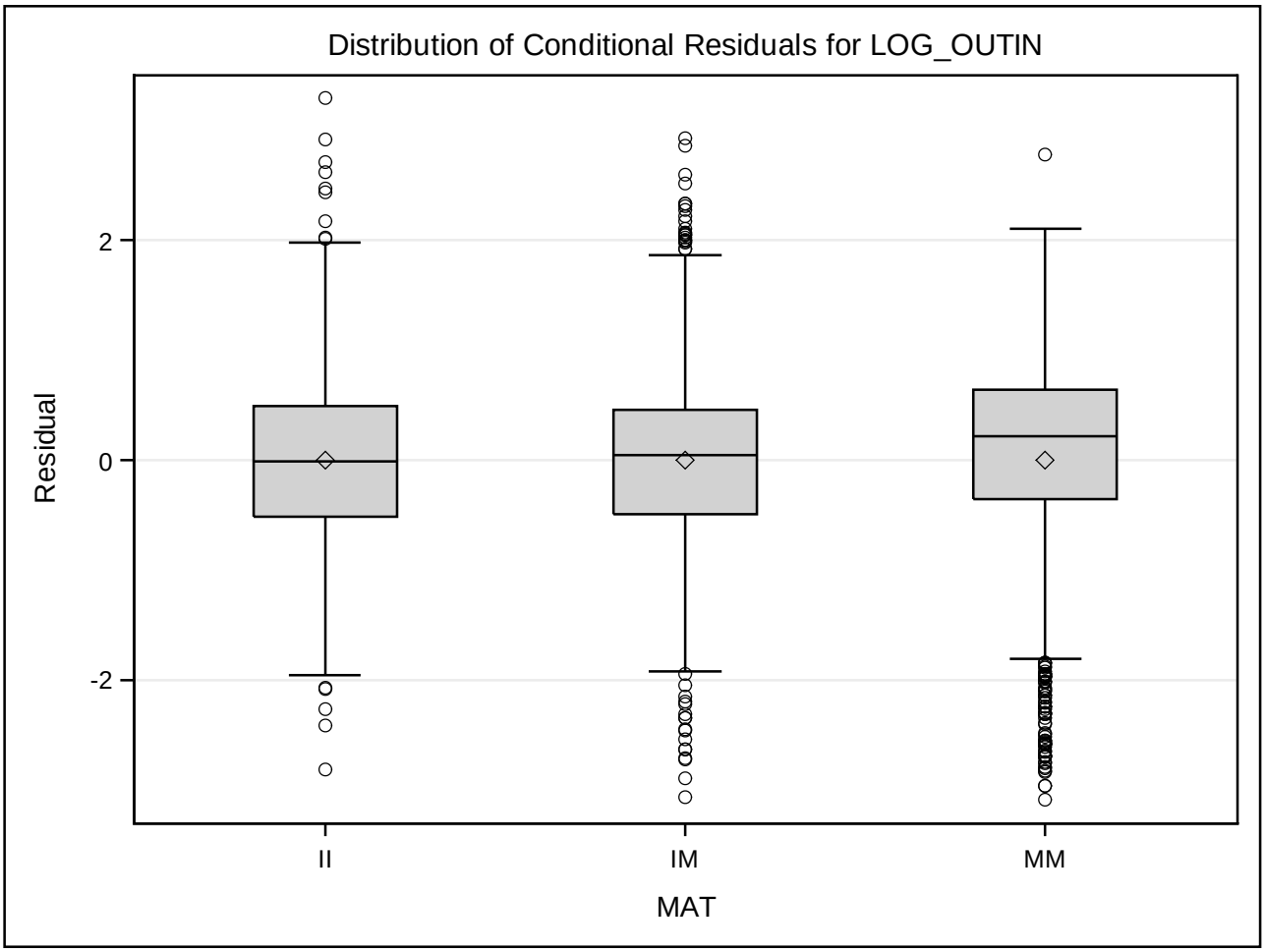
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



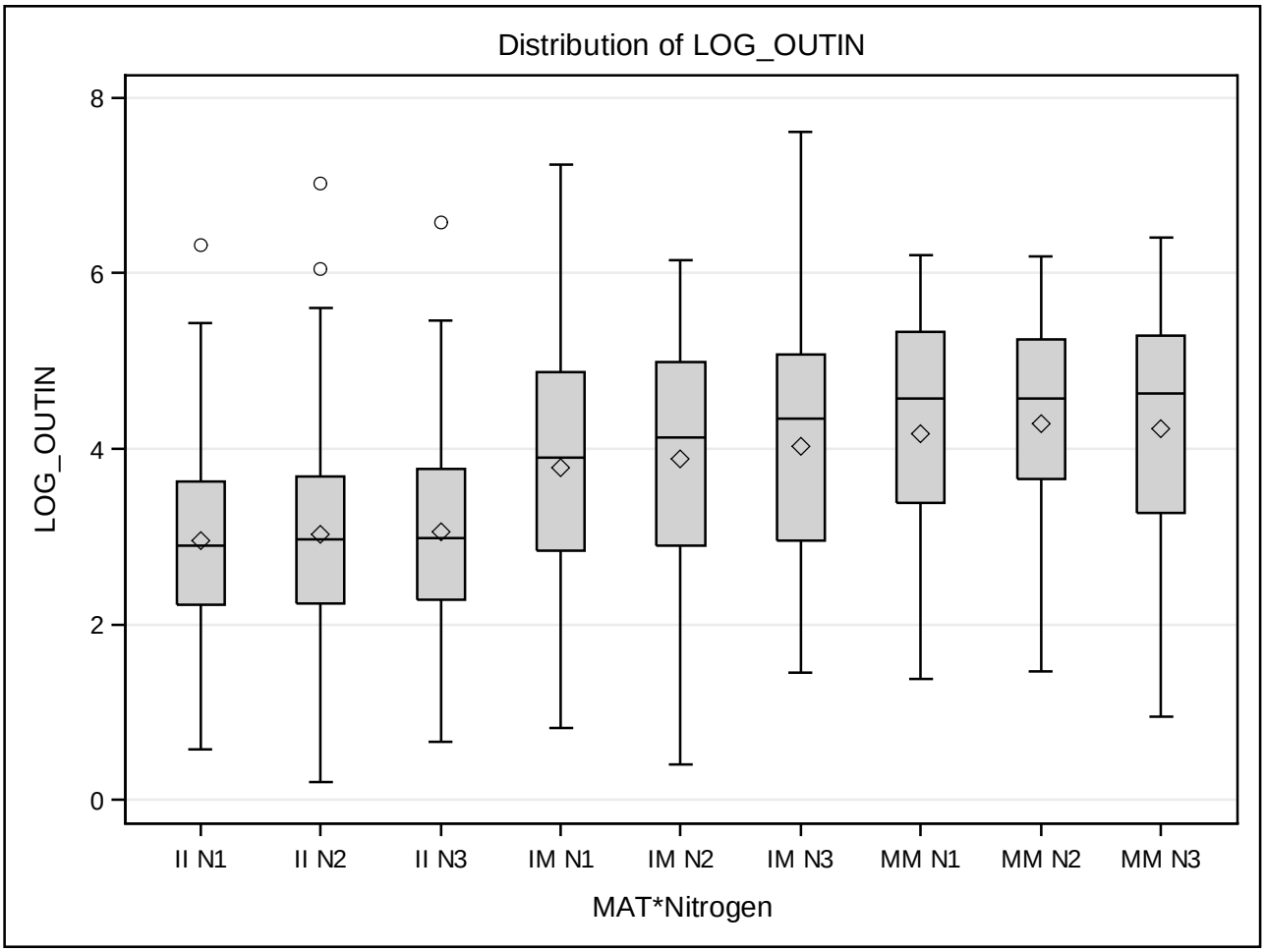
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



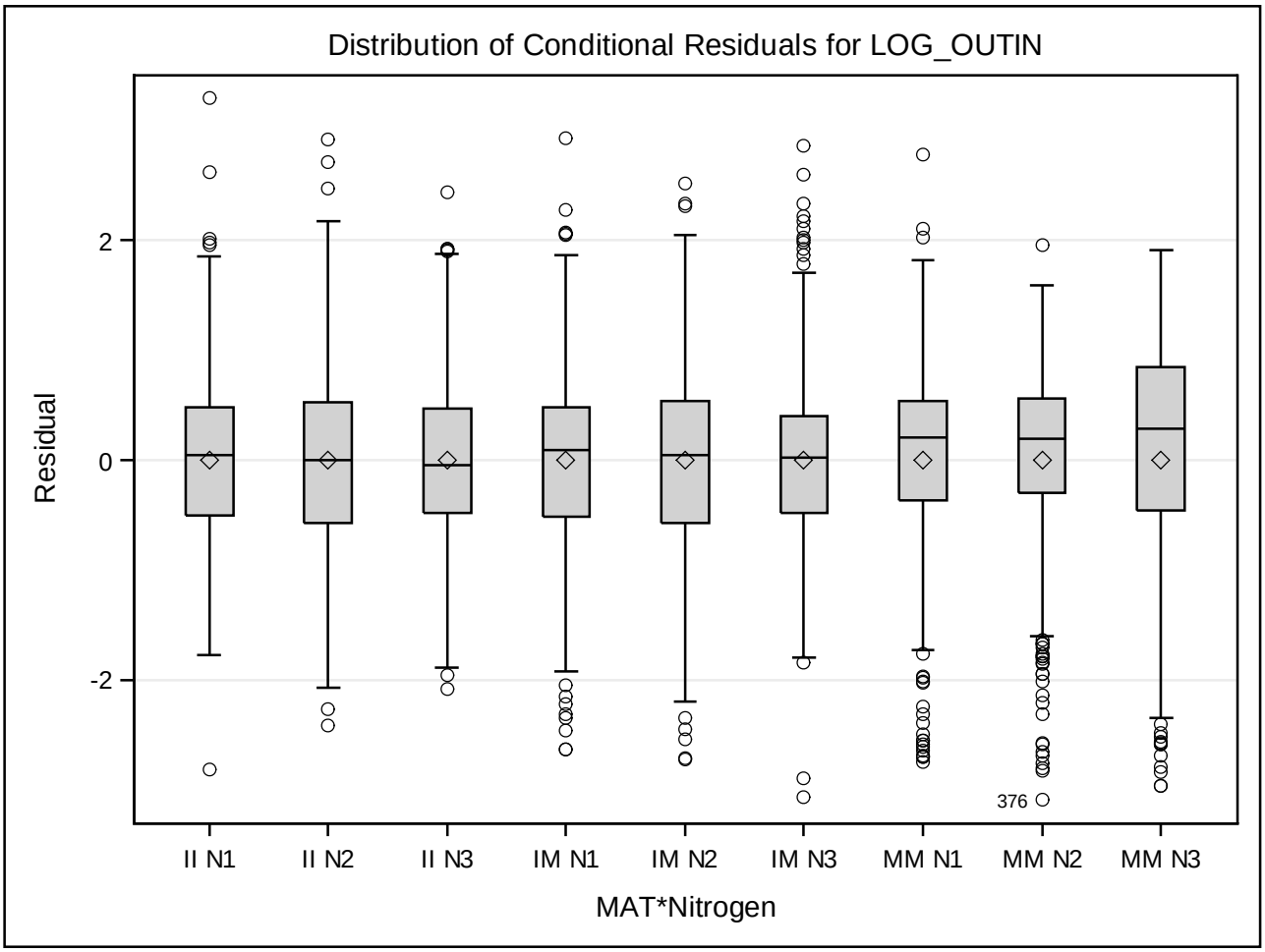
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



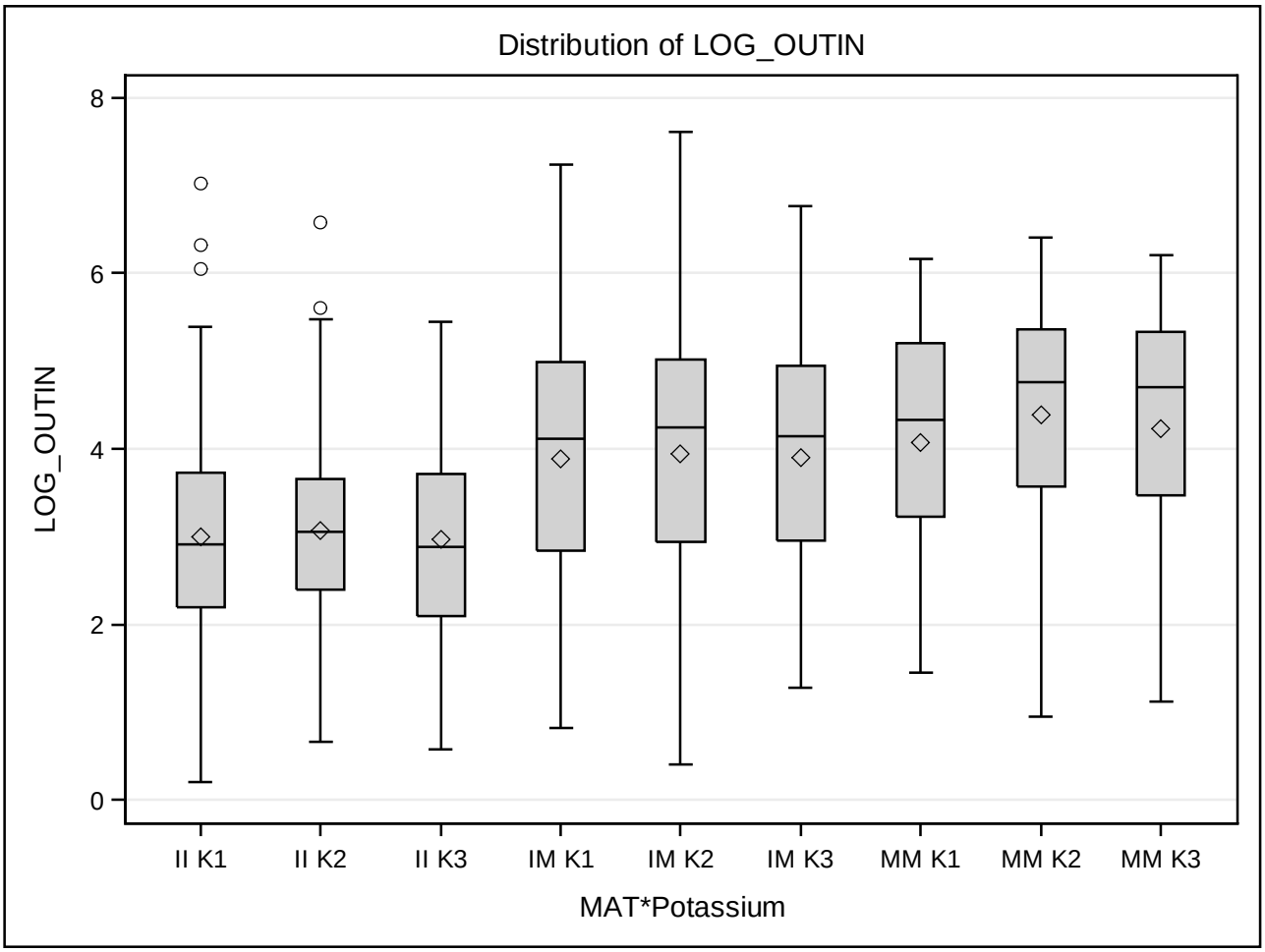
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



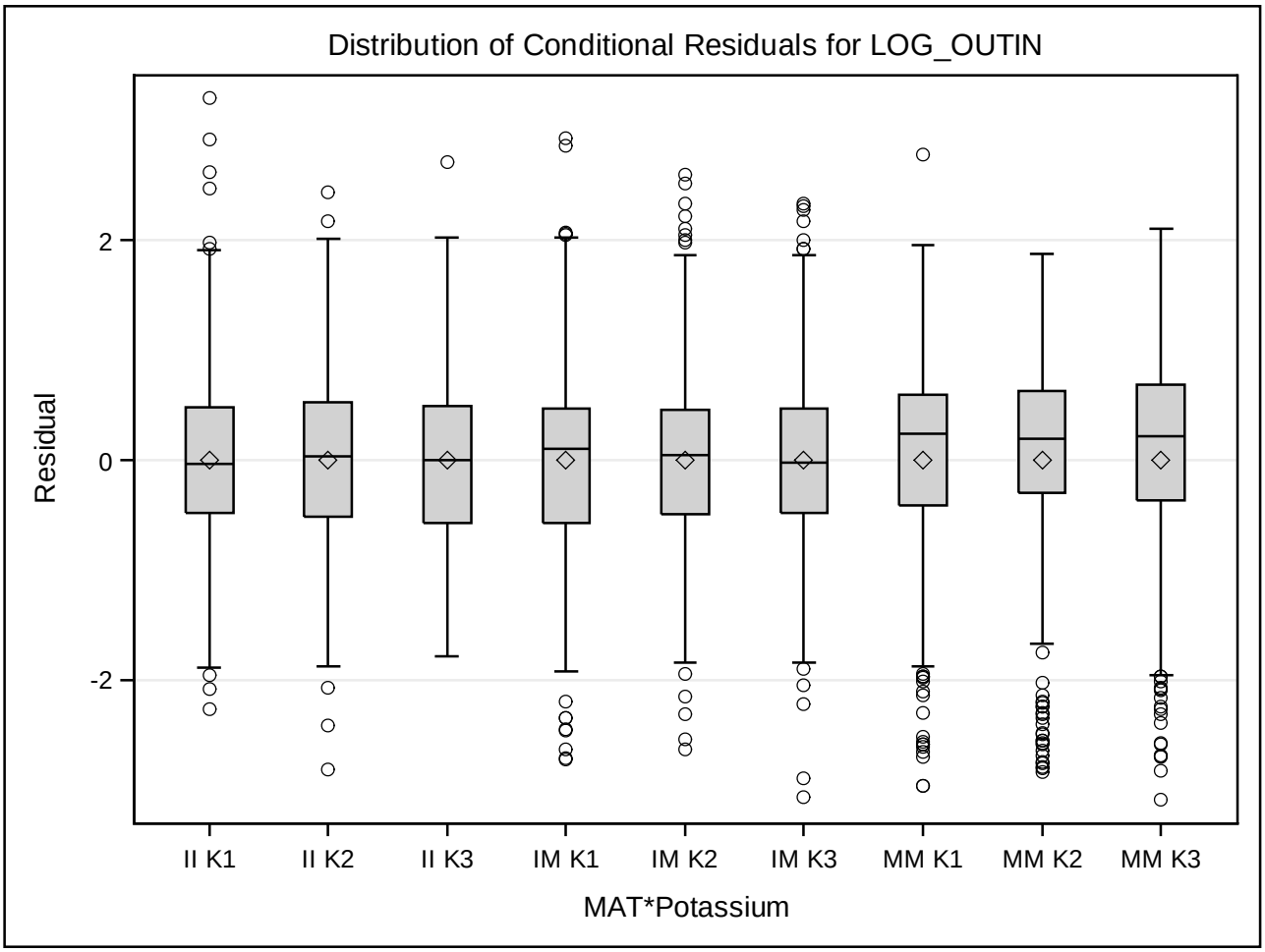
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



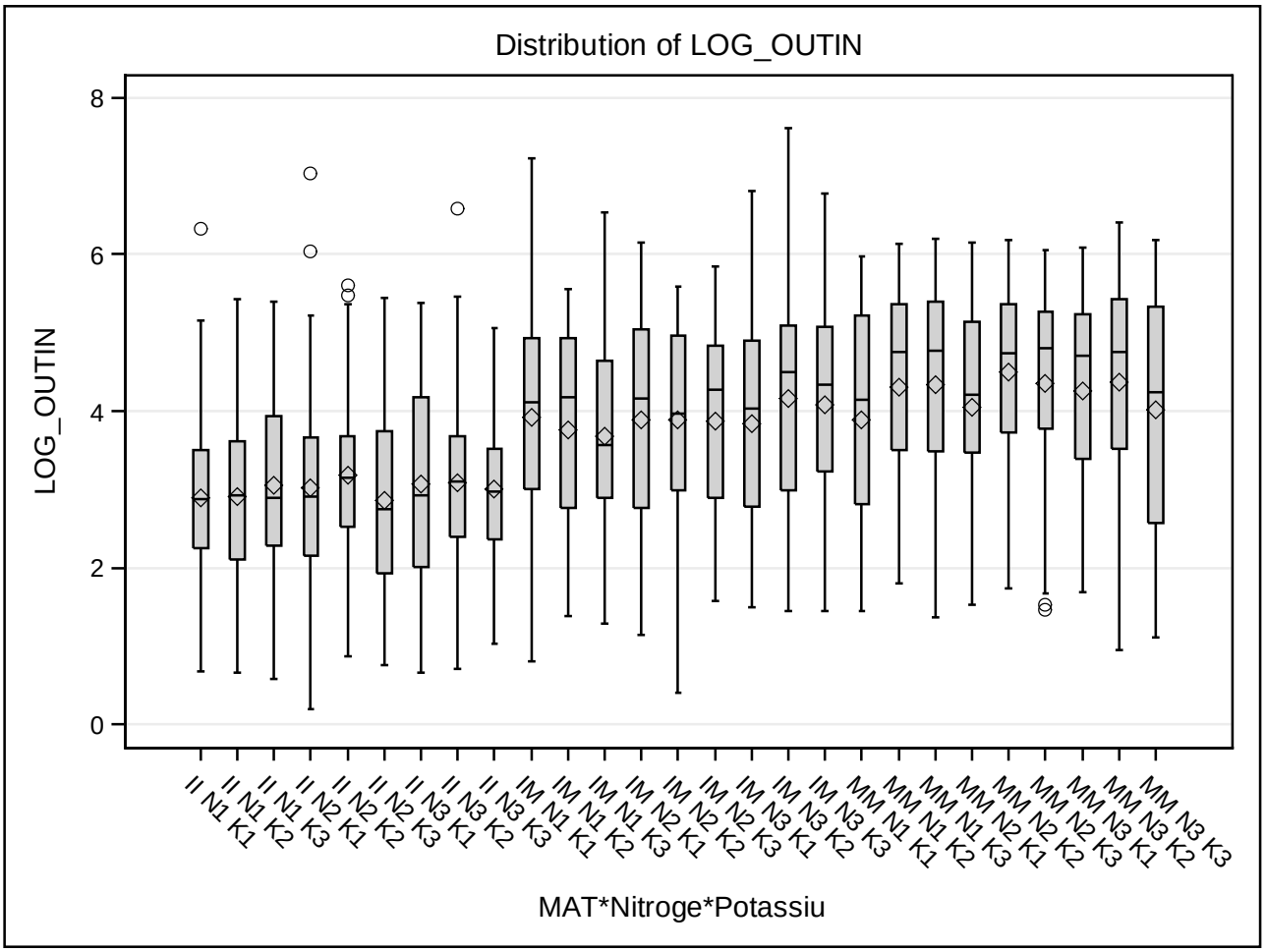
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



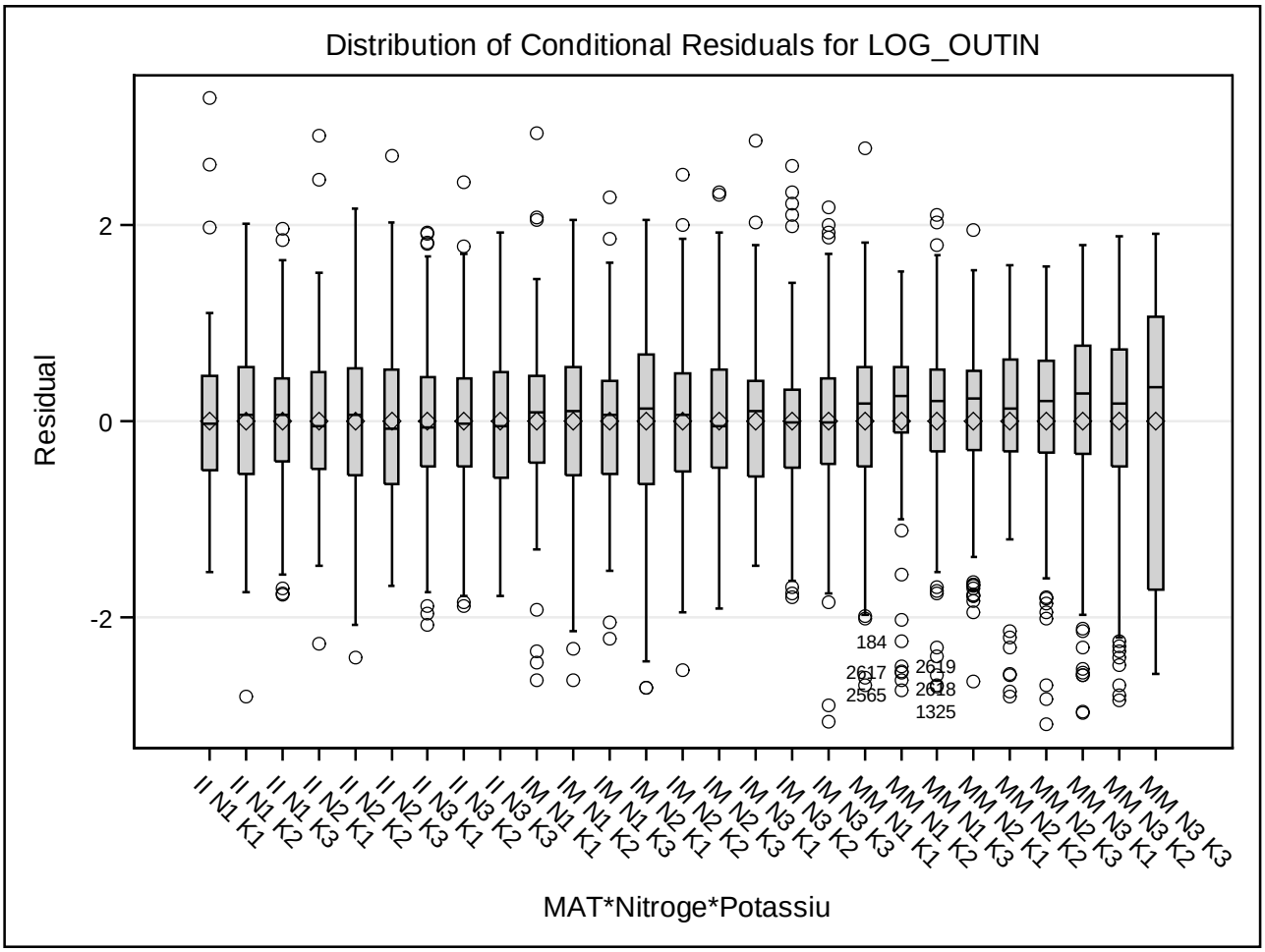
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



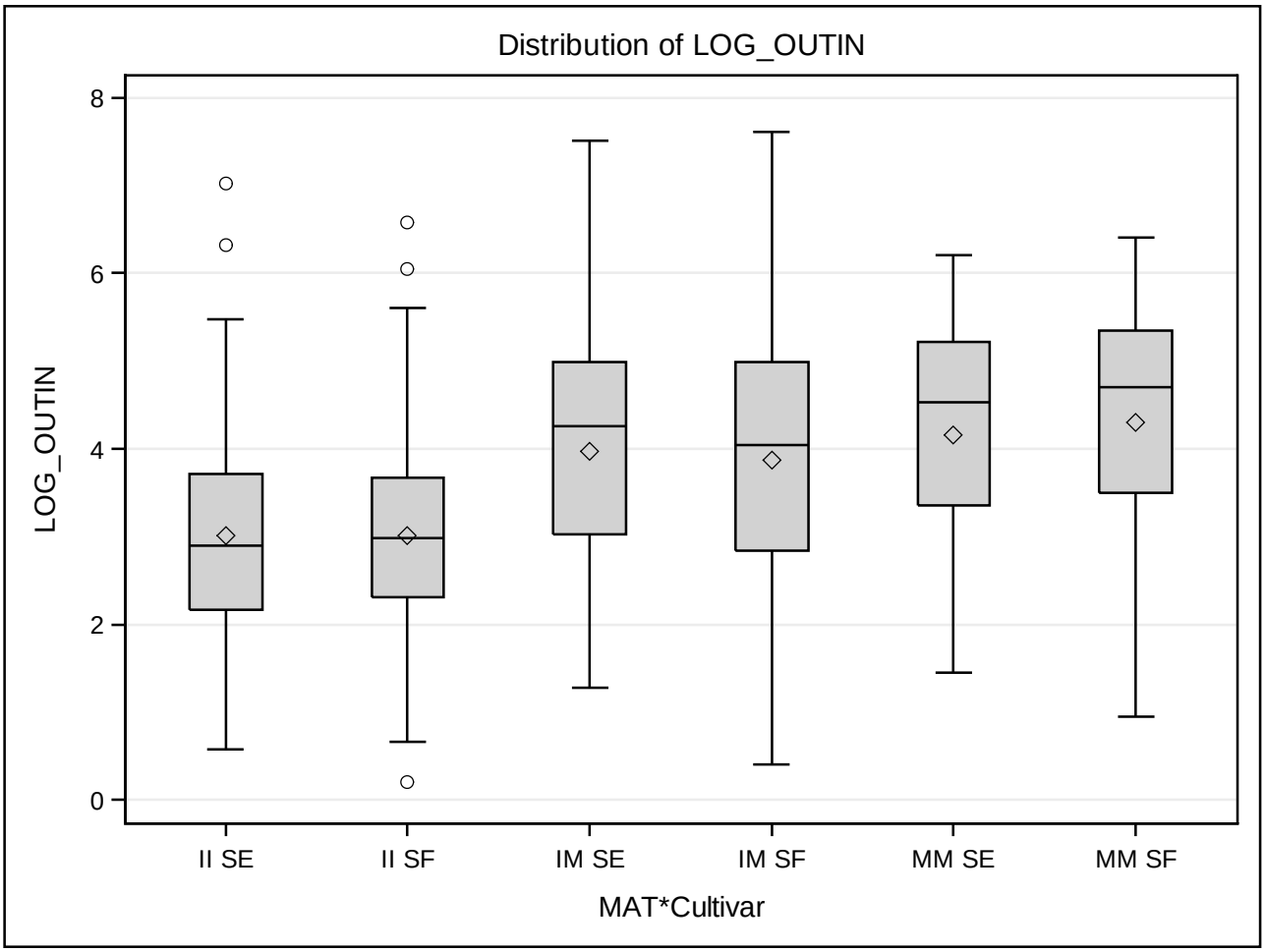
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



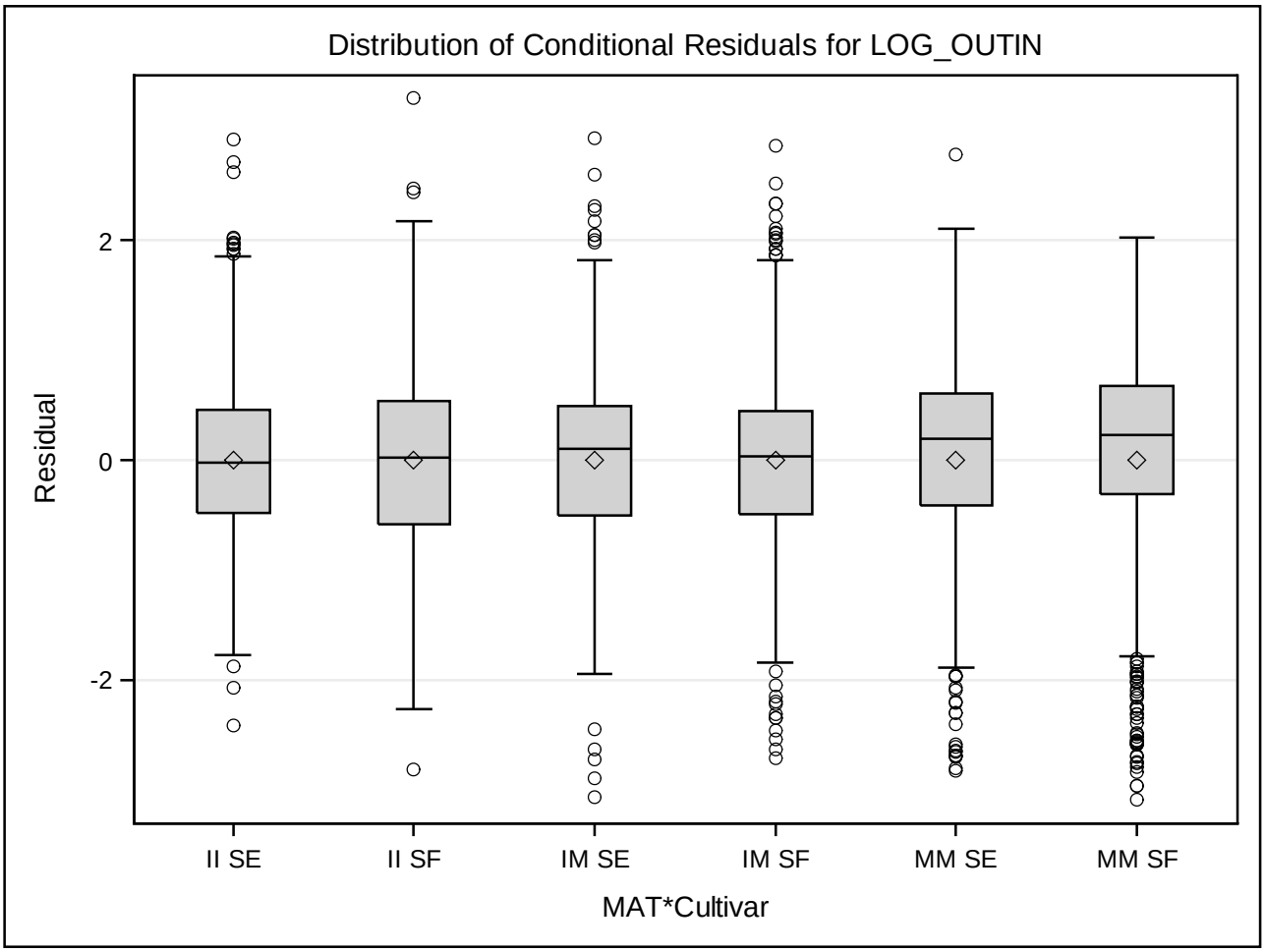
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



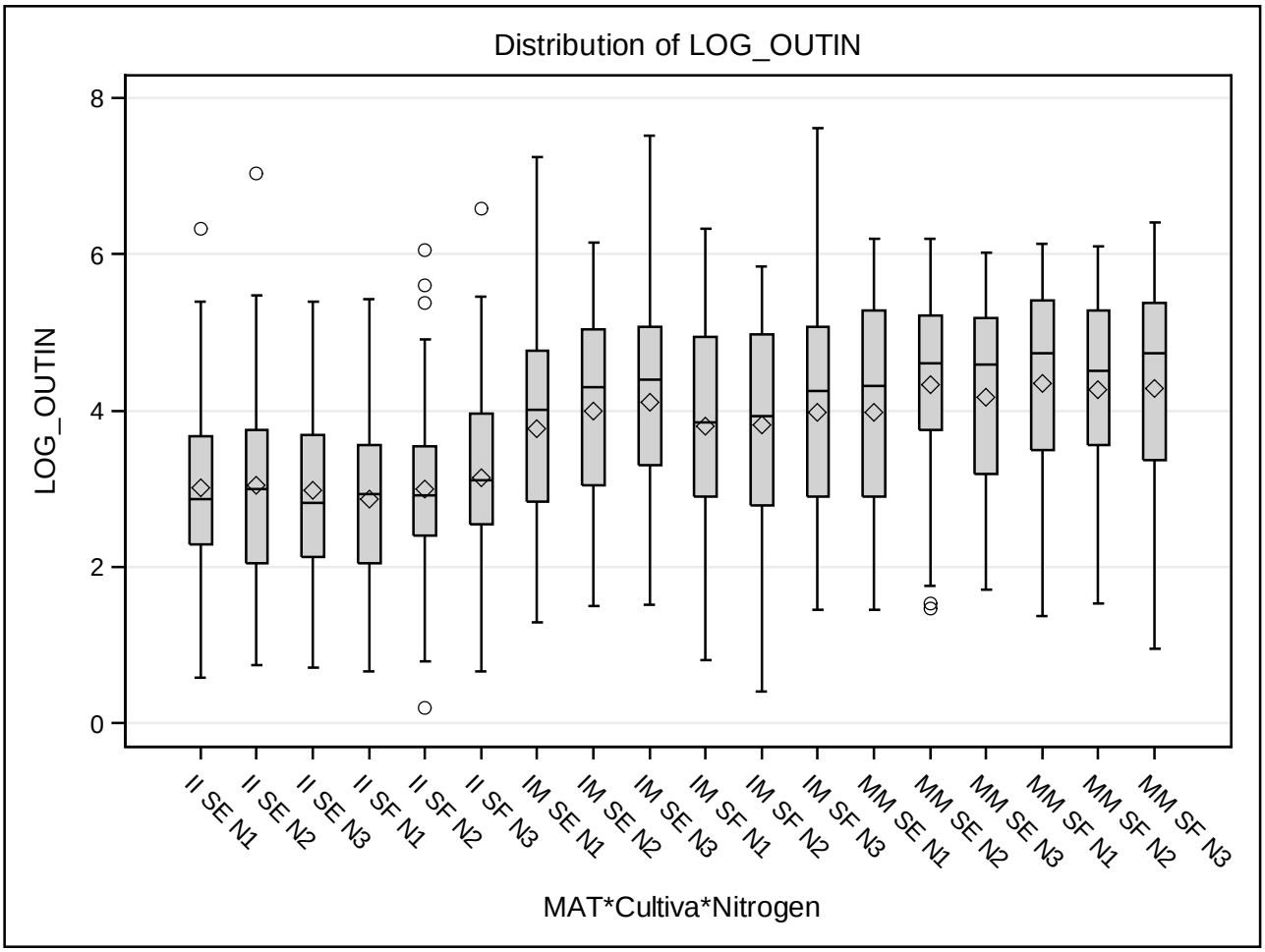
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



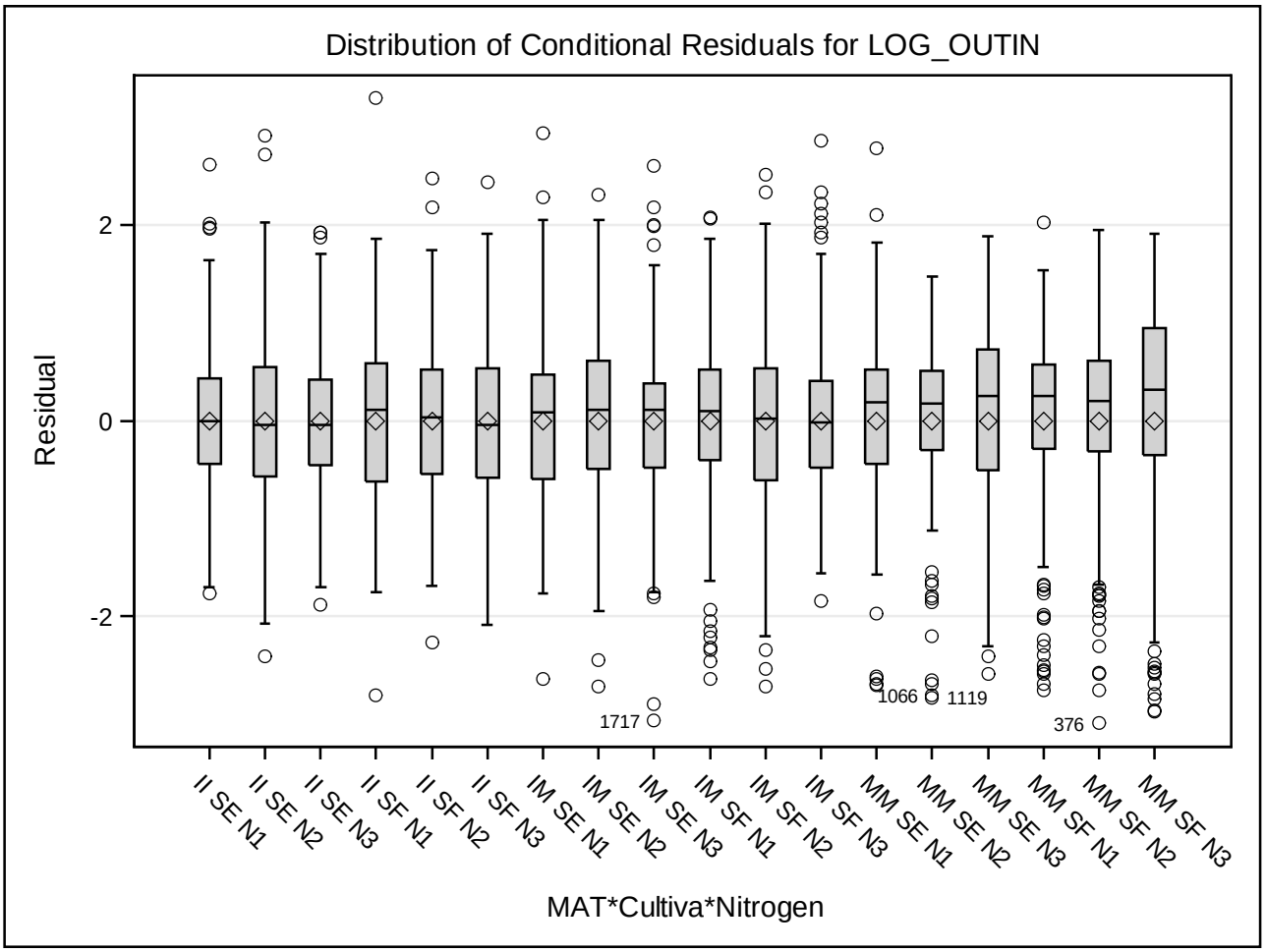
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



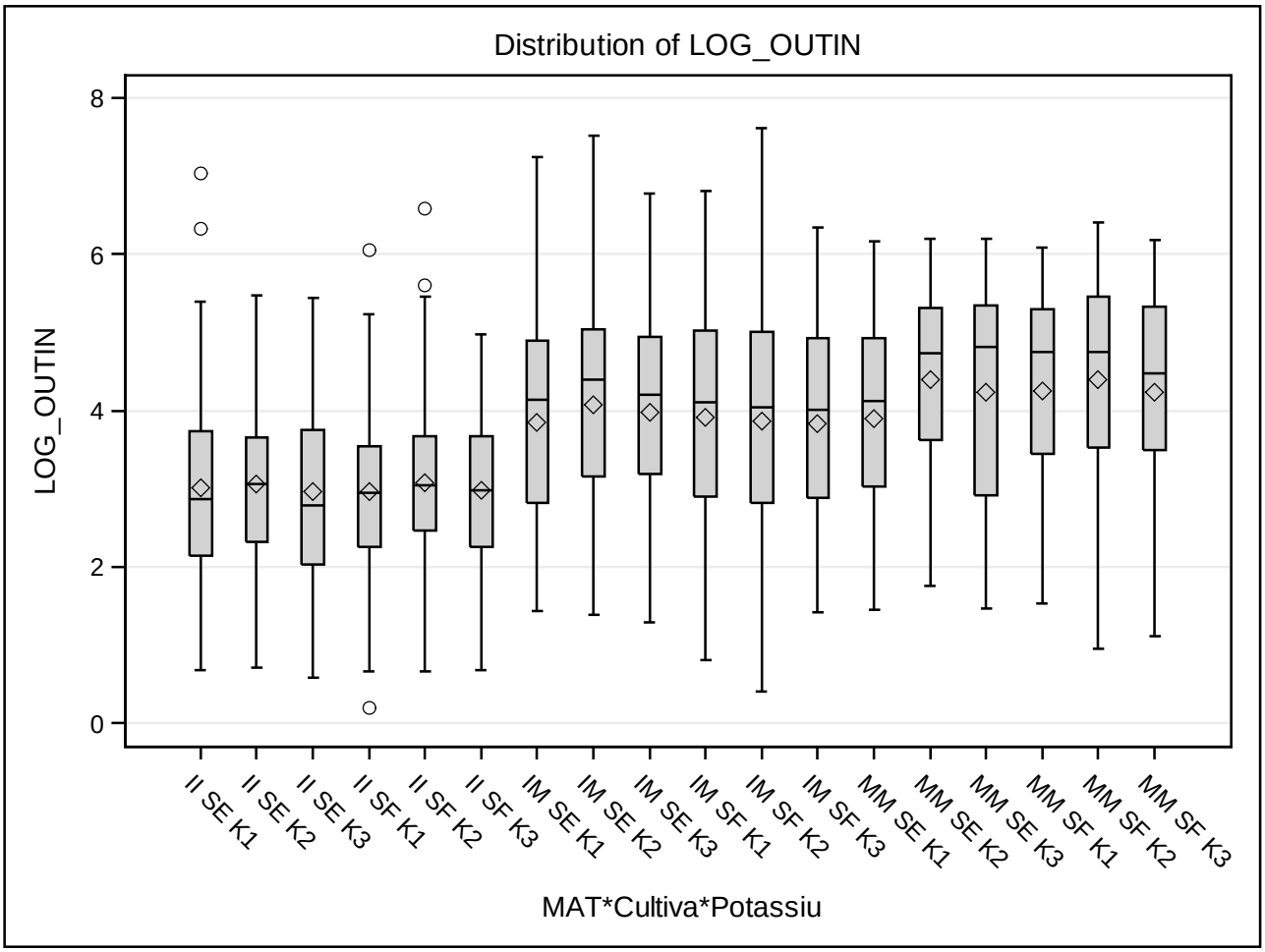
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



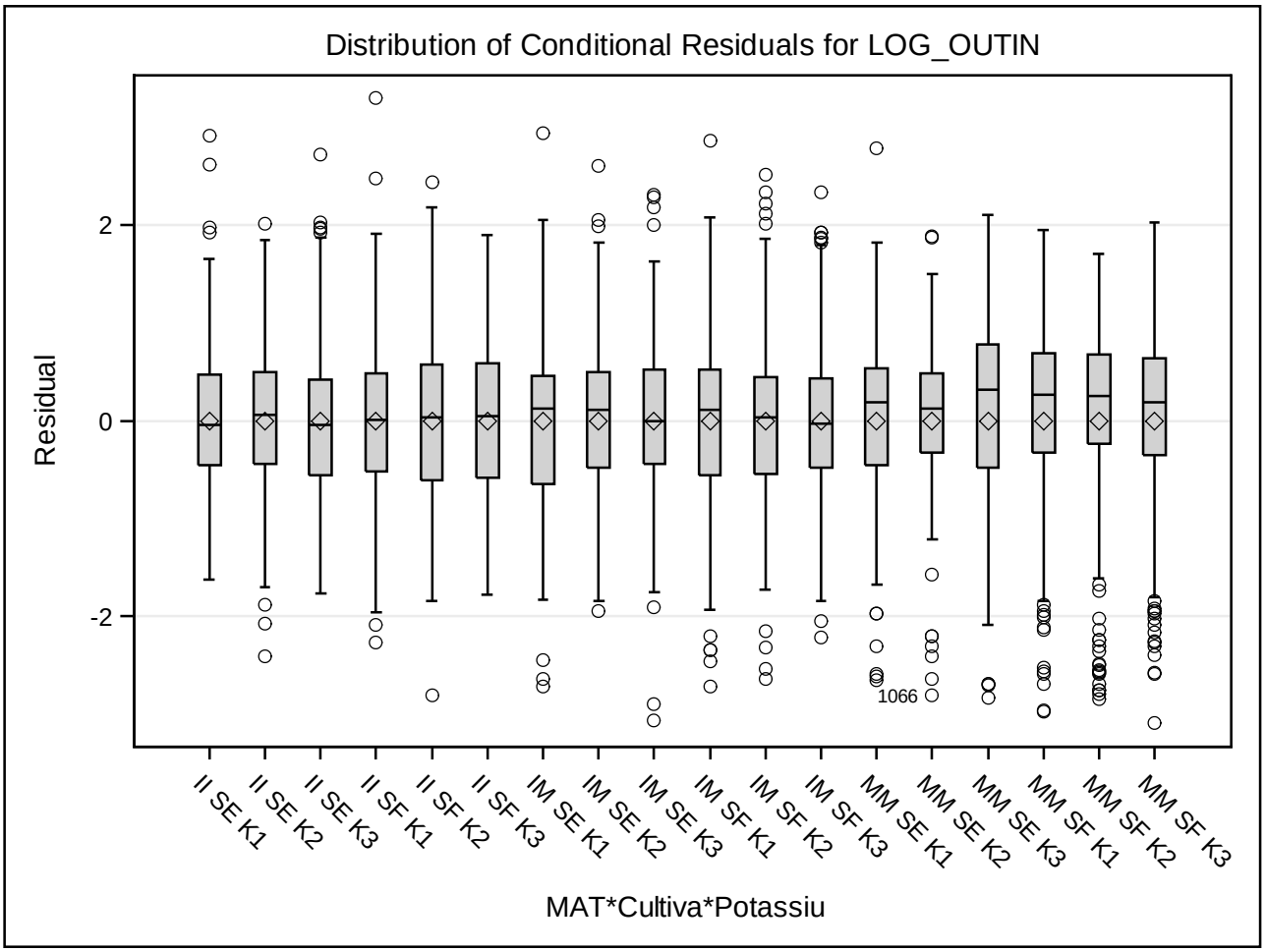
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



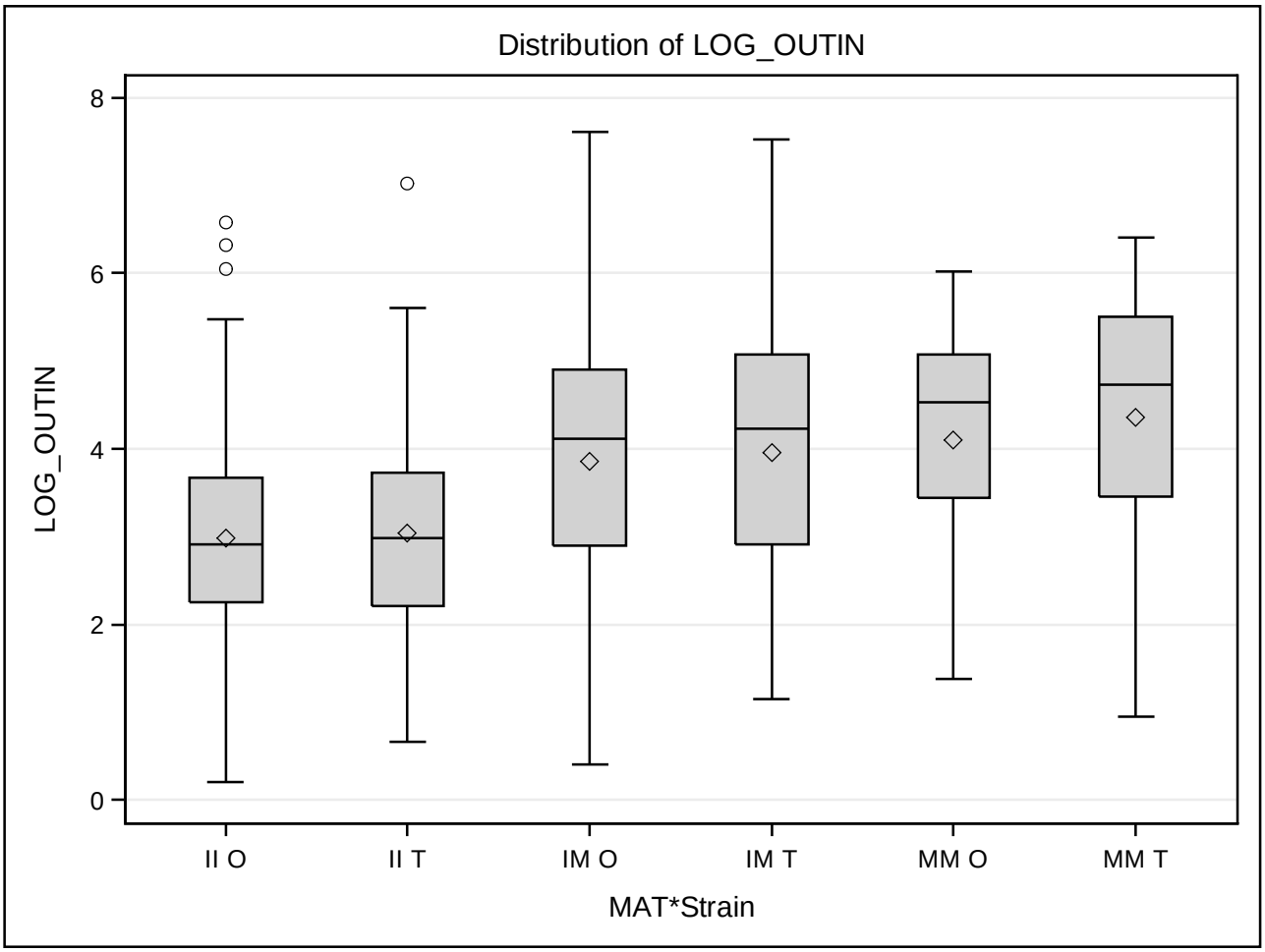
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



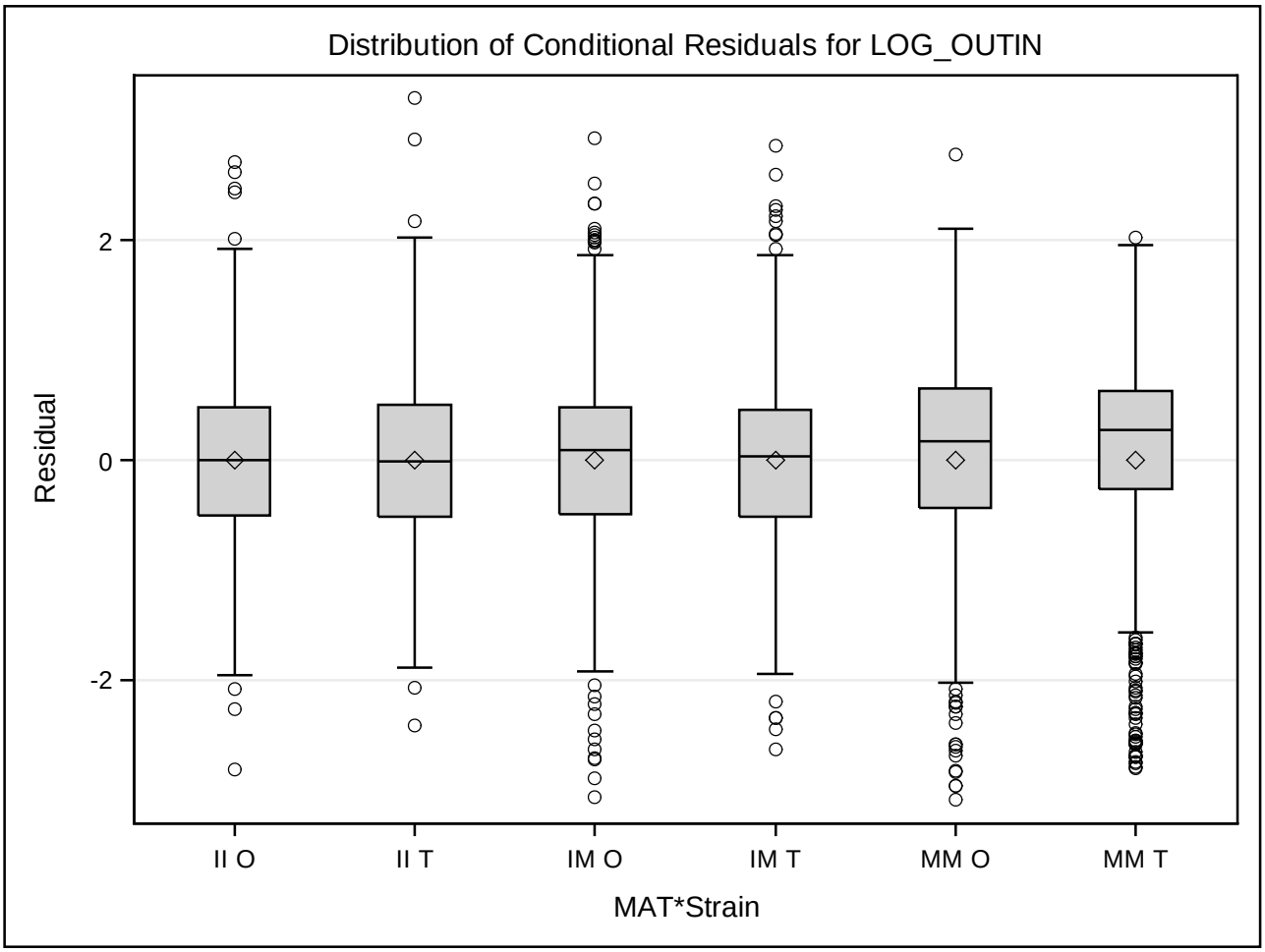
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



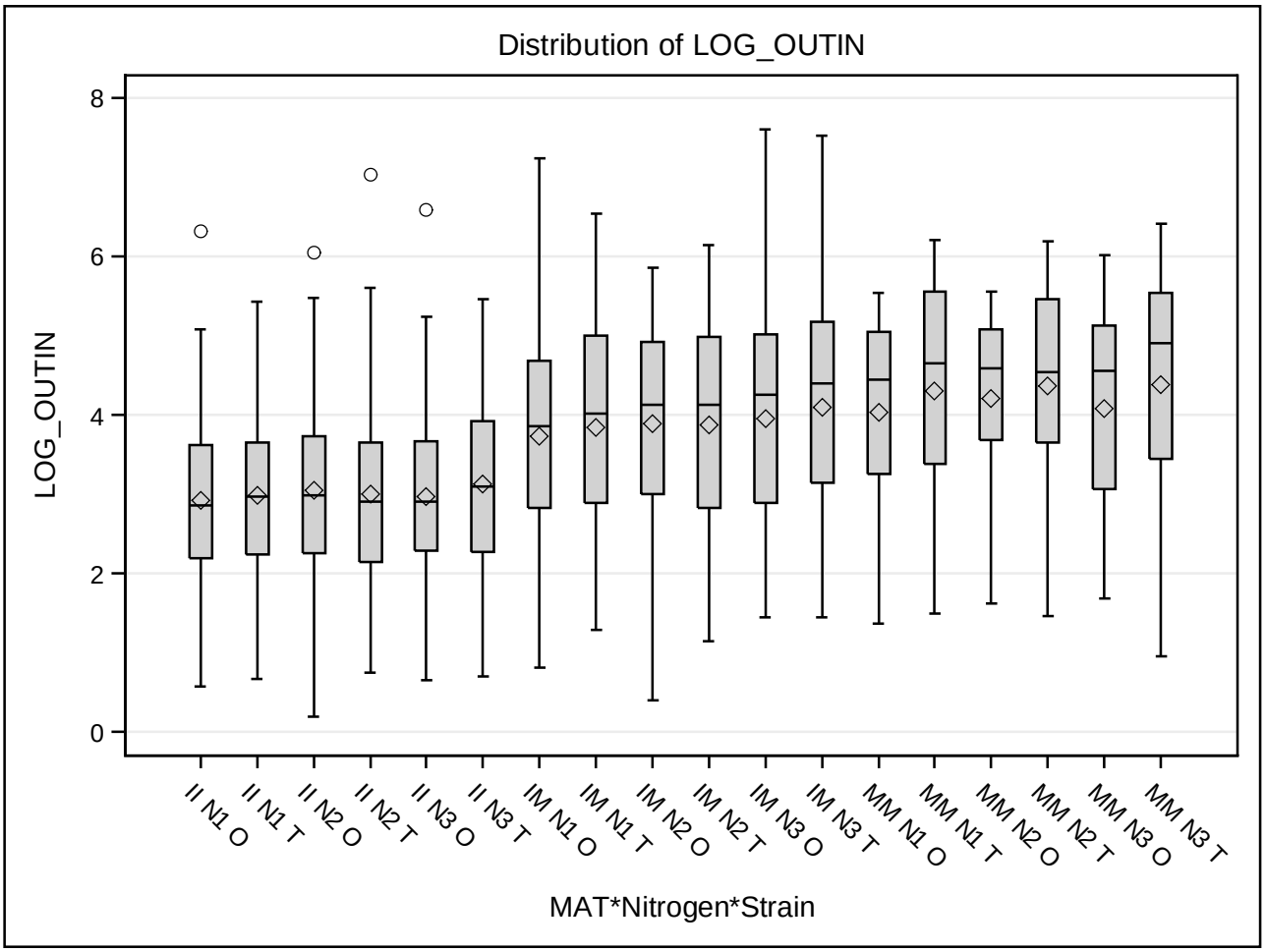
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



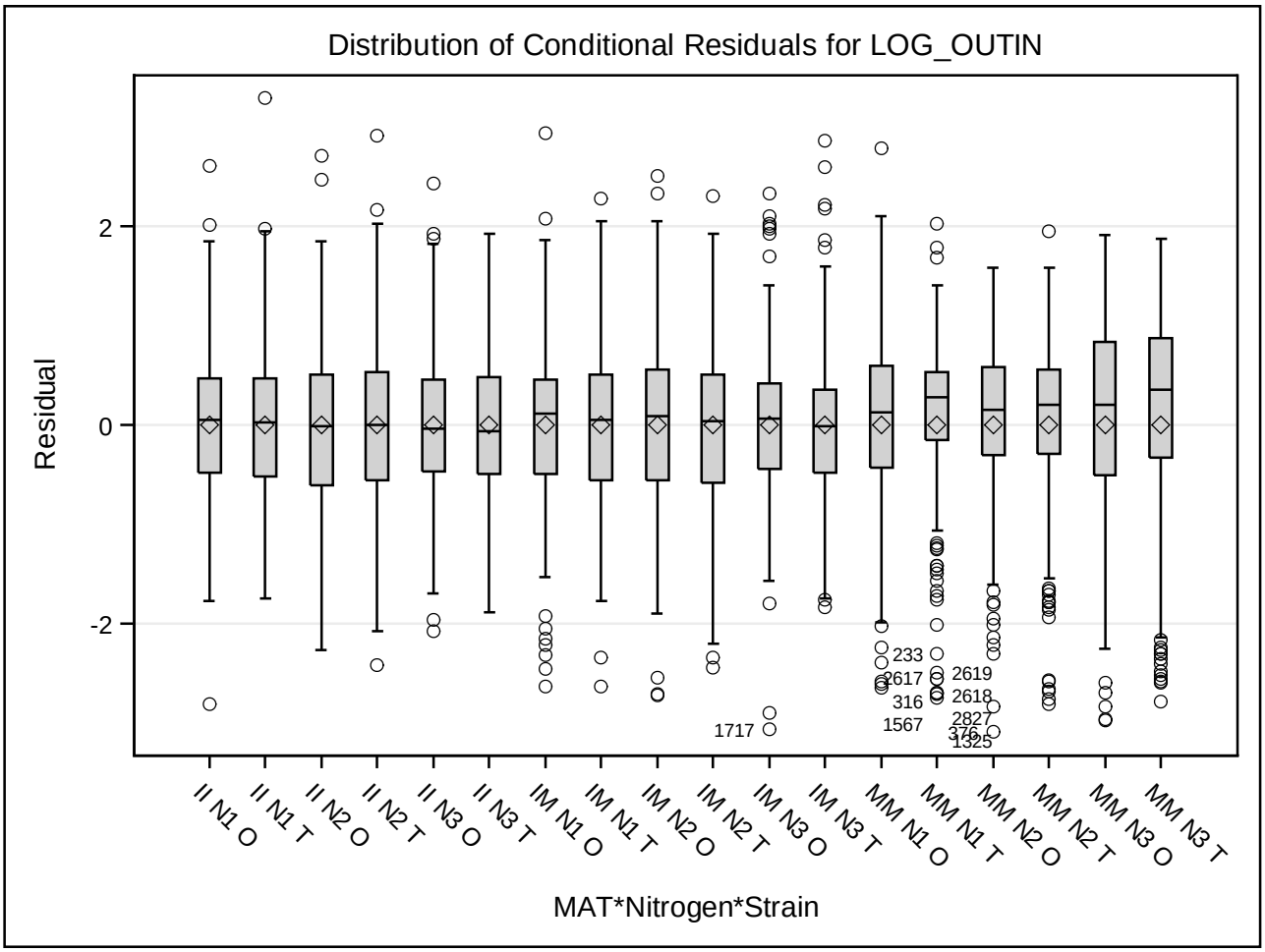
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



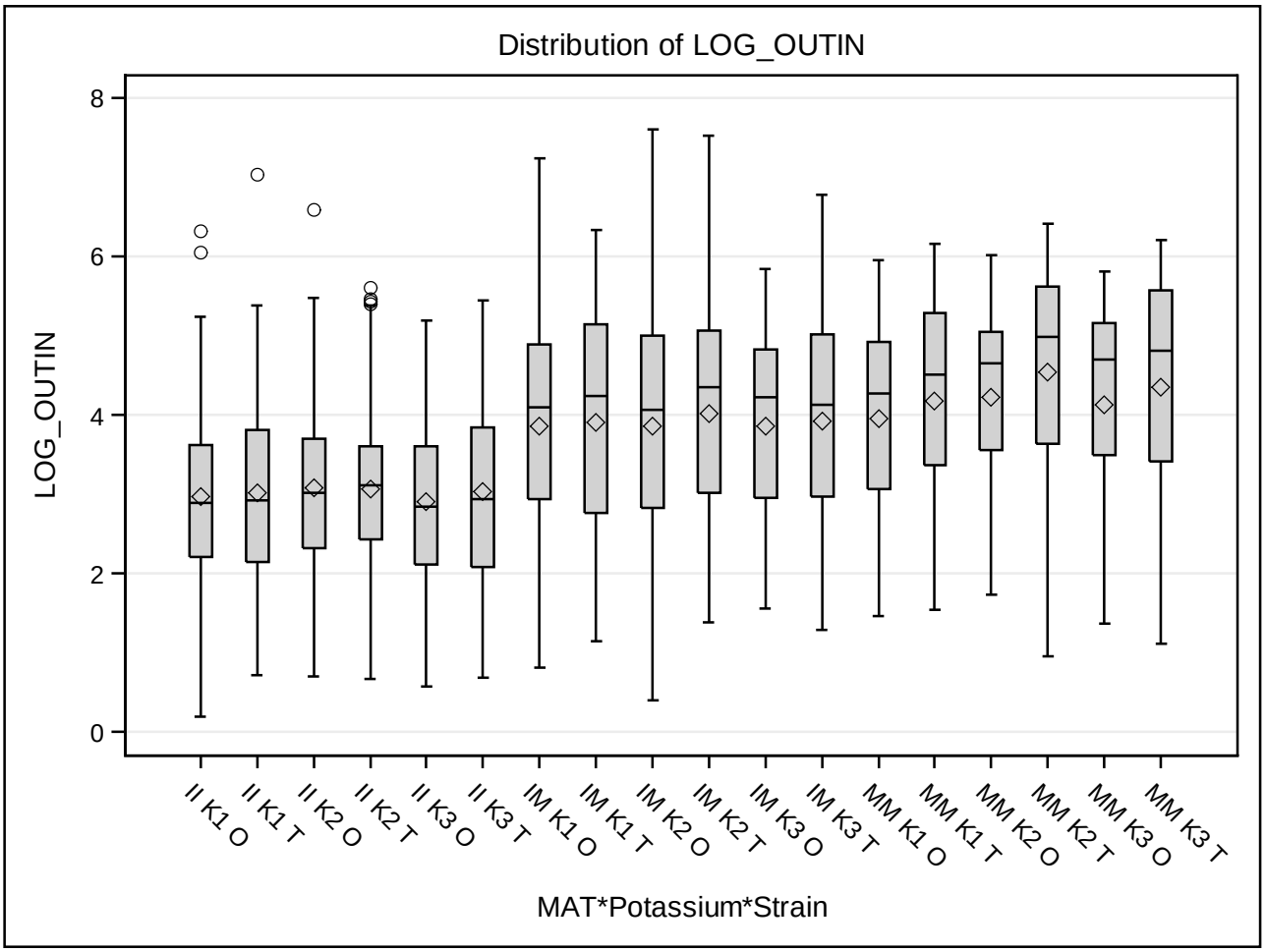
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



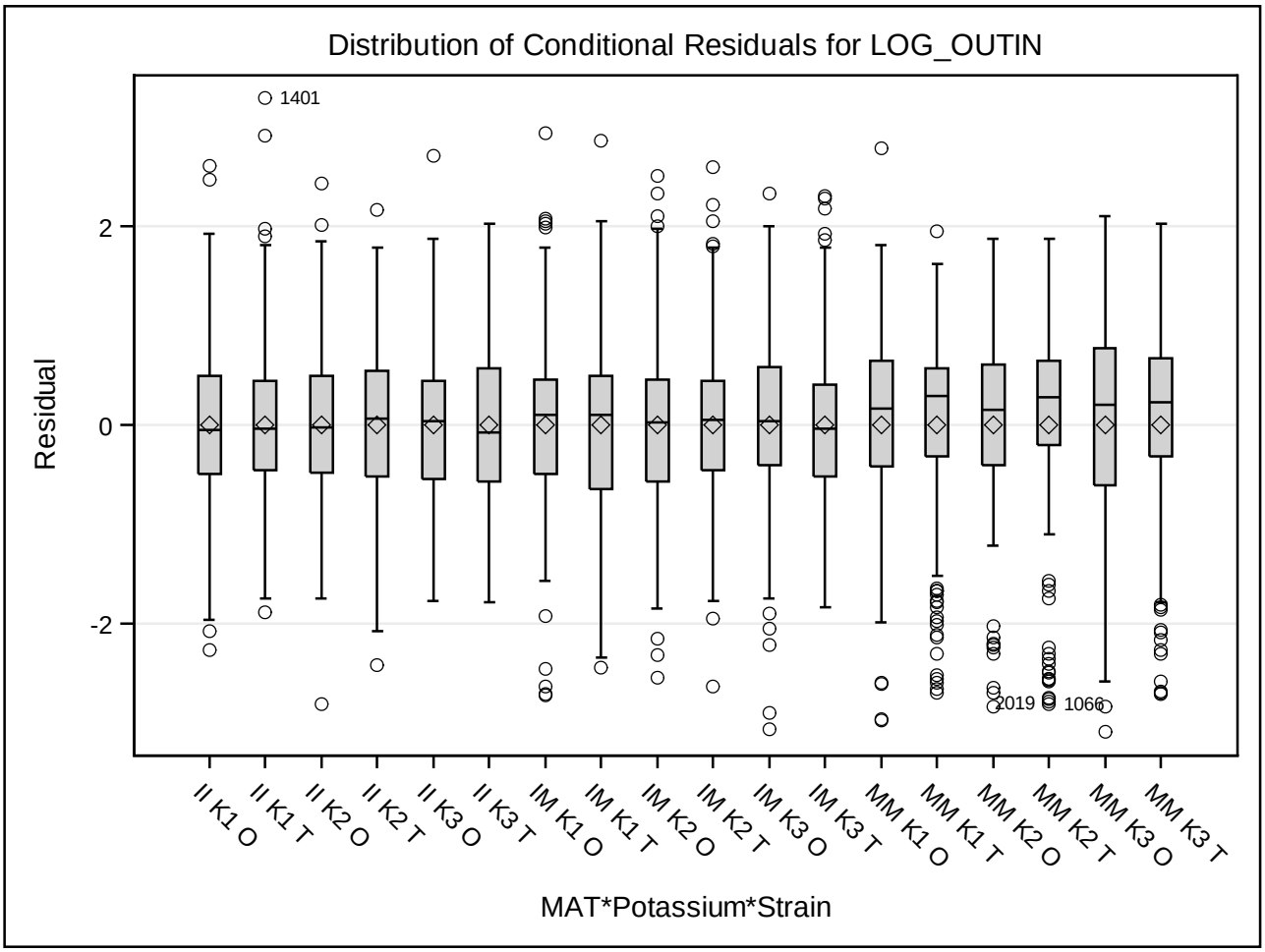
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



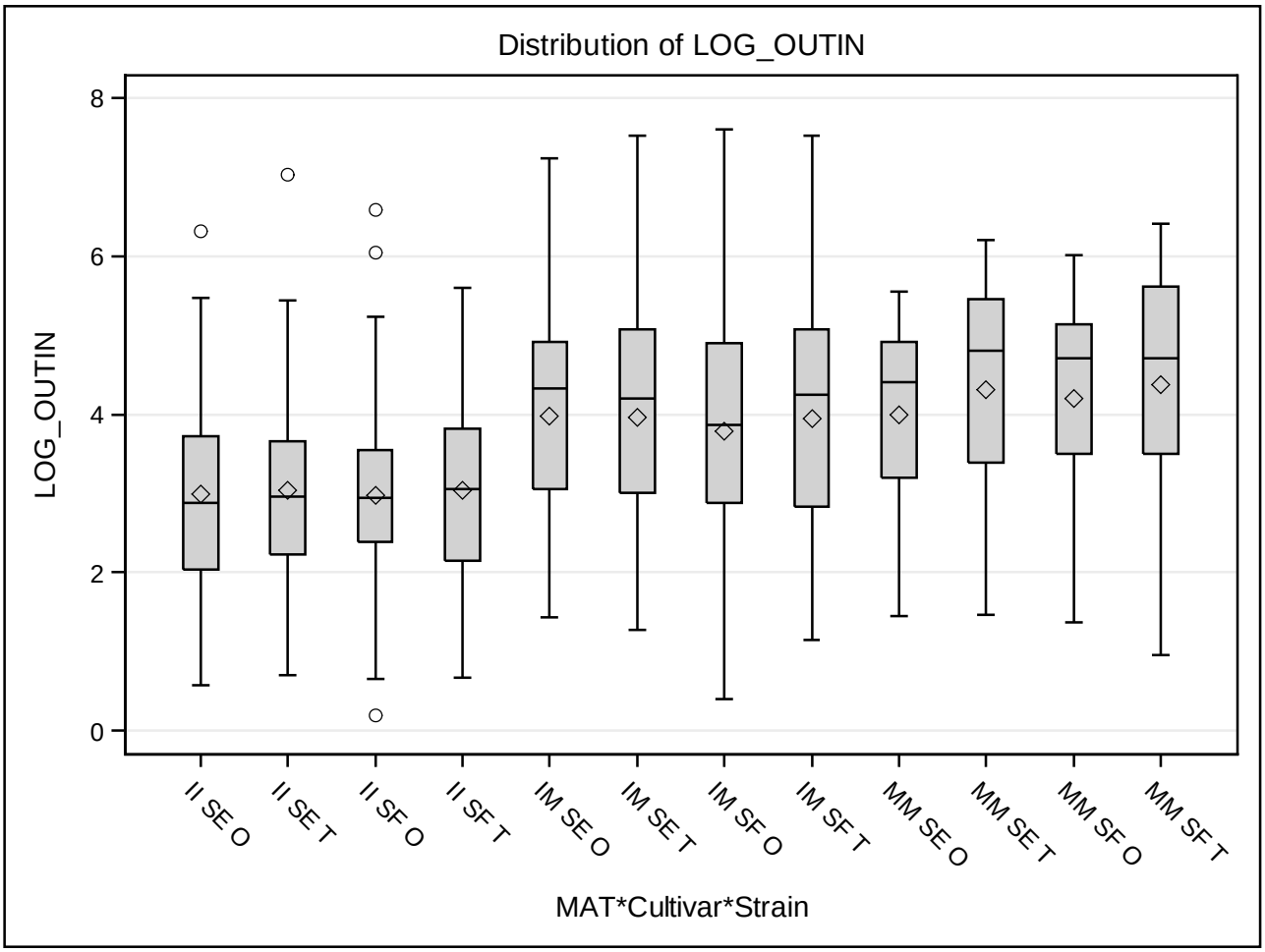
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



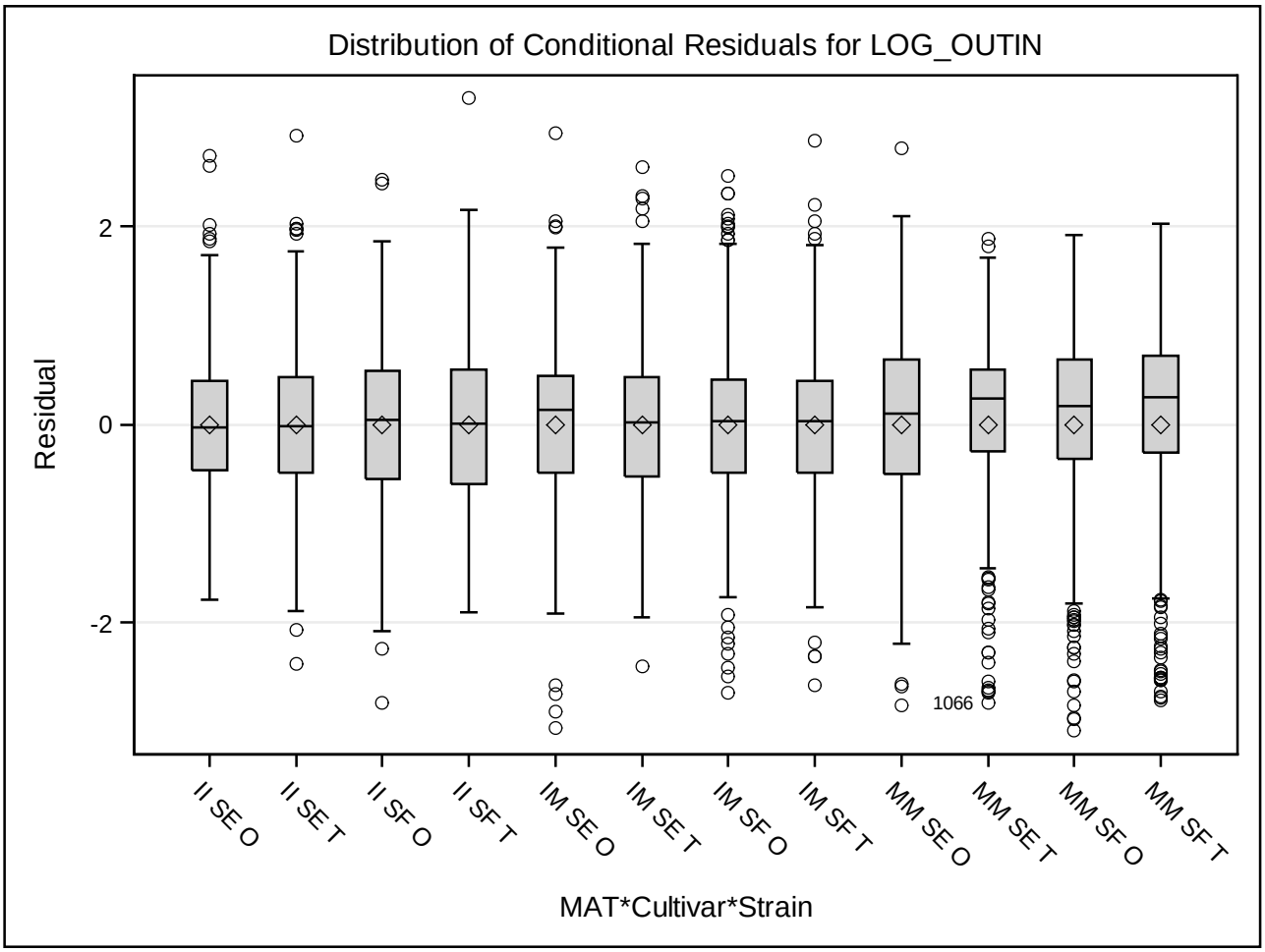
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



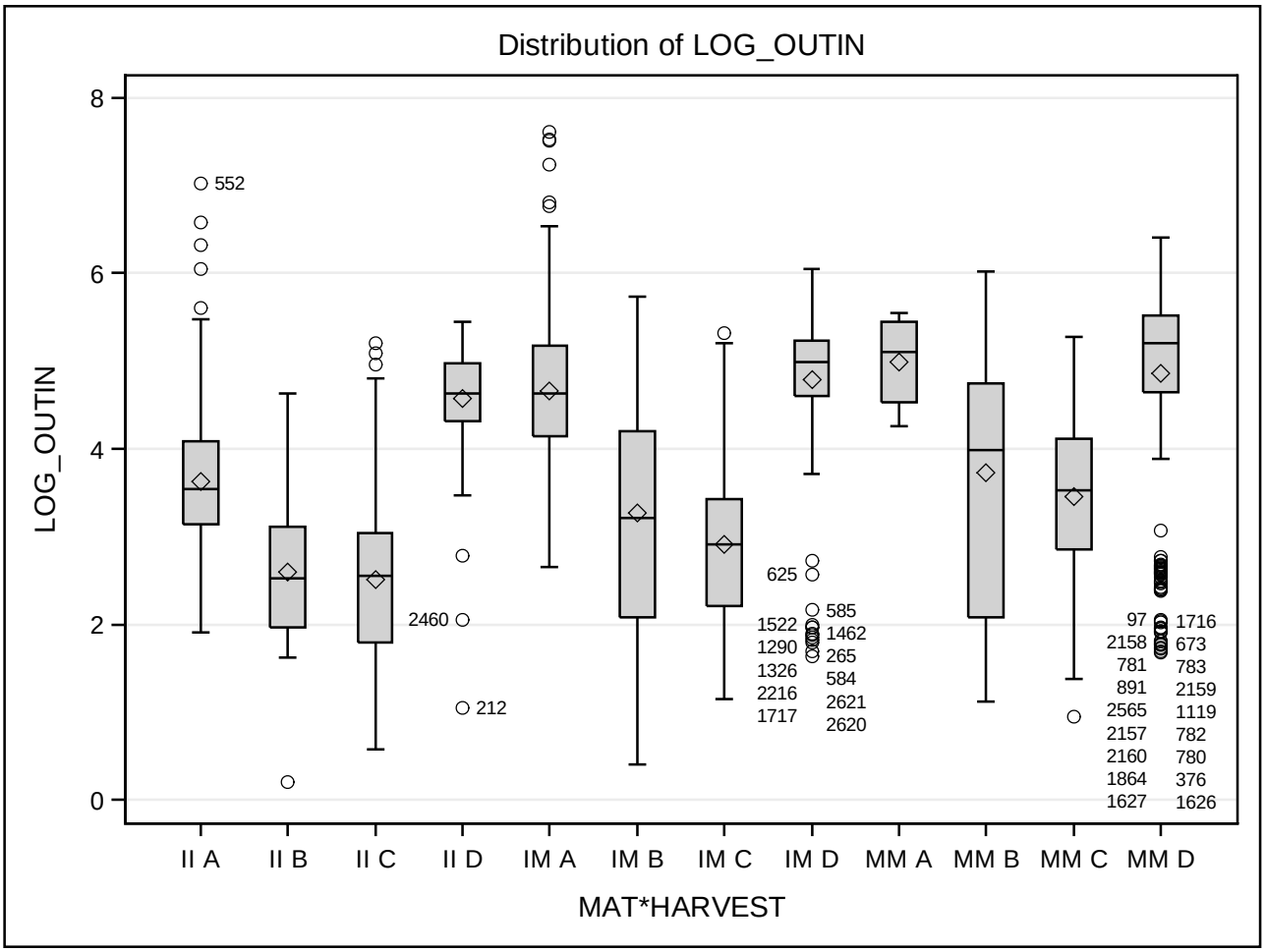
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



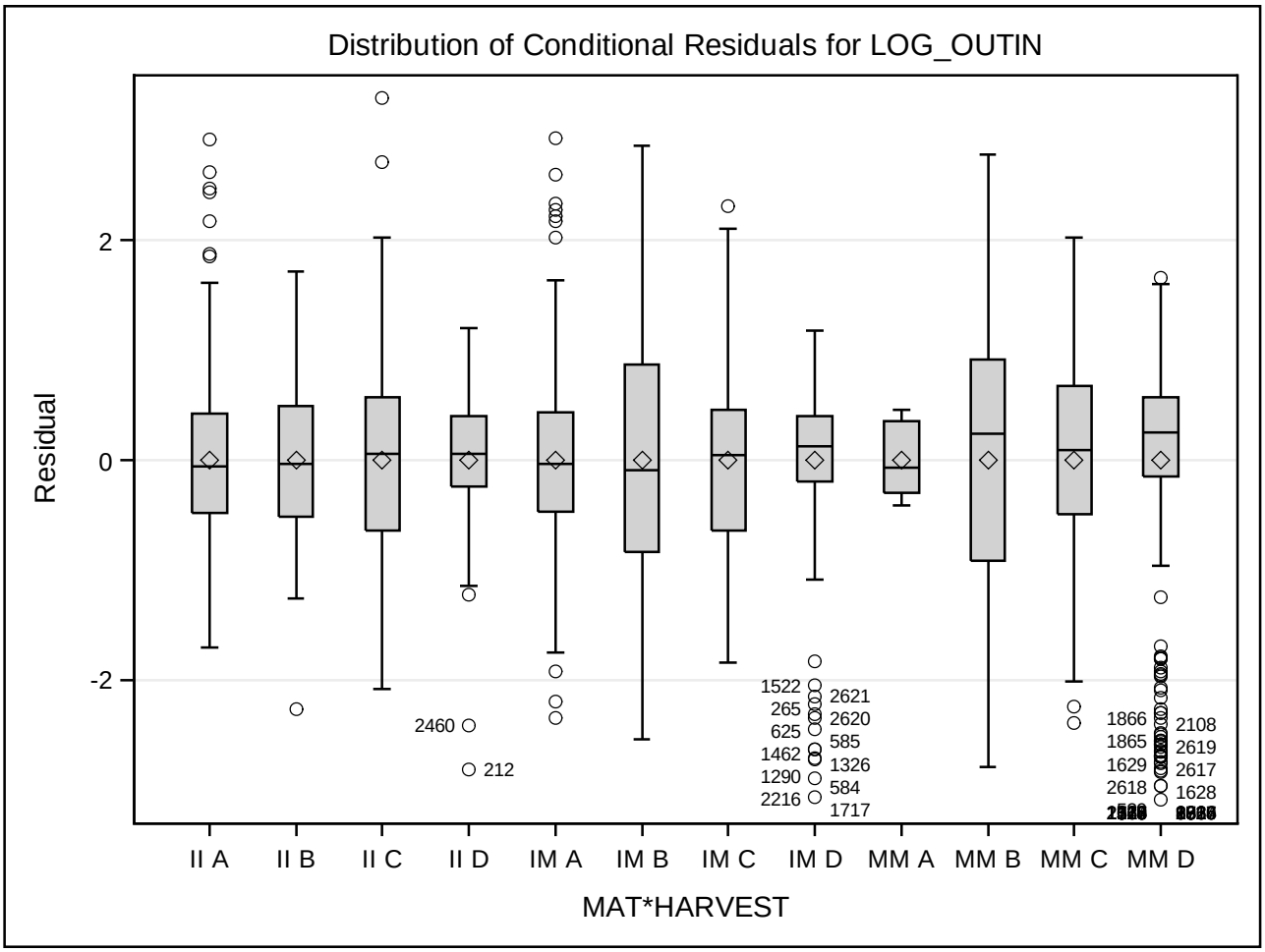
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



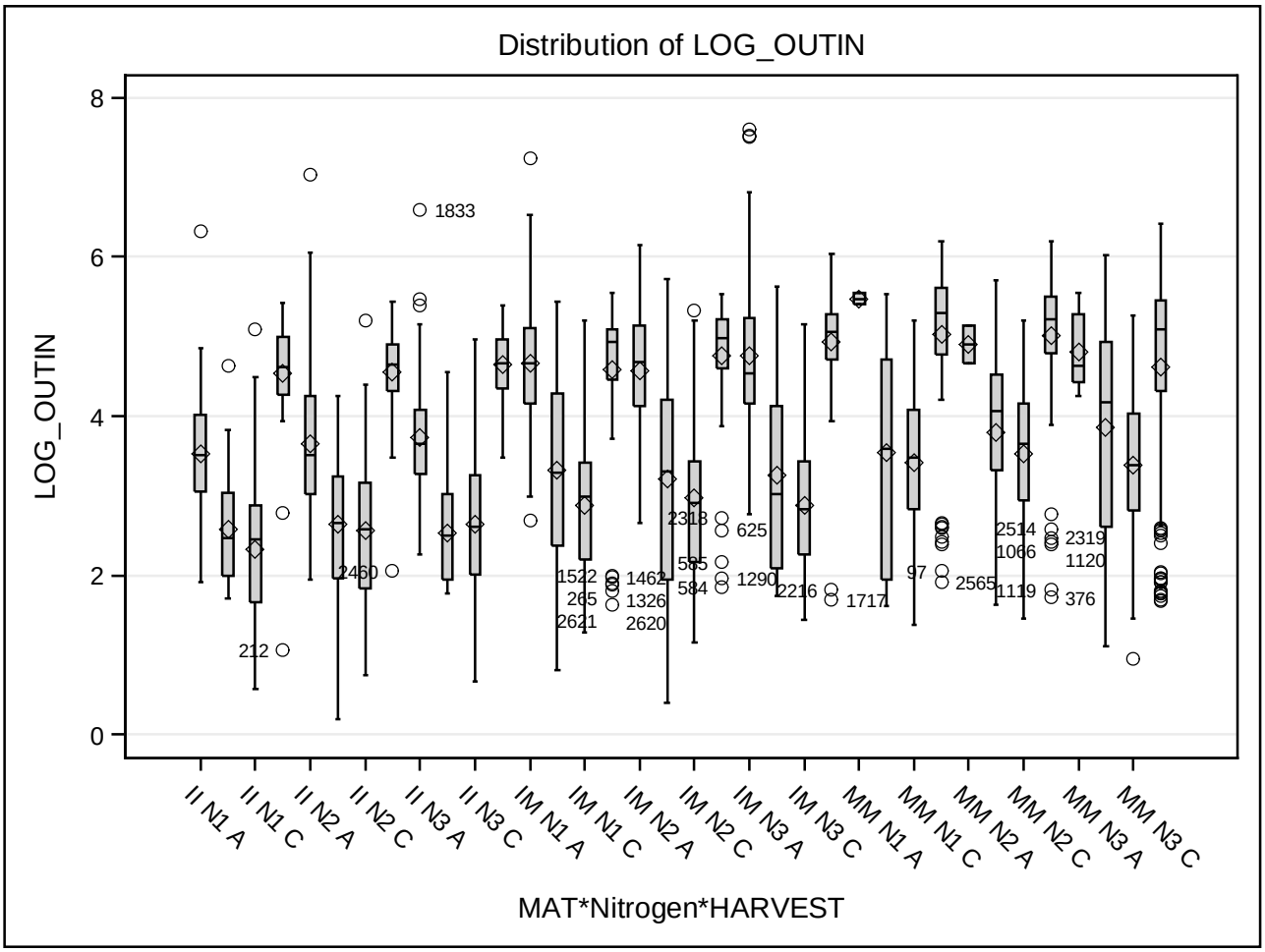
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



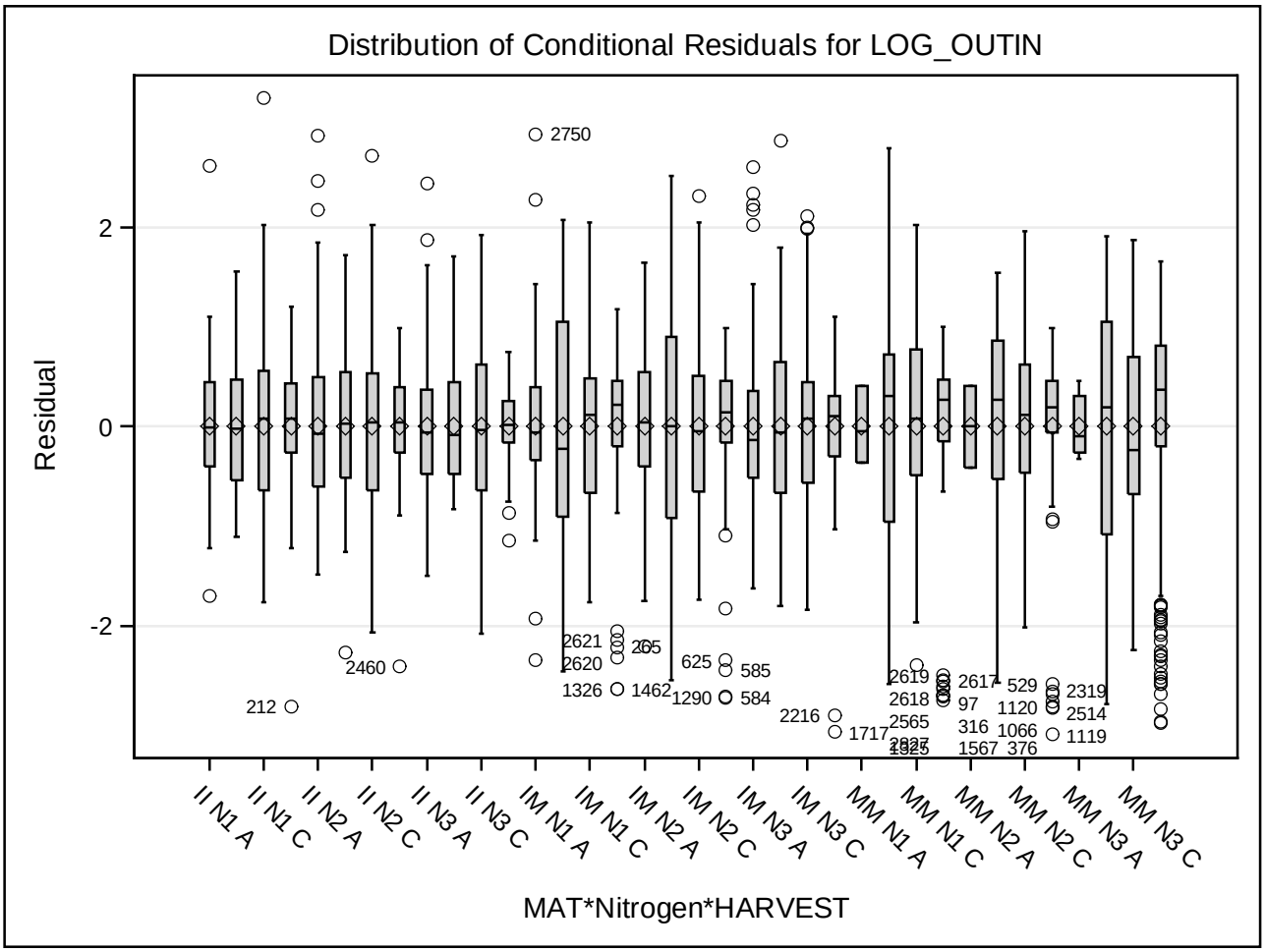
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



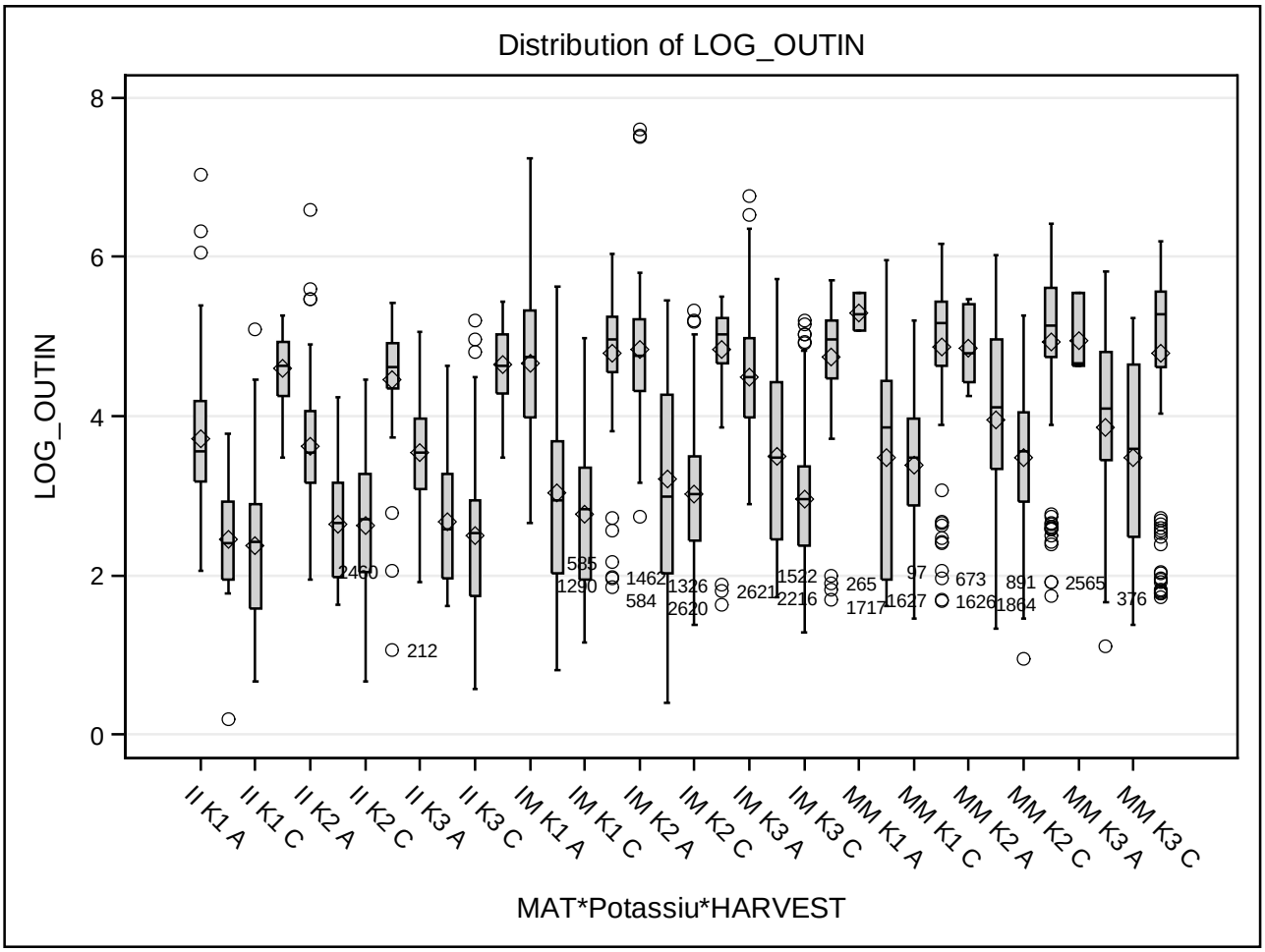
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



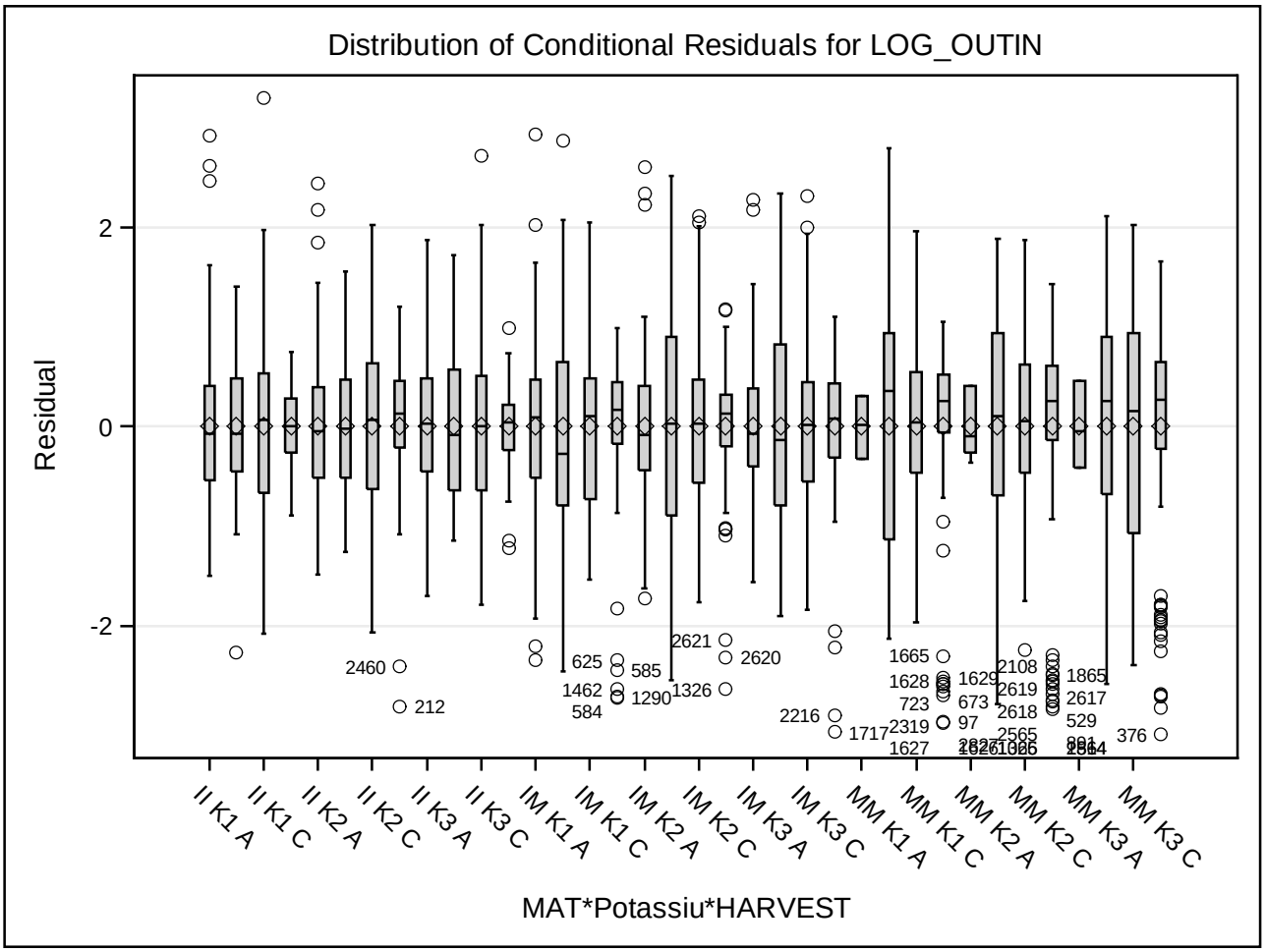
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



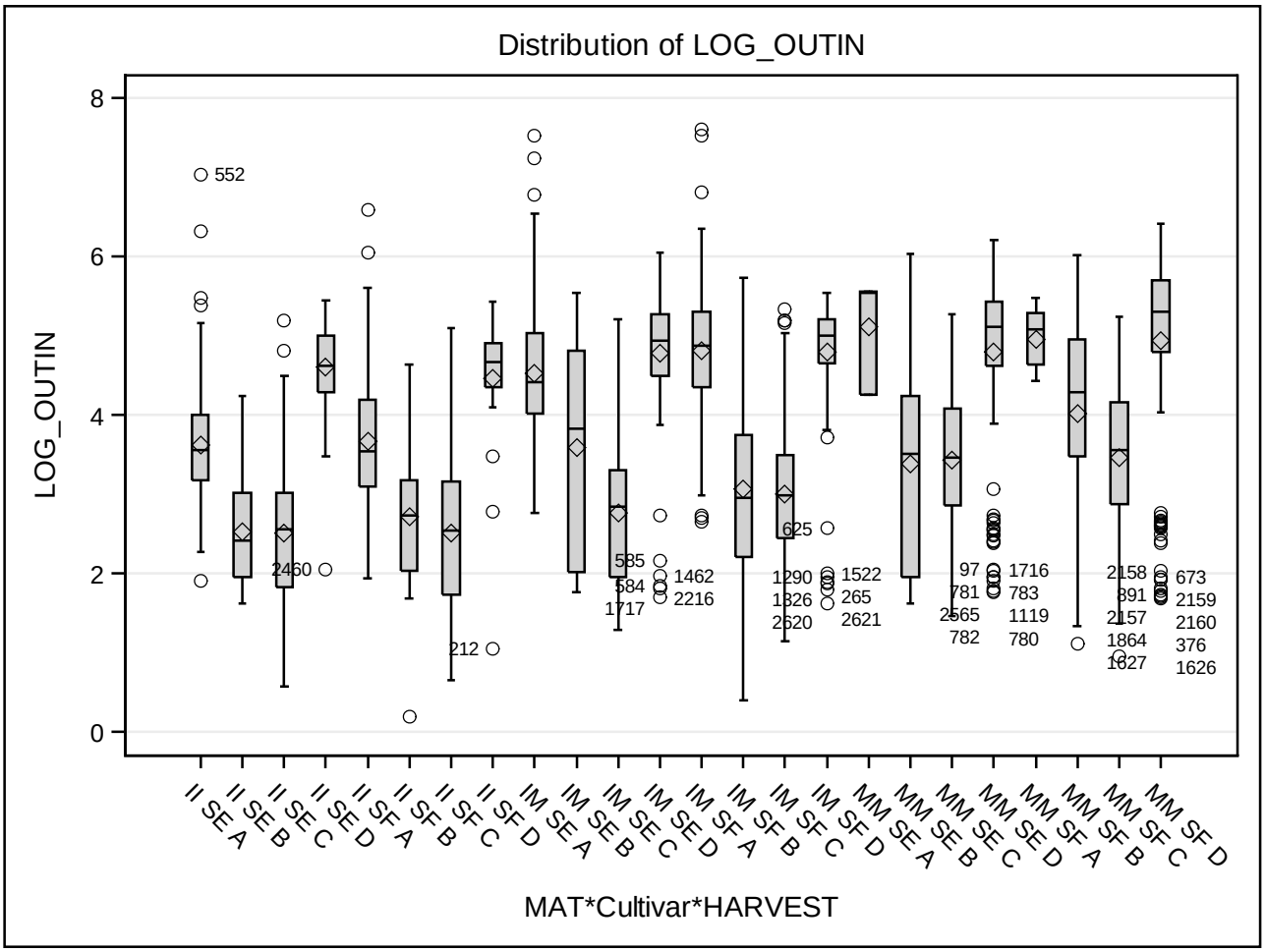
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



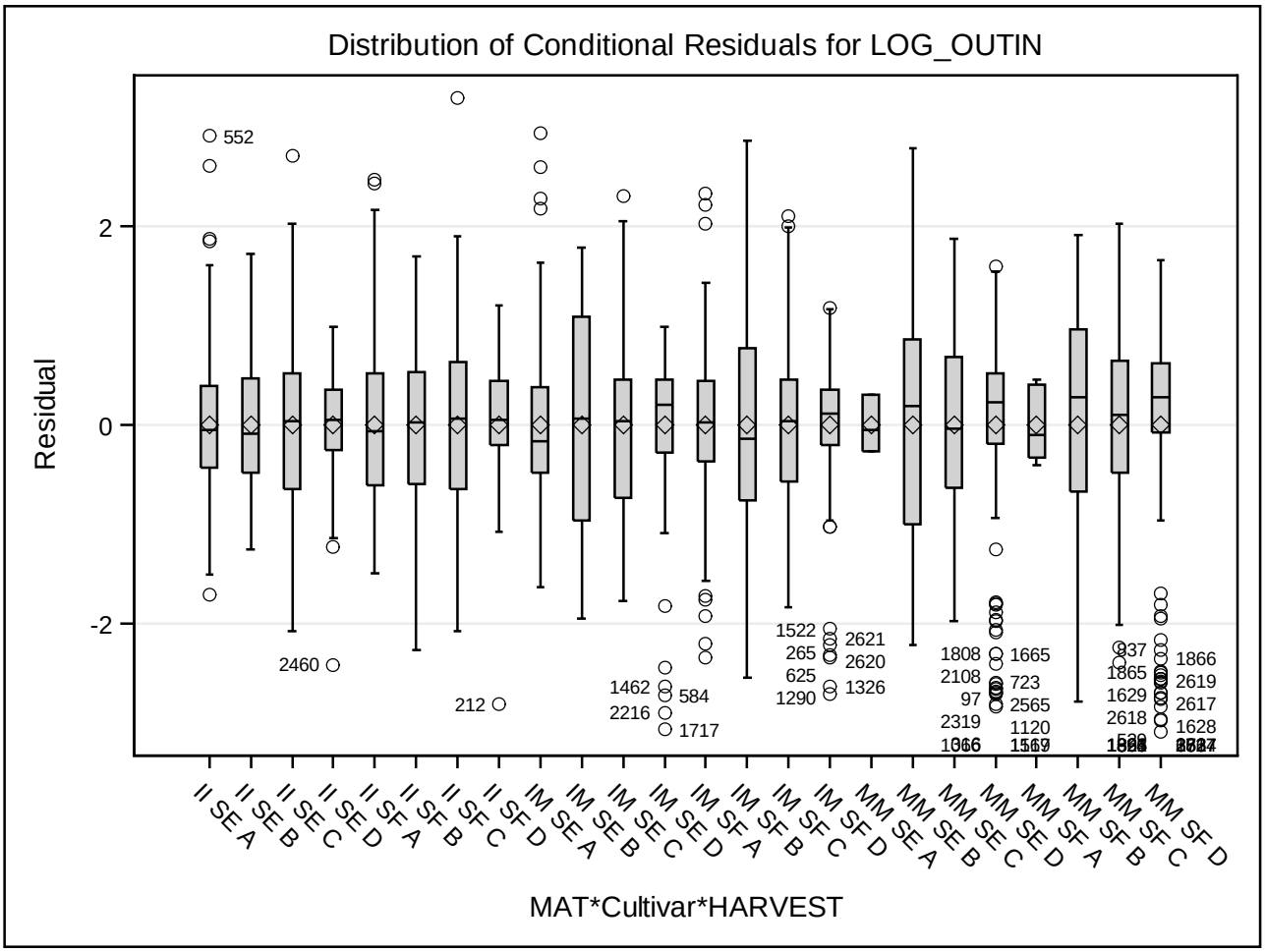
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



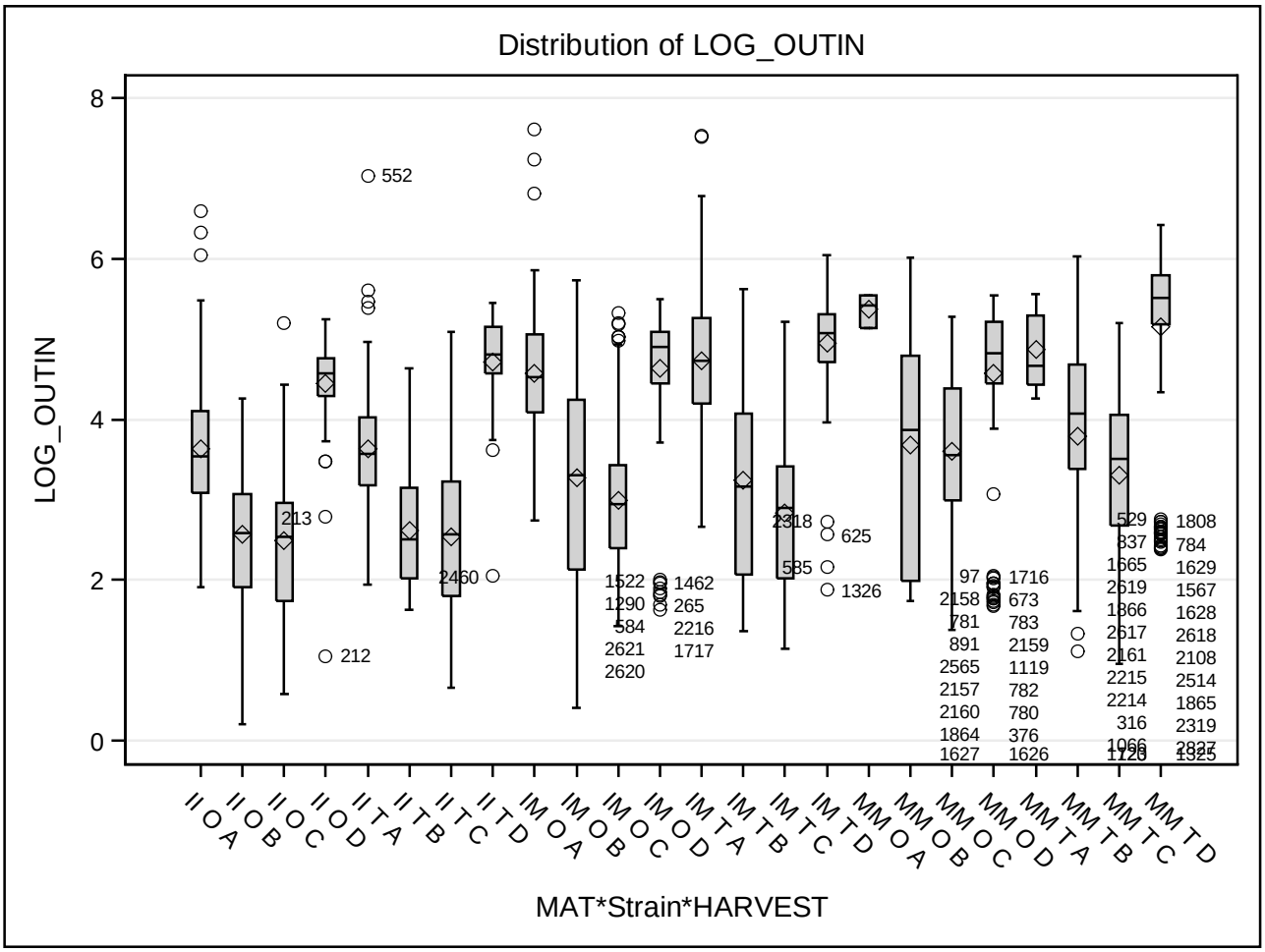
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



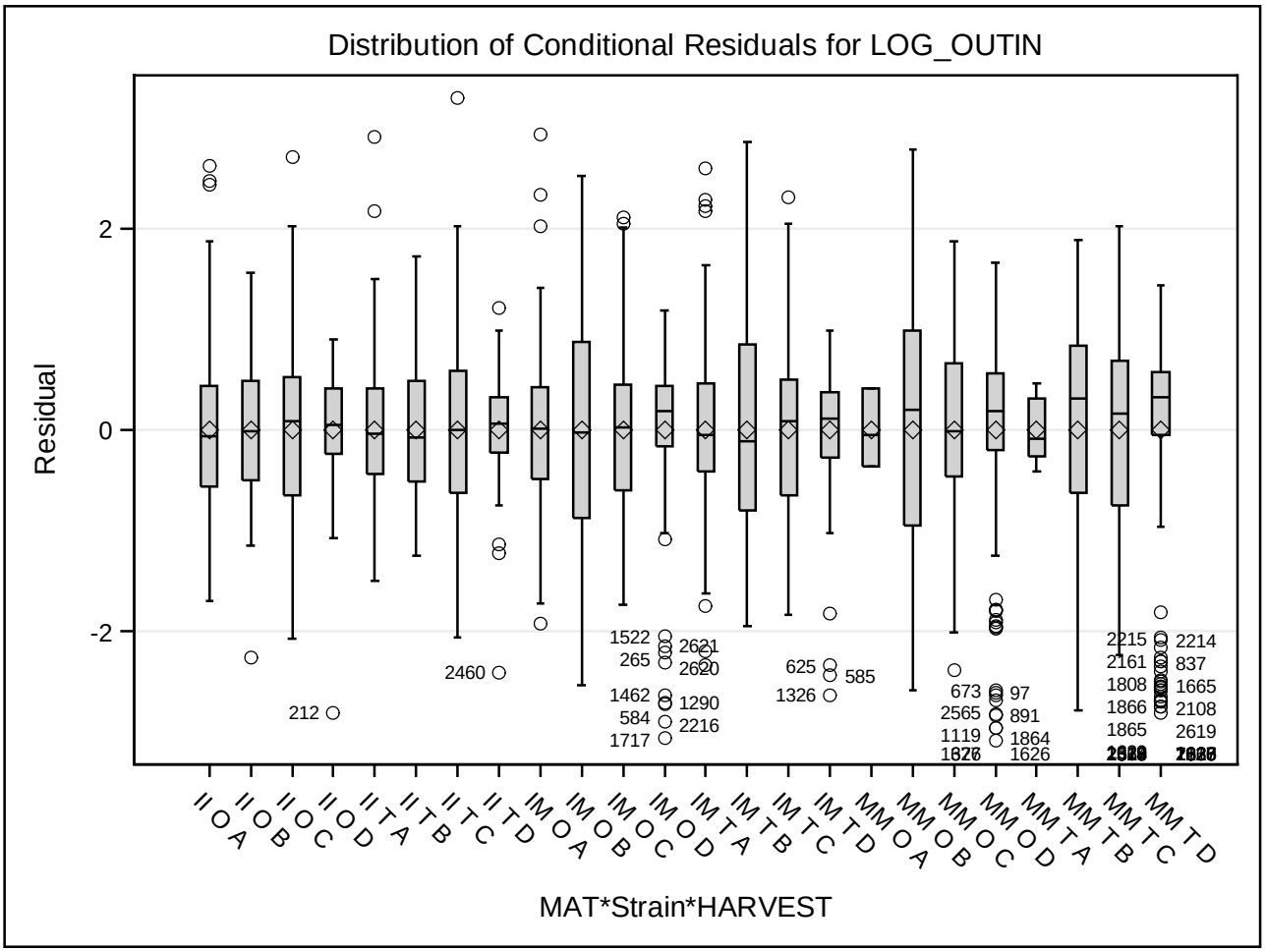
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



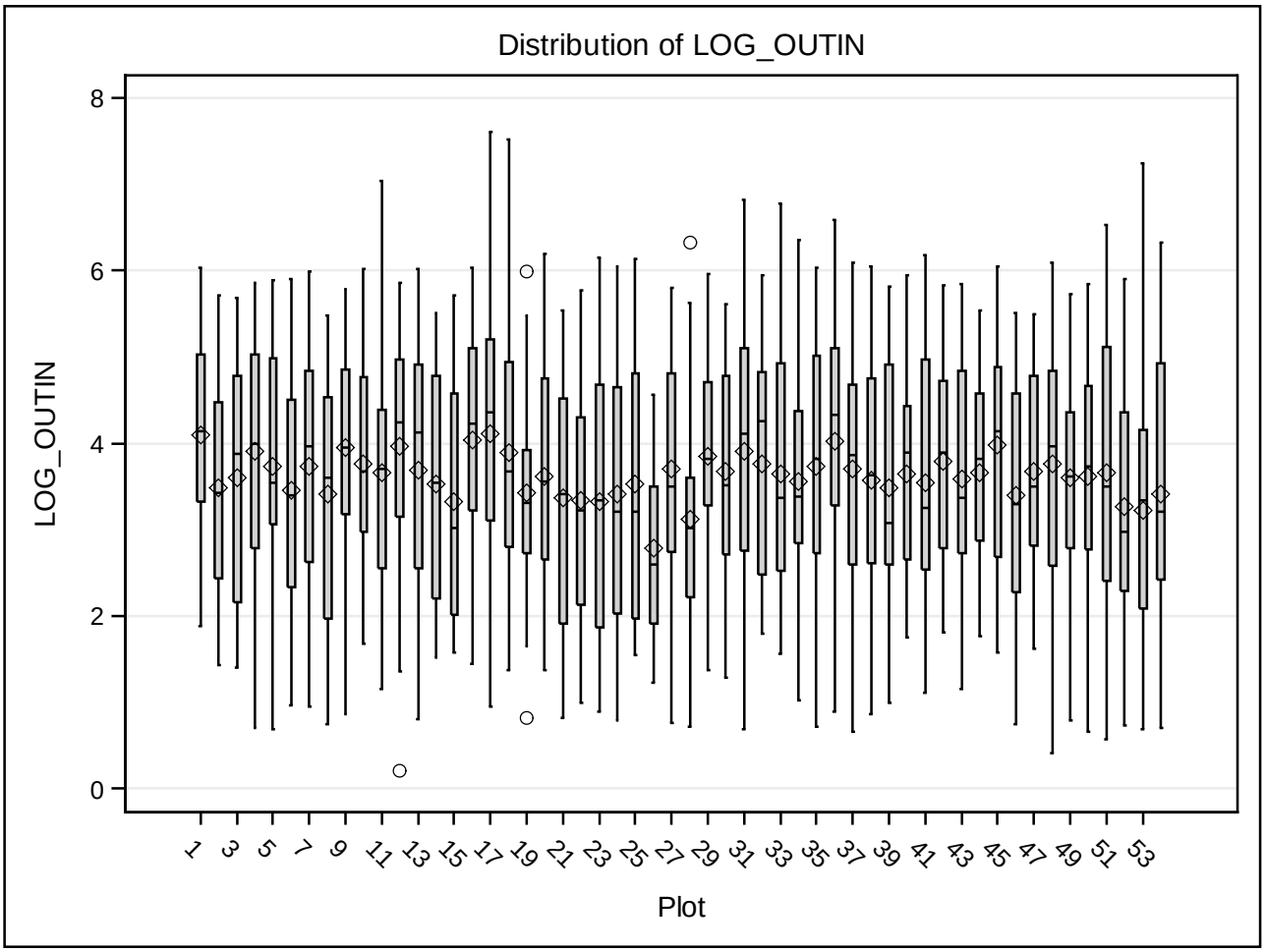
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



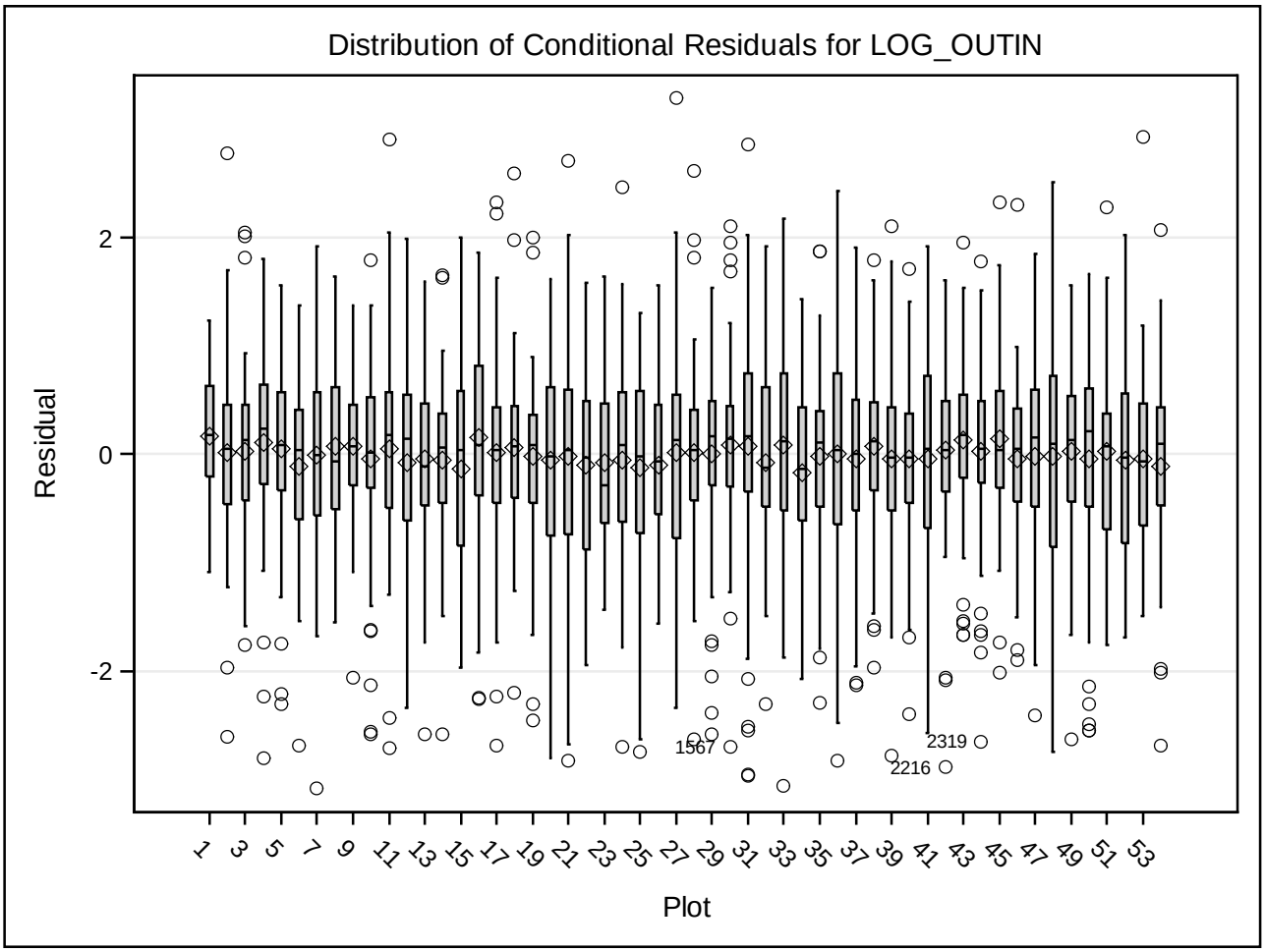
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



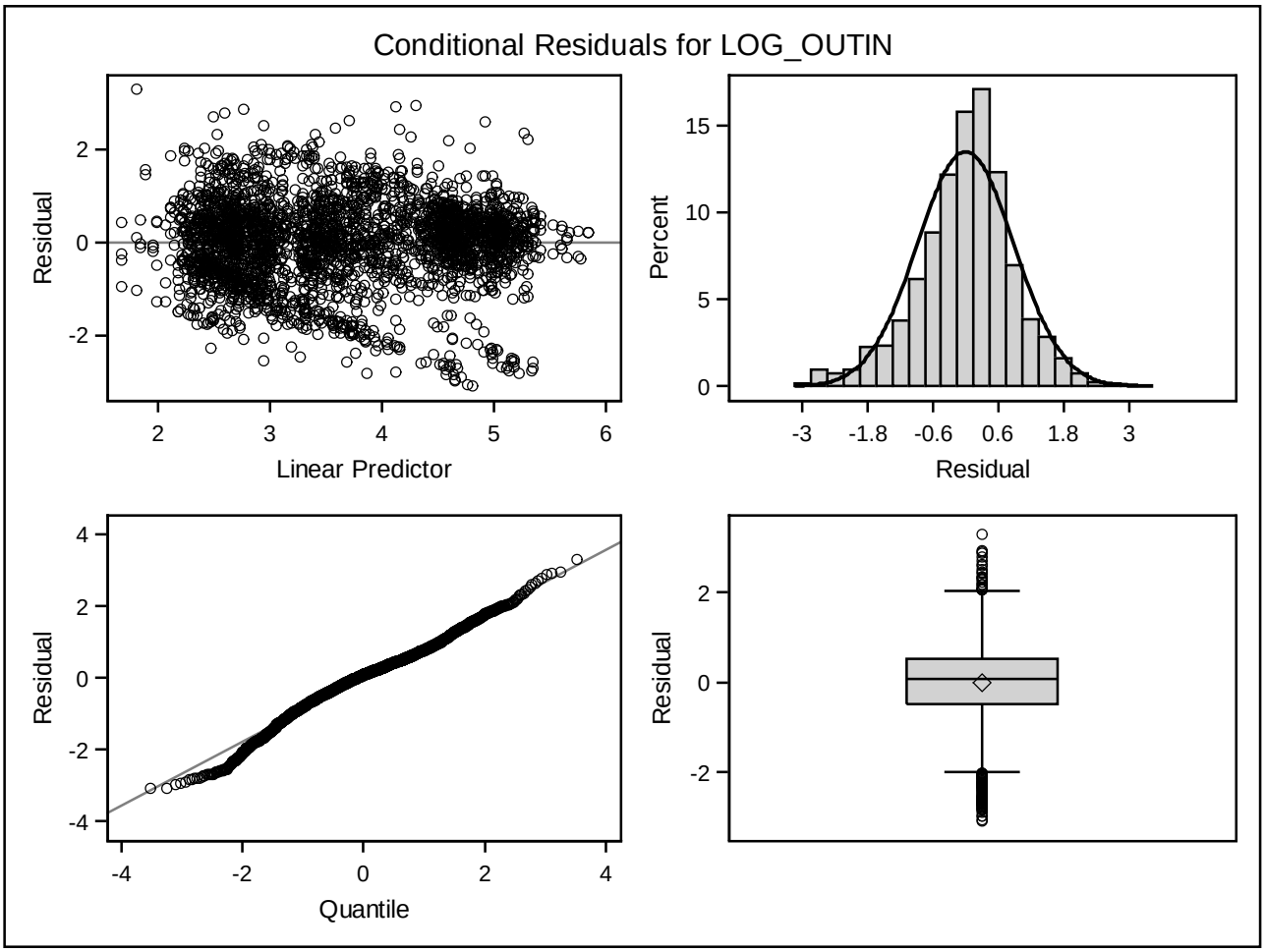
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



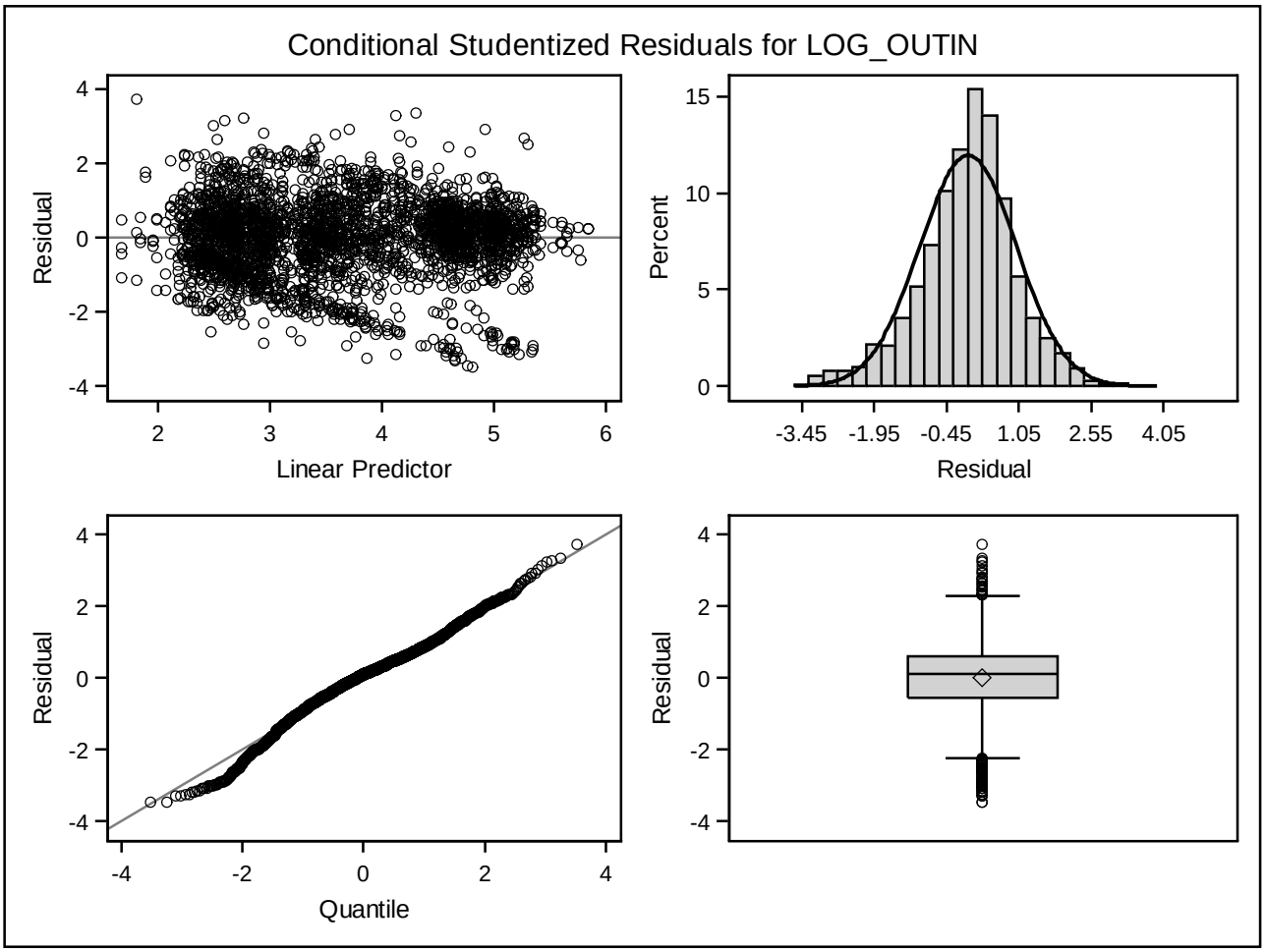
Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



Statistical Analysis: 06/05/2013

The GLIMMIX Procedure



Statistical Analysis: 06/05/2013

The UNIVARIATE Procedure
Variable: student (Studentized Residual)

Moments			
N	2835	Sum Weights	2835
Mean	0.00017915	Sum Observations	0.50790167
Std Deviation	1.00071481	Variance	1.00143014
Skewness	-0.3650047	Kurtosis	0.82473453
Uncorrected SS	2838.0531	Corrected SS	2838.05301
Coeff Variation	558577.9	Std Error Mean	0.01879463

Basic Statistical Measures			
Location		Variability	
Mean	0.00018	Std Deviation	1.00071
Median	0.09708	Variance	1.00143
Mode	-0.71033	Range	7.18181
		Interquartile Range	1.13363

Note: The mode displayed is the smallest of 3 modes with a count of 2.

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	0.009532	Pr > |t|	0.9924
Sign	M	118.5	Pr >= |M|	<.0001
Signed Rank	S	97602	Pr >= |S|	0.0251

Tests for Normality				
Test	Statistic		p Value	
Kolmogorov-Smirnov	D	0.05194	Pr > D	<0.0100
Cramer-von Mises	W-Sq	2.538026	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	14.54883	Pr > A-Sq	<0.0050

Quantiles (Definition 5)	
Quantile	Estimate
100% Max	3.7118635
99%	2.2547957
95%	1.5855051
90%	1.1396485
75% Q3	0.5940491
50% Median	0.0970755
25% Q1	-0.5395853
10%	-1.2774641
5%	-1.8516036

Statistical Analysis: 06/05/2013

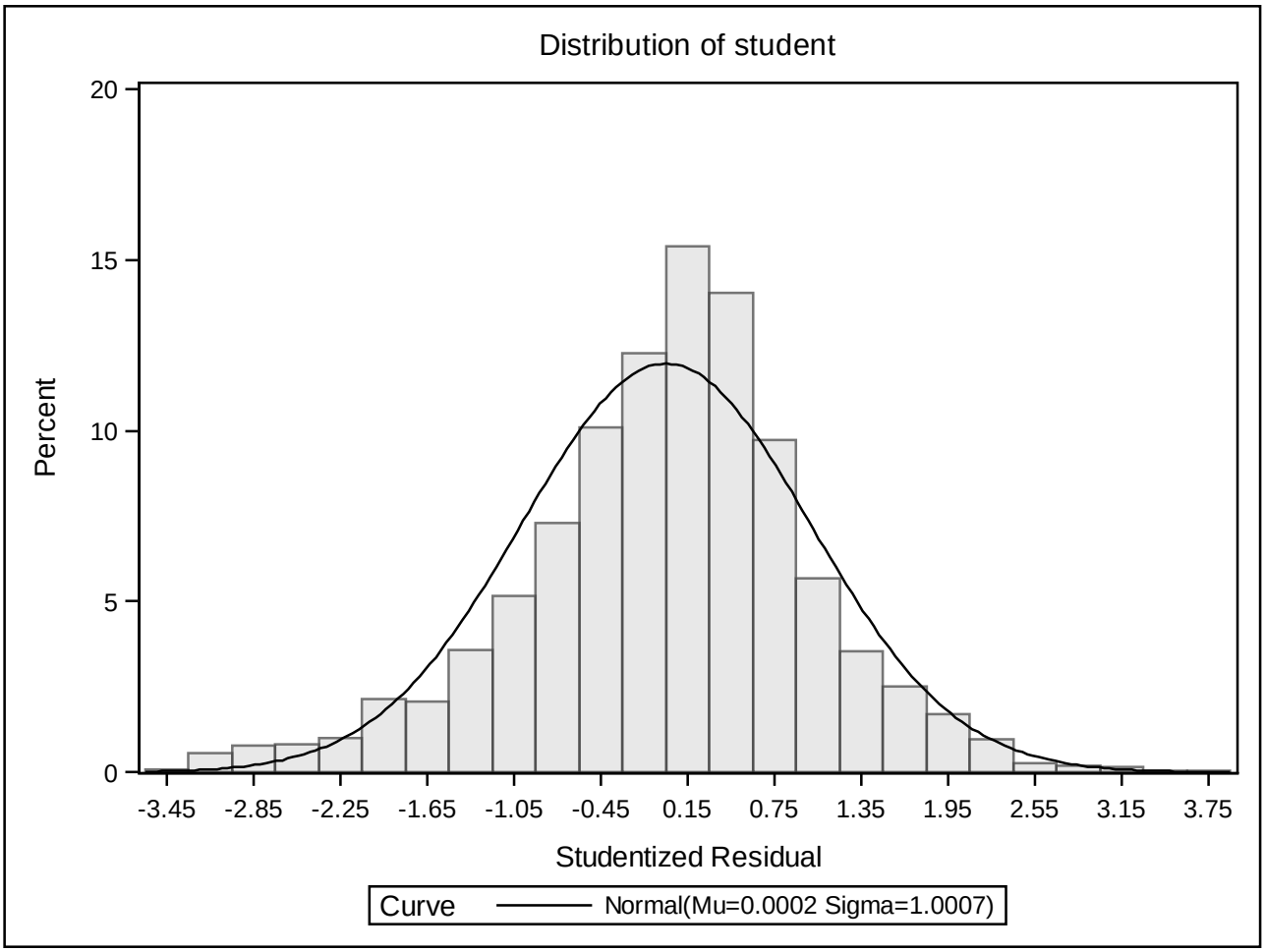
The UNIVARIATE Procedure
Variable: student (Studentized Residual)

Quantiles (Definition 5)	
Quantile	*Estimate*
1%	-2.8931179
0% Min	-3.4699416

Extreme Observations			
Lowest		*Highest*	
Value	*Obs*	*Value*	*Obs*
-3.46994	376	3.13974	77
-3.45479	1717	3.23222	1605
-3.29982	1626	3.27379	552
-3.28976	1627	3.34499	2750
-3.25744	212	3.71186	1401

Statistical Analysis: 06/05/2013

The UNIVARIATE Procedure



Statistical Analysis: 06/05/2013

The UNIVARIATE Procedure
Fitted Normal Distribution for student (Studentized Residual)

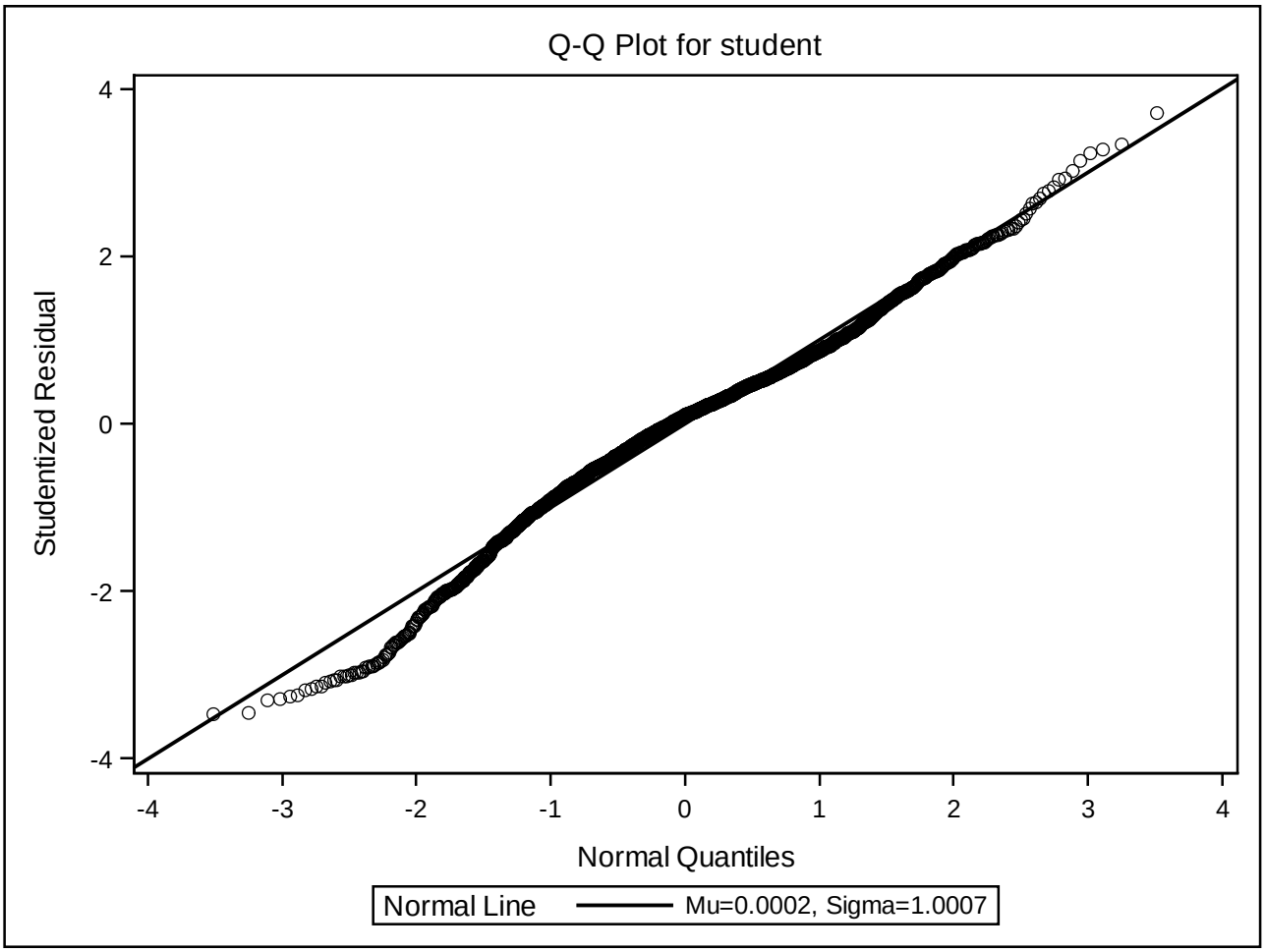
Parameters for Normal Distribution		
Parameter	*Symbol*	*Estimate*
Mean	Mu	0.000179
Std Dev	Sigma	1.000715

Goodness-of-Fit Tests for Normal Distribution				
Test	*Statistic*		*p Value*	
Kolmogorov-Smirnov	*D*	0.0519404	*Pr > D*	<0.010
Cramer-von Mises	*W-Sq*	2.5380256	*Pr > W-Sq*	<0.005
Anderson-Darling	*A-Sq*	14.5488313	*Pr > A-Sq*	<0.005

Quantiles for Normal Distribution		
	Quantile	
Percent	*Observed*	*Estimated*
1.0	-2.89312	-2.32783
5.0	-1.85160	-1.64585
10.0	-1.27746	-1.28229
25.0	-0.53959	-0.67479
50.0	0.09708	0.00018
75.0	0.59405	0.67515
90.0	1.13965	1.28265
95.0	1.58551	1.64621
99.0	2.25480	2.32819

Statistical Analysis: 06/05/2013

The UNIVARIATE Procedure



Appendix to Project (26): University of Florida - Florida Small Farms - Capacity Building, Training and Outreach

SUMMER
2011

RESEARCH REPORT

Small Farms & Alternative Enterprises

Small Farms Focus Groups

Center for Public Issues Education
IN AGRICULTURE AND NATURAL RESOURCES
UF|IFAS

Contents

Introduction....4
Methodology....4
Results....4
Challenges of Small Farmers....4
Business Decisions....6
How do you make business decisions about your farming operations?....6
Do you feel you could benefit from information about business skill development?....7
Goals....7
How do you feel about setting goals for your farm?....7
How do you set goals?....8
Marketing....8
How do you market your farm products?....8
How do you get the word out about your product? How do consumers find you?....9
Training....10
Do you participate in any kind of training programs on your farm? Do you or your workers attend any training programs off of your farm?....10
Accessing Information....11
When you have a question, need more information about something, or are looking for advice on a topic that affects your farming operation, who or what do you turn to for this information?....11
Do you feel that accessing needed information comes easily?....11
Extension Programs and Resources....12
Do you use extension programs or resources?....12
Food Safety....12
What do you think when you hear the word food safety?....12
Do you feel that food safety is an important issue?....13
What do you identify as sources of on-farm contamination in your operation?....13
Do you feel that you minimize food safety risks on your farm?....14

How could UF/IFAS and FAMU help you improve your knowledge of food safety principles? 14
Would you be interested in attending food safety training designed specifically for small farmers? 15
Perceptions of Small Farmers 15
What do you think consumers think about farmers like yourselves? 15
What do you think corporate agriculture thinks about farmers like you? 16
What do you think higher education (land grant) thinks about farmers like yourselves? 17
Small Farm Organization 17
Do you think that small farmers need to create their own organization? 17
Advice to Extension 18
Assume the Dean of Extension came into this room right now and asked for 30 seconds of your advice about the best way to help small farmers? What would you tell them? 18
Recommendations 18

Introduction

In order to strengthen the Small Farm Industry in Florida, it is important to understand the programmatic needs, concerns, and resources of small farmers. A recent study completed by the Center for Public Issues Education in Agriculture and Natural Resources (PIE Center) in partnership with the University of Florida and Florida A & M Extension's Small Farm and Alternative Enterprise division provides valuable information concerning the needs, challenges, and frustrations of small farmers. This research was funded by a grant provided by the Florida Department of Agriculture and Consumer Services (FDACS).

Participants were asked about their challenges, current business practices, business needs, food safety, accessing needed information, and Extension programs and services. Overall the information provided by the participants will aid Extension in serving the small farm population.

This report discusses the study's methodology, research findings, strategic recommendations, and recommendations for further research.

Methodology

To conduct this study, three sets of two (6 total) focus groups were held in Marianna, Sarasota, and Gainesville, Florida. Participants were recruited from the counties in which these towns were located as well as neighboring counties. All participants were small farmers in the state of Florida. Participants were identified as small farmers through a list provided by Extension. A total of 59 small farmers participated in these focus groups. The small farmers in the focus groups raised a diverse array of fruit and vegetable crops, livestock, tree and nursery products, and row crops. However, the participants demonstrated a fairly even distribution across the five USDA subcategories for small farms. The majority of participants were between 40 and 70 years of age, with two-thirds of the participants being male. A large portion of participants were either first-generation farmers or came from families who had farmed for more than three generations.

Participants were asked a series of open-ended questions throughout the focus groups to guide discussion. The discussion was recorded and transcribed. To analyze the discussion major themes were identified using the constant comparative method. Themes were analyzed across all six groups and findings are based on agreements across four or more groups.

Results

Challenges of Small Farmers

The small farmers participating in these focus groups identified eight major categories of challenges.

Cost of Expendables

QUOTE: "I have the cost of expendables, and I have in parentheses; feed, fuel, power, things that are outside of our control."

Grants and Funding

QUOTE: "The ability to get funding when you need it. As a small farmer, some of the larger scale places do USDA grants and those kind of funds. I've been going through that for the last several, last year and a half, trying to get grants. In my previous job, I had some experience with some grants and you find out that they are 18 months out before the calls come in or the paperwork is voluminous or you have to have a grant writer. Some of those things are accessible through USDA, like grant writers, for instance, but that is something that you have to aggressively seek and when you work on a small farm and you are a 'mom and pop' and you do everything, you know, you are already running like a 16 hour day, it is difficult to have time to sit down and help somebody word your grant for you. Or you keep hearing that, "Oh there is plenty of money out there for the small farmer, for the small business." But you try to access that. It is not as easy as they make it sound. I have tried to tap into every one. There is about 200 on the list and I have tried to tap into every one, and getting close to one. You know? It is very difficult for the small farmer when you don't have a big lobby group behind you to get that. I am starting to learn ways to get those groups to help me, but to just to reach out there, make a phone call, fill out a form, get the money, it's not that easy. You know?"

Regulations

QUOTE: "The biggest problem, the most aggravating problem I'm working with right now is wrong size regulation. A lot of regulations that farmers deal with are written for large scale operations and if you're not a large scale operation then there's a mismatch. Specifically one that I've been dealing with for the last couple of years is eggs. To sell one dozen eggs, under current Florida regulations, I've gotta build a 15 thousand dollar facility to wash them in. And that makes sense if you've got 10 thousand hens in one house, you should build a place separate that you are gonna work the eggs in. But, you know, I've got 50 chickens and I just want to sell a few dozen eggs and I've got to build a 15 thousand dollar facility. So the state studied that for a year and made recommendations to fix it and then somebody in the department of agriculture advertised the report and it's not gonna happen. So, I'm very frustrated by that."

Economics

QUOTE: "Citrus, we were feeding the cattle citrus pulp. The citrus companies, they turn the rind and the skin into a pellet for the cattle and for the goats. And it was very economical to feed that last year. This year it is more than double."

Organic Guidelines/Rules

QUOTE: "The organic guy is the one who pays attention to what your neighbors are doing. And we have wonderful neighbors so we, it's nice, but again it is a little bit of a concern there. And it is labor intensive when one of you said that. When you are the only one working, just he and I, and my son-in-law comes and tries to help us some too, and when you are organic, it is labor intensive. You have lots of pests and lots of things and you have to know, you have to read the labels to find out if this can be used for that. And sometimes everything in it is organic, but it won't be approved for you to use.
(Another participant's response) Yeah, in the organic outline, I mean the products on the NOP, there is no list of products. There is nothing. They give you clues. It's very klugey. I looked at it too. (Agreement heard) Just to see if I should transition..."

Weather

QUOTE: "I'd say the last two years it has been the weather. It has been an extreme challenge, and we going to more protected agriculture. We are building hoop houses, even for the small kid's gardens that we have, we bought one of those benders from Johnny's Seed Catalog and we are building these hoop houses and we are conducting these studies on covering them with different colors of shake moss as well, but that has been a real challenge. We are in Pinellas County, supposedly Zone 10, but we have had some extreme winter conditions here the last two years."

Marketing

QUOTE: "Marketing is a big problem with us. The big fish always eating up the little fish. Small farmers don't have good access, cannot get in on a lot of the larger good markets and all of the conditions that goes along to explore that particular issue."

Competition

QUOTE: "The flip side of that is that the fear of what comes in from overseas creates a market and we sell a lot of trees to backyard people who want to grow their own fruit. And that is the same with everybody buying locally, but that is the opportunity. And they are willing to pay more. It still doesn't stop the cheap competition, we don't face imported competition but we face it from the large mega-nurseries that sell to the chain stores. And people expect us to match the chain store price and to have a guarantee. "Well, you don't guarantee that?" It was in good shape when you picked it up here at the farm, what you did with it afterwards, I can't control. (laughter)"

Business Decisions

How do you make business decisions about your farming operations?

The small farmers participating in these focus groups identified three things that aid them in making business decisions.

1. **Market Awareness**

   QUOTE: "What I did my second year was, I had already gotten an individual clientele of household people that either come by and did their own picking or I would see if I could meet them at the farmer's market. Well, we come up with this idea, people say, "Can you grow this, can you grow this?" So last year, I had a questionnaire at my stands, we had four produce stands set up. And they wanted certain things so my wife, she should be sitting here, the brain. She put that together versus the cost of how much we would have to plant, with a half of a commitment. Almost like a CSA, almost like that, but nobody committed. And we based some of our decision on if we were going to plant a quarter acre, a half acre or just a couple hundred foot rows or whatever. That is keeping it simple and we did very well doing that. We didn't over plant, in fact, a few things we under planted."

2. **Cost**

   QUOTE: "And what can you afford to try? You try so many things that you run out of money and you think, "Omigosh I should have tried something else." Too late now"

3. **Personal Acquaintances**

   QUOTE: "For our rabbit production. We learned from the first small farmer's conference we attended, we met Beth Sealy down there and she, that's why we decided to get into it, because we knew we had a market. I can't imagine getting into some of these things and then making your own market. People that are getting into the business, and then going out to make their own market, that is two or three jobs right there, a marketer and a...(sentence trails off)"

Do you feel you could benefit from information about business skill development?

Five of the six groups of small farmers agreed that they could benefit from information about business skill development. However, it was also discussed that they needed "fresh" information pertaining to business skill development.

QUOTE: "I have been to a lot of those, how to market products and how to, in reference to your question, and after you have been to 7 or 8 of them, they seem to be regurgitating the same information and a lot of this sounds good, but you know, a lot of it is not really useful. You can only hear it so many times and, on my scale, I can only use so much of it. It may be different for a big corporation but, after a while that stuff is kind of the old tricks kind of thing. If you had no knowledge at all, it might be important to sit through a few of those, but after you sit through a couple of them, personally, I don't get any more benefit out of them after I have seen it two or three times."

Goals

How do you feel about setting goals for your farm?

The small farmers participating in these focus groups indicated that unpredictable circumstances impacted their goals and that goals must be realistic.

1. **Unpredictable Circumstances**

   QUOTE: "It's really hard to set a goal because, take if you growing corn, if you contract your corn for, say $5 a bushel, okay, if you don't contract your corn you won't own the contract for $5. I know a farmer, this is true, I know a farmer, contracted 10,000 bushels of corn for $4 a bushel. He had to make the contract. Now corn is $7.60 a bushel. He got to fulfill that contract before he can sell any at $7.60 a bushel. That's $3.60 more a bushel lost. And then if you don't have a contract, if corn $5 a bushel, he'll start off paying you maybe $4.95. For two or three days then it's gonna hit the bottom and stay there until you get all the corn in and then the price will jump back up again. That's the truth."

2. **Realistic Goals**

   QUOTE: "Well, you have to know where you are going. You have to know where you are going so you have to set goals on a five year basis and you have to have a plan on how to get to your goals. You have to know what you want in order to get there. You have to be able to see it to get it."

How do you set goals?

The participants discussed that their goals are driven by market needs.

QUOTE: "It really does seem to be consumer driven. We get a lot of requests from LocalHarvest of people saying, 'Are you open to the public, do you have a farm stand?' They have gotten pretty savvy, they come to a farmer's market and there is not a farmer to be found. At least in our area, they are all produce peddlers. And so people really want to know the farmer. If they have been a member of a CSA in another area, they find us through LocalHarvest or what have you. We aren't set up that way, there is only four of us who could possibly man a produce stand and wait for someone to come and buy vegetables. But it is consumer driven, and we were naive enough early on, that we gave our CSA members and all of our chef's seed catalogs so then they came back with all these wonderful ideas of things we can grow. (agreement heard) Bad idea."

Marketing

How do you market your farm products?

The small farmers participating in these focus groups mentioned several different ways that they market their farm products including farmer's markets, selling directly off of the farm, directly marketing to consumers, wholesale, retail, restaurants, schools, CSAs, and pre-sale orders. However, only four marketing outlets were used by participants in four or more of the groups.

1. **Farmer's Market**

   QUOTE: "Oh, so my original concept when I opened was, since I am downtown, and I'm only growing a few thousand plants, literally, a few people from the neighborhood is all I really need as customers. Well, that never happened, so I finally threw up my hands and said, "the hell with this", and I went and joined the farmer's market downtown and that's interesting because you have to build a clientele. Against not only the crop vendors at the end, but then you've got a (name omitted) who has been growing amazing product forever and been there forever, that has a loyal following that I can't dent. But..... (sentence trails off)"

2. **Selling Directly off the Farm**

   QUOTE: "Primarily two varieties. The rest of them I convert to the olive oil. But I sell right at the farm."

3. **Direct Marketing**

   QUOTE: "I'm trying to have it direct marketing so I know what I'm doing. That's the best way, but sometimes you have to go to the market."

4. **Wholesale**

   QUOTE: "Well, with this wholesale co-op we have a person that do market. That's what they do, they go out there and make deals so it's sold before it's put into the ground. Good thing about the co-op."

How do you get the word out about your product? How do consumers find you?

The small farmers participating in these focus groups identified three main ways that the word gets out about their products and how their consumers find them.

1. **Word of Mouth**

   QUOTE: "Word of mouth. Everybody knows who I am."

2. **Email**

   QUOTE: "We started out just taking products to the market and selling them and that kind of evolved into people wanting the same thing over and over again and so we developed a customer base. And one of the most helpful things we did, and I didn't realize it, we started putting out an informal newsletter once a week. We collect, you know, let them sign their name on the sheet at the market. We started putting out this little, started out as just an email and then we took our letterhead and then we started putting out a little newsletter, and talking about products. Reminding them which market we would be at on what day, and maybe little pictures. Start dropping a little picture on there and on our farm, the goat farm, there is always some funny story. Every day there is a funny story of something that the goats did. So I started putting those little funny stories on there and come to find out those would get forwarded to people that weren't even on the list. And then we have a following and then we started getting emails and then some of our regular customers, our products are in high demand and sometimes we sell out, so they started sending us an email. "Hey can I get you to bring this to the market?" So then we started taking orders from that. And then we had some illnesses and deaths in our family and I didn't put that email out for about a month. And our sales dropped. I couldn't figure out why, but I didn't relate it to the email. Then I started sending the newsletter out again, and our market picked up again. So, I'm like, okay, it is directly related to the newsletter, so now I never forget to put the newsletter out. It always goes out, no matter what, even if it's one in the morning, the newsletter goes out because it keeps selling. And sure enough, I'll hit send, and in just a few minutes, I'll start getting some orders. And it reminds people, oh yeah, the market is Friday, I'd better get my order in. So when we got to the market, probably a third of the stuff we take is already spoken for. So we know we have those sales committed. And then the rest of the stuff we just sell are just spontaneous buys, people walking up to our booth."

3. **Online Media**

   QUOTE: "I want to say one thing, we are living the direct sales of produce. You would be surprised what you get out of a website, Facebook page, the whole nine yards. We rolled out the whole social media, all the cliches, we are in this deep into all of it. And you would be surprised the business it drums up. You can build that reputation, you can really, there is liability there, but man, there is a ton of opportunity. Particularly when people want small farmers, want small farm operations. They want fresh produce, local stuff, they've gotta know how to find it. You have to meet them, you ain't gonna meet them halfway, you are gonna have to meet them most of the way."

Training

Do you participate in any kind of training programs on your farm? Do you or your workers attend any training programs off of your farm?

The small farmers participating in these focus groups identified three general groups of trainings that they participate in.

1. **IFAS/Extension Training Programs**

   QUOTE: "And then that connected us with the Master Tree Farmer Program. We went to the Extension office in Quincy once a month or I don't know, anyway, it was over a period of time and the thing was televised and there were people in Clemson and Gainesville and all these different experts and that was a real help. Yeah, getting hooked up with Extension and available programs has been real important for us. We learned a lot about long leaf pines."

   Other IFAS/Extension training programs mentioned throughout this discussion included Project Annie, IFAS blueberry information training, food safety training, Chicken 101, and the small farm network (based out of Sarasota County).

2. **Trainings at various Expos, Seminars, Conferences, and Trade Shows**

   QUOTE: "I go to most trade shows, especially since I made a shift in industries. I went to almost every trade show that I could and Small Farms, in particular, for me was a really good training for me."

   Other expos, seminars, conferences, and trade shows mentioned throughout the discussion included Florida Organic Grower events, Georgia Organics events, Southern Sustainable Agriculture Working Group, Florida Forest Stewardship Program, SARE Conference, Florida Ag Expo, Small Farms Conference, and Range Forage Seminars.

3. **Trainings specific to Certifications/Licenses**

   QUOTE: "We do. We have to have HACCP training and GAP training. You've got to keep everything legal and on the up and up. Food handling. So we go and we send our employees. We make sure at least one person knows something about something. You know?"

Accessing Information

When you have a question, need more information about something, or are looking for advice on a topic that affects your farming operation, who or what do you turn to for this information?

The small farmers participating in these focus groups identified three main sources of information.

1. **Social Acquaintances**

   QUOTE: "That seems to be the more trusted source is if you have somebody you know who is already doing it. And you go to them. That seems to be far more trusted."

2. **Internet**

   QUOTE: "First, Google."

3. **Local Extension Agent**

   QUOTE: "There's times where I'll ask Mr. Brasher something or an Extension agent a specific question about what is going on. Week before last, I had snap beans coming up with a white leaf. I had never seen that before. Mr. Brasher asked me, "did you daylight 'em?" Yeah, I daylighted them. That's what happened. The roots hadn't gotten out to be fertilized yet. Well, that made sense because they was turning green in two days. You need to have your Extension agents and your people that you are supposed to be able to trust, they need some practical knowledge too. And I can guarantee a lot of the PhD's out in Gainesville and Knoxville and Tallahassee and Athens and Baton Rouge and all that they don't know what daylighting means."

Do you feel that accessing needed information comes easily?

The small farmers participating in these focus groups indicated that it was situational whether needed information would come easily or not.

QUOTE: "It depends on which information that you are looking for."

Extension Programs and Resources

Do you use extension programs or resources?

Affirmative "yes" was heard from all groups participating in the research. Several programs and resources were mentioned. However, none were mentioned in four or more groups. Those that were mentioned include

- Seminars
- Publications
- Newsletters
- Meetings
- Programs/Trainings
- Extension agents
- Online extension resources, including the small farms website
- EDIS
- Other state's extension services
- Small Farms Conference
- Handbooks

Food Safety

What do you think when you hear the word food safety?

The small farmers participating in these focus groups identified four categories triggered by the word food safety.

1. **Regulations**

   QUOTE: "One of the things I wrote down was regulations. To hear that the health department is going to come out and inspect you, will scare you to death. But you also got to know what the regulations are. They will tell you that they want you to have a fully enclosed building to shell peas and beans in. I don't know if you all know how loud a pea sheller can get, but you couldn't stand it inside an enclosed building. In Florida, all you got to have is a cement floor and a roof. You don't have to have fully enclosed. So we passed our inspection, but you have got to know your regulations, and you have got to be able to show that person that comes out there that we are safe, this is our HACCP plan. Now they want you to have your name and address on every product you sell, especially to stores and stores don't like that, but they are not the ones dealing with them."

2. **Safety Concerns with Imported Food**

   QUOTE: "I think it is important. I mean, I want our food to be safe. But what I worry about, I worry about the safety of the food that comes into our country. A lot more than I worry about the produce and the food that is grown here. (agreement heard and crosstalk)"

3. **Lack of Consumer Education regarding Food Safety**

   QUOTE: "People cooked their food and they understood that you shouldn't have your chicken juice running around with your lettuce, you know? And I think a lot of the issue in food safety is at the end consumer level, they are so dumbed down by going to get chicken nuggets all the time that a lot of them have no idea, any idea how to cook. I am giving a class in Gainesville called Chicken and Egg 101 and we are going to learn how to cut up chickens and cook eggs. (laughter) You know? But anyway."

4. **Food Safety not an Issue on Small Farms**

   QUOTE: "Bad micro-managing, industrial agriculture. Usually not the small guys who are at fault."

Do you feel that food safety is an important issue?

Five of the six groups agreed that food safety was an important issue. In addition, it was also indicated that the government has too much involvement with food safety or is out of touch with the realities of food safety.

QUOTE: "I think having to do anything like that is ridiculous! I hate government intrusion in my life! I hate the government standing between me and my customer and telling my customer he can't buy from me and I can't sell to them! If a customer wants my stuff and knows how I raise it, then I ought to be able to sell it to them, it's not their business!"

What do you identify as sources of on-farm contamination in your operation?

The small farmers participating in these focus groups identified several sources of on-farm contamination. However, only one source was mentioned in four or more groups.

1. **Animals or Pests**

   QUOTE: "Vermin. Bugs, Rats."

   Other on-farm contamination sources mentioned include
   - Water
   - Bacteria
   - Zoonotic diseases
   - Storage containers
   - Manure/composting
   - Packaging
   - Employees
   - Pesticides or other farm chemicals
   - Dirty equipment
   - Neighbors

Do you feel that you minimize food safety risks on your farm?

Five of the six groups participating in this research agreed that they minimized food safety risks on their farm. Several ways that these small farmers minimized food safety risks were mentioned. However, only one minimization of risk was mentioned in four or more groups.

1. **Food Safety Training Courses and Certifications**

   QUOTE: "One thing about HACCP, it makes you think about what you are doing and how you are going to fix the problem if a problem creates."

   Other ways to minimize food safety risks that were mentioned include

   - Wearing gloves
   - Keeping things organized
   - Hand washing
   - Proper irrigation
   - Clean equipment
   - Sanitary conditions
   - Limiting visitors
   - Paying attention
   - No animals
   - Testing the well
   - Not allowing employees to work when ill

How could UF/IFAS and FAMU help you improve your knowledge of food safety principles?

The small farmers participating in these focus groups provided several suggestions to help small farmers improve their knowledge of food safety principles. However, none of the suggestions were made by four or more groups. Those suggestions mentioned include

- By including courses similar to those offered by the National Restaurant Association
- By offering free training
- By focusing on the farm instead of the restaurant
- By not insulting our intelligence (reference to a training they attended that they felt covered elementary topics)
- By focusing on the details
- By continuing to offer classes/workshops
- By conducting on-site visits
- Small Farms Conference
- Books, bulletins, brochures

- Put it in simple terms & be able to define the regulations
- Hold trainings in local areas
- Online resource
- By offering a kitchen training
- They already are
- Nothing – it scares us and there are some things you can't avoid

Would you be interested in attending food safety training designed specifically for small farmers?

Five of the six groups participating in this research agreed that they would be interested in attending food safety training designed specifically for small farmers. The group, which was not in agreement, indicated that they may be interested. Stipulations of attending training were given throughout the discussion. However, the same stipulations were not mentioned in four or more groups. The stipulations that were mentioned include.

- If it was web based
- If there was a certification
- If it was free or reasonably priced
- If it was production method specific
- If they didn't have to travel far
- If there was a clear cost vs. benefit
- If they knew about the training well in advance
- If it was on DVD

Perceptions of Small Farmers

What do you think consumers think about farmers like yourselves?

The small farmers participating in these focus groups discussed three areas concerning consumers and small farmers.

1. **Consumers think Small Farmers are Great**

   QUOTE: "I think for a growing segment of the population there's a tremendous respect and appreciation for farmers that there wasn't even 10 or 15 years ago. It has really grown a lot, I've noticed. And that's really a welcome development, I think. That they see all these things that have entered our lives like disappearing bees, and food safety and reasons for them to really respect and appreciate the small grower and the healthy food that we produce. I get people at the market on a regular basis that just come up and say, 'Thank you for what you are doing.' It's become pretty common to hear that."

2. **Consumers need Educated about Agriculture**

   QUOTE: "Consumers come in different ages, too. Children don't know who farmers are. And then you have the older, the adults who just, I don't know what they think. They pretty much think we are out of our minds. People don't really understand where their food comes from...(sentence trails off)"

3. **Consumers are Unaware of the Money and Work that goes into Farming**

   QUOTE: "Yeah, you don't know what time I start in the morning with doing everything. A lot of it, I think they look and it's really cool because I have all sorts of animals and gardens, but I don't think that they really realize what we put into it and why we ask the prices that we do, because my time is worth something. You know? The hours and hours that I put into it is definitely worth something. (Agreement heard all around)"

What do you think corporate agriculture thinks about farmers like you?

The small farmers participating in these focus groups discussed three main topics related to corporate vs. small agriculture.

1. **Corporate Agriculture sees Small Farmers as a Threat**

   QUOTE: "They actually see us as a threat."

   (Another participant adds) "Not specifically to our farm or an individual farm, but small farms in general."

2. **Corporate Agriculture Tries to pass for things Small Farmers are known for, like Organic and Local**

   QUOTE: "To give you an example of how the impact of a small farm can be, I can't really tell you the name because I don't remember if you can give the name or not, (crosstalk) but in Los Angeles, California every morning, there is 10 pickup trucks sitting and waiting on a semi to get there from out of the Valley. And that semi is bringing produce and breaks it up into the small pickup trucks. And that's a large farmer, one of the major producers, Dole or somebody like that, who is really doing this and they are sending their culls out to the local markets and they don't care about the small farmer, but they certainly are trying to push him out and take their spot. They said they was making more money off them, 5 semi loads of produce a week, then they was some of the other stuff, big stuff."

3. **Corporate Agriculture pushes for Regulation that only Benefits Themselves**

   QUOTE: "I think some are, the feedlot for example. When this natural thing on beef was being pushed, the decision on what could be labeled as natural was held up while the feedlots lobbied to get their definition of natural. (crosstalk) And their definition was, and that is what happened, the feedlot could be natural and all they have to do was to open the gate to the next pen to have more room to walk. (crosstalk)"

What do you think higher education (land grant) thinks about farmers like yourselves?

The small farmers participating in these focus groups discussed several ideas. However, none of them were present in four or more of the groups. The ideas discussed include

- They are surprised by our roadblocks
- They realize the importance of agriculture
- They like small farmers
- They want to support small farmers
- They only fully support what they get money from (i.e. research money)
- They don't care about us

Small Farm Organization

Do you think that small farmers need to create their own organization?

The small farmers participating in these focus groups focused on three main areas when discussing the creation of a small farm organization.

1. **Strength in Numbers**

   QUOTE: "There is power in numbers and then we can influence legislation a little bit.(Agreement heard) We can actually get some of this crap out of our way so we can do what we should be doing."

2. **Good Idea**

   QUOTE: "It wouldn't hurt."
   (Another participant adds) "They should have their own organization."

3. **Concerns**

   QUOTE: "It is doable, but I'd say if it was a state wide organization, the things that would benefit Live Oak and Gainesville and Alachua and Bradenton and Manatee may not benefit Marianna and Difuniak Springs. You could have a state wide organization, but it has to have a regional theme to it."

   Other concerns mentioned included

   - Time commitment
   - Diversity among farmers
   - Already involved in several organizations
   - Cost

Advice to Extension

Assume the Dean of Extension came into this room right now and asked for 30 seconds of your advice about the best way to help small farmers? What would you tell them?

The small farmers participating in these focus groups gave many suggestions. However, none of the suggestions were present in four or more groups. The suggestions include

- Extension agents need to get back out on the farm
- Focus on water
- Improve knowledge of funding and grants
- Lobby to coordinate regulations across local, state, and national governments
- Establish a political stance/representation
- Get organized, make information easily accessible
- Offer more cross-disciplinary services (i.e. marketing & business)
- Promote farmer to farmer education
- Let me talk to someone who will listen, get out of the way
- Talk to your extension agents, they know what is going on
- Educate the public
- Conduct more research (i.e. organic, aquaculture, worm castings, more research money).
- Help us with marketing & advertising
- Free gas, kill white flies, give us money (unrealistic responses)
- They are doing good

Recommendations

Based on the results from this study, the PIE Center recommends the following:

- The small farmer population in Florida represents a diverse array of individuals with vastly different communication requirements. The demographics collected on the participants suggest that small farmers in Florida represent a broad age range, as well as a diverse length of farming involvement. Just as different generations of individuals require different communication methods, those with little farming experience need communicated with differently than those with many years of farming experience. To research this possibility further, it is suggested that extension continue to monitor program effectiveness via follow-up surveys in each county. This will allow for a comparison between counties to be conducted and analyzed. Additionally, it will identify the suite of tools that could to be used in each county in order to communicate and educate as effectively as possible.

- Due to the diversity of responses on programming delivery, small farms team should continue to seek avenues to deliver educational programming and information via multiple and new channels (social media,

for example) in order to comply with the cultural, geographical, and agricultural needs of different parts of the state.

- Participants in these focus groups indicated that they like to learn from others in their social environment. This validates the small farms conference approach, but also suggests opportunities to build on this success via development of additional social learning platforms, such as mentoring programs, “master farmer” type program, etc.

SPRING 2011

TOPLINE REPORT

Small Farms & Alternative Enterprises

Small Farms Focus Groups

Center for Public Issues Education
IN AGRICULTURE AND NATURAL RESOURCES
UF|IFAS

Contents

Demographic Survey Results 6
USDA Small Farm Classification: 6
Years of Experience Farming: 6
Primary Occupation: 7
Spouse or Partner's Primary Occupation: 7
How long family has been farming: 8
Age: 8
Gender: 9
Race: 9
Highest Level of Formal Education: 10
Greater than 50% of Total Household Income Generated off Farm: 10
2010 Farm/Ranch Gross Income: 11
Focus Group Results 11
Commodities: 11
Now that you have completed your tic-tac-toe boxes lets discuss what challenges you have identified. 11
All six groups discussed the costs of expendables as being a challenge to their small farm: 11
Five of six groups discussed the difficulties of obtaining grants/funding as a challenge: 12
Five of six groups discussed regulations as being a challenge to their small farm: 13
Four of six groups discussed economics as being a challenge to their small farm: 13
Four of six groups identified organic guidelines/rules as being a challenge to their small farm: 14
Four of six groups discussed weather as being a challenge to their small farm: 15
Four of six groups discussed marketing as being a challenge to their small farm: 15
Four of six groups discussed competition as being a challenge to their small farm: 16
How do you make business decisions about your farming operations? 16
All six groups discussed market awareness as helping them make business decisions: 16
All six groups referenced cost as impacting their business decisions: 17

Five of six groups referenced avenues of information, such as acquaintances, as leading them to make business decisions: 19

Do you feel you could benefit from information about business skill development? 19

Five of six groups responded with agreement: 19

Five of six groups indicated that they needed "fresh" information about business skill development: 20

How do you feel about setting goals for your farm? 21

Four of six groups referenced unpredictable circumstances impacting their goals: 21

Four of six groups discussed planning in a realistic sense as helping them set goals: 21

How do you set goals? 22

Four of six groups discussed that their goals are driven by market needs: 22

How do you market your farm products? 24

Five of six groups discussed marketing their products at farmers markets: 24

Four of six groups referenced selling their farm products directly off the farm: 25

Four of six groups mentioned directly marketing their products to customers: 25

Four of six groups referenced marketing their products through wholesale outlets: 25

How do you get the word out about your operation? How do consumers find you? 26

Five of six groups mentioned word of mouth as how people find out about their operation: 26

Four of six groups indicated that email was how they stayed in contact with their customers: 26

Four of six groups mentioned online media as a way of reaching and staying in contact with their customers: 27

Do you participate in any kind of training programs on your farm? Do you or your workers attend any training programs off your farm? 28

Four of six groups discussed IFAS/Extension training programs: 28

Four of six groups discussed receiving training through various expos, seminars, conferences, and trade shows: 28

Four of six groups discussed attending trainings that were specific to certifications/licenses: 29

When you have a question, need more information about something, or are looking for advice on a topic that affects your farming operation, who or what do you turn to for this information? 29

All six groups discussed turning to acquaintances for needed information: 29

Five of six groups discussed turning to the Internet for needed information: 30

Four of six groups discussed turning to their local extension agent for needed information: 30

Do you feel that accessing needed information comes easily? 31

Four of six groups indicated that it was situational whether needed information came easily: 31

Do you use extension programs or resources? 31
All six groups were in agreement that they use extension programs or resources: 31
What do you think when you hear the word food safety? 31
Five of six groups indicated that the word food safety made them think of regulations: 31
Four of six groups discussed concern regarding the food safety of imported foods: 32
Four of six groups discussed the lack of consumer education in regards to food safety: 33
Four of six groups discussed that food safety usually was not an issue on small farms: 34
Do you feel that food safety is an important issue? 34
Five of six groups agreed that food safety was an important issue: 34
Five of the six groups indicated that the government has too much involvement, or is out of touch with the realities, in food safety: 35
What do you identify as sources of potential on-farm contamination in your operation? 36
Four of six groups mentioned animals or pests as being sources of on-farm contamination: 36
Do you feel that you minimize food safety risks on your small farm? 36
Five of six groups affirmatively agreed that they minimized food safety risks: 36
Four of six groups referenced food safety training courses or certifications: 37
How could UF/IFAS and FAMU help you improve your knowledge of food safety principles? 38
Various suggestions were given to help small farmers improve their knowledge of food safety principles: 38
Would you be interested in attending food safety training designed specifically for small farmers? 39
Five of six groups were in agreement that would be interested in attending food safety training designed specifically for small farmers: 39
Delivery mechanisms were suggested in regards to whether they would attend: 39
What do you think consumers think about farmers like yourselves? 39
Four of six groups indicated that they believed consumers thought they were great: 39
Four of six groups referenced a need for consumer education: 40
Four of six groups indicated that consumers were unaware of the work and money that goes into farming: 41
What do you think corporate agriculture thinks about farmers like you? 41
Five of six groups indicated that corporate agriculture sees small farms as a threat: 41
Five of six groups discussed that corporate agriculture was trying to pass for things that small farmers are known for, like local and organic: 42
Four of six groups discussed that corporate agriculture pushes for regulations that only benefit themselves: 43

What do you think higher education (land grant) thinks about farmers like yourselves? 44

Many ideas were presented: 44

Do you think Florida small farmers need to create their own organization? 44

Four of six groups indicated that there would be strength in numbers: 44

Four of six groups indicated that it would be a good idea. 45

Four of six groups expressed concerns with a small farmer's organization: 45

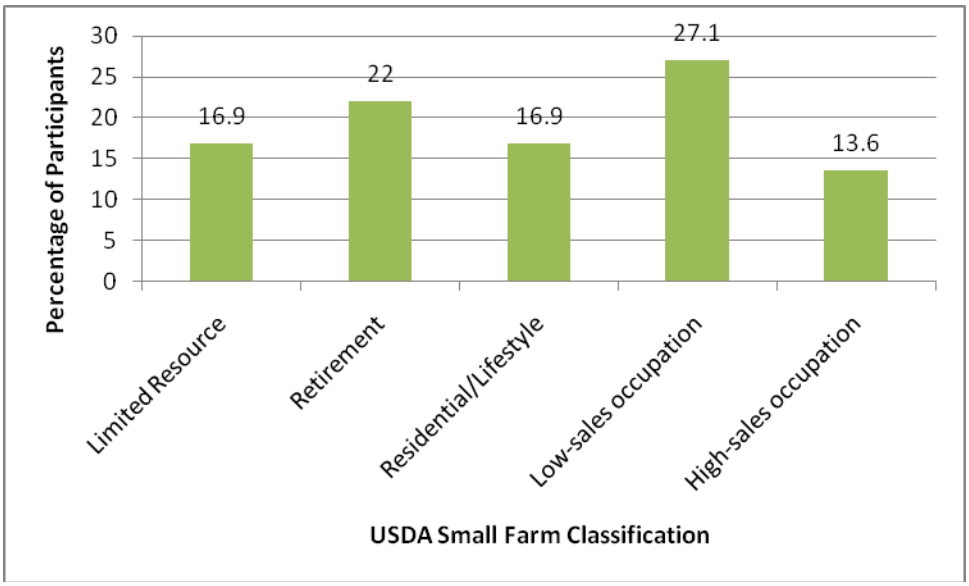
Assume the Dean of Extension came into this room right now and asked for 30 seconds of your advice about the best way to help small farmers. What would you tell them? 46

Many suggestions were given: 46

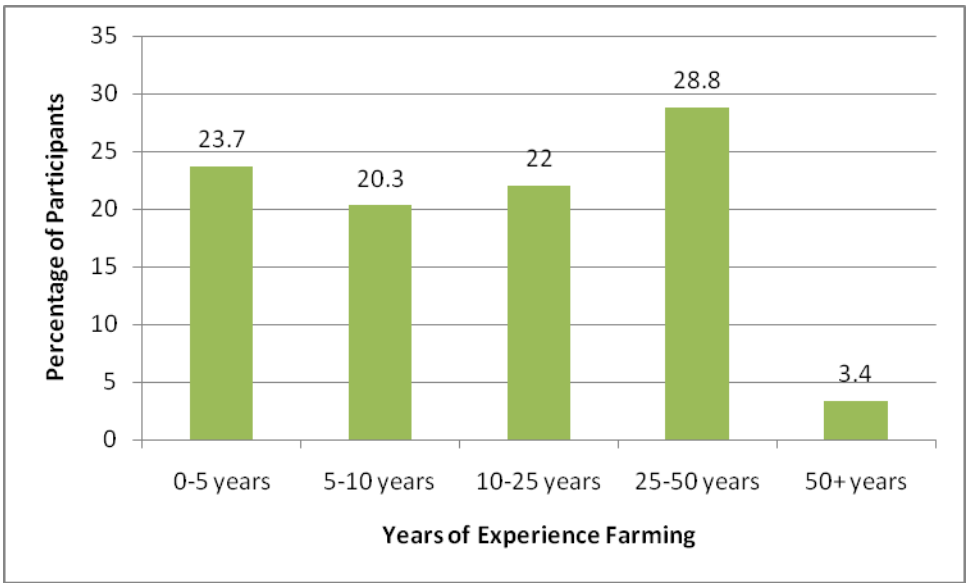
Recommendations 46

Demographic Survey Results

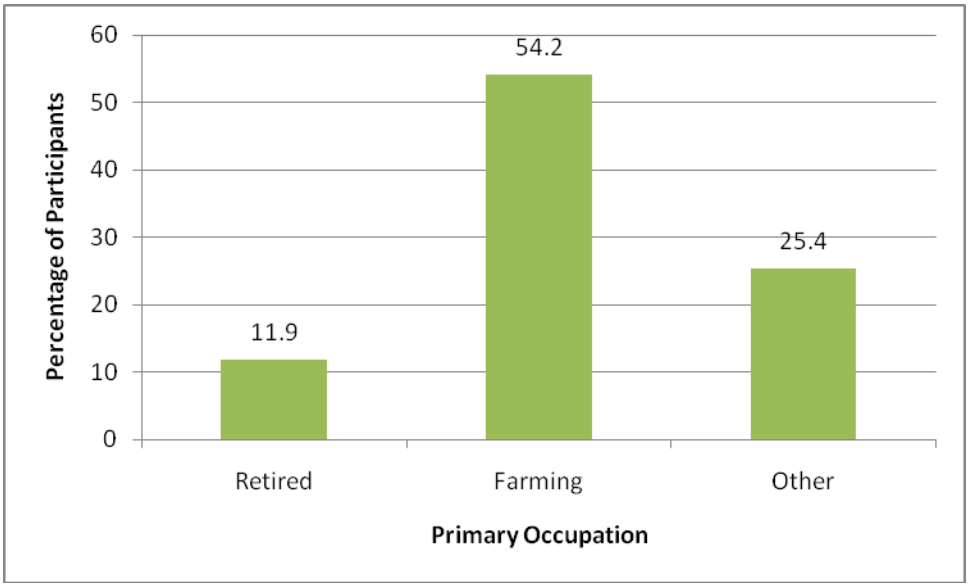
USDA Small Farm Classification:



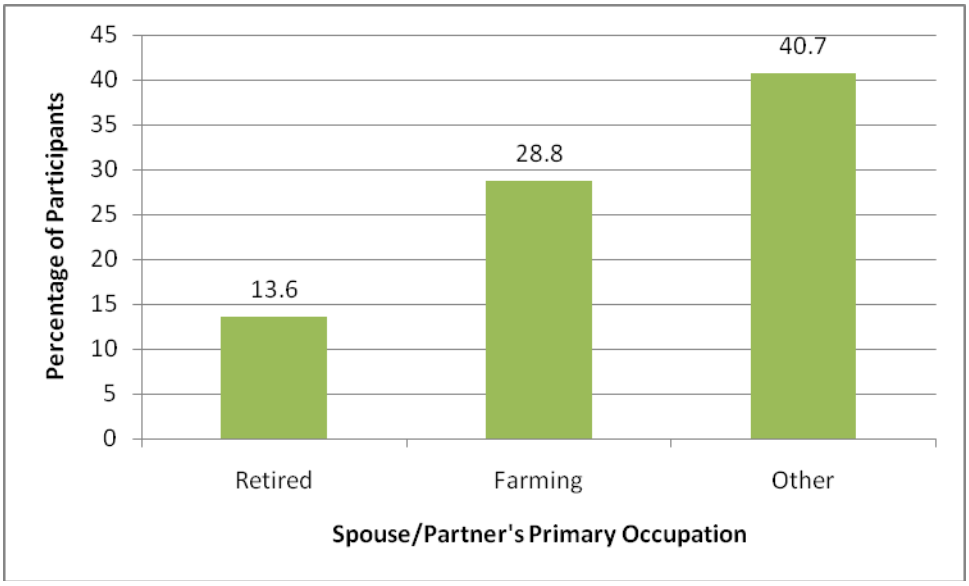
Years of Experience Farming:



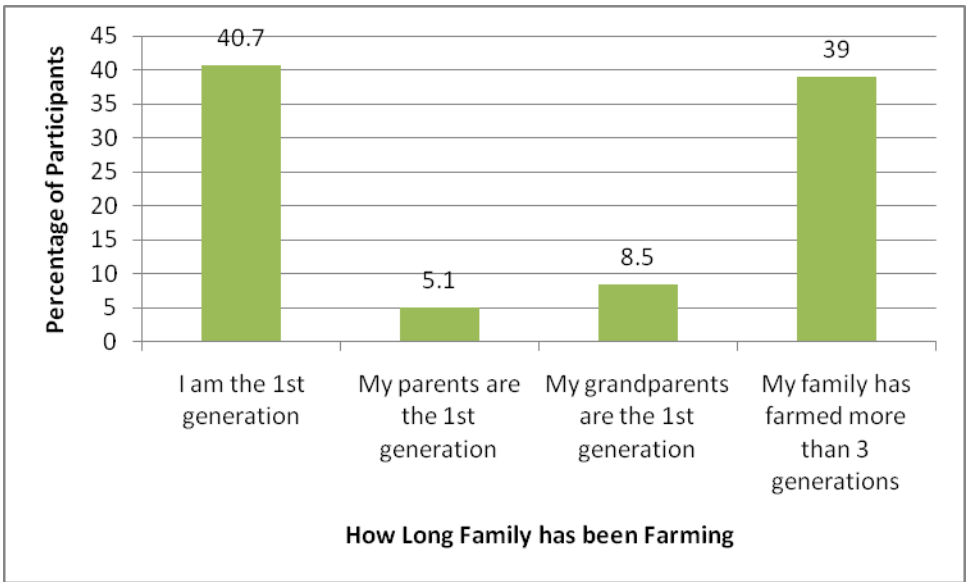
Primary Occupation:



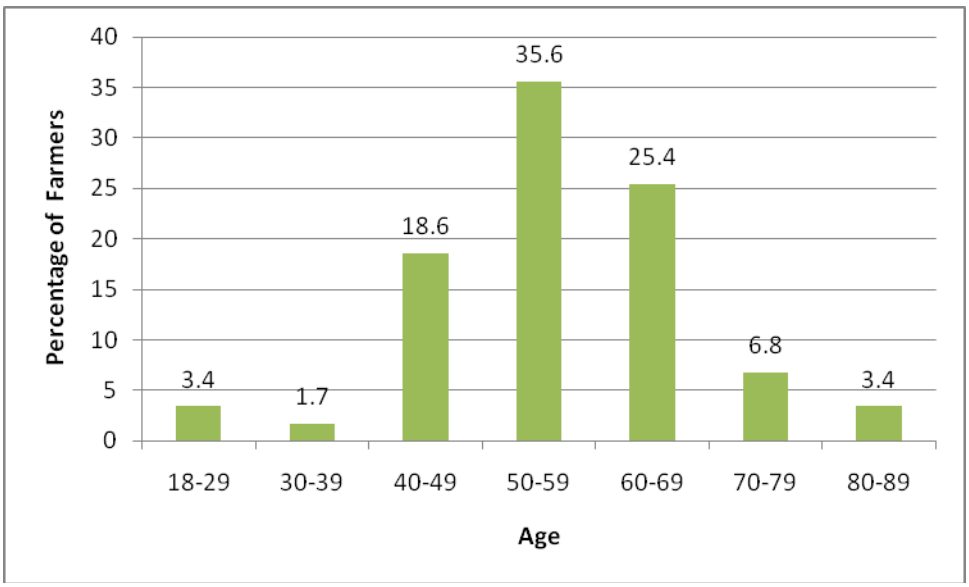
Spouse or Partner's Primary Occupation:



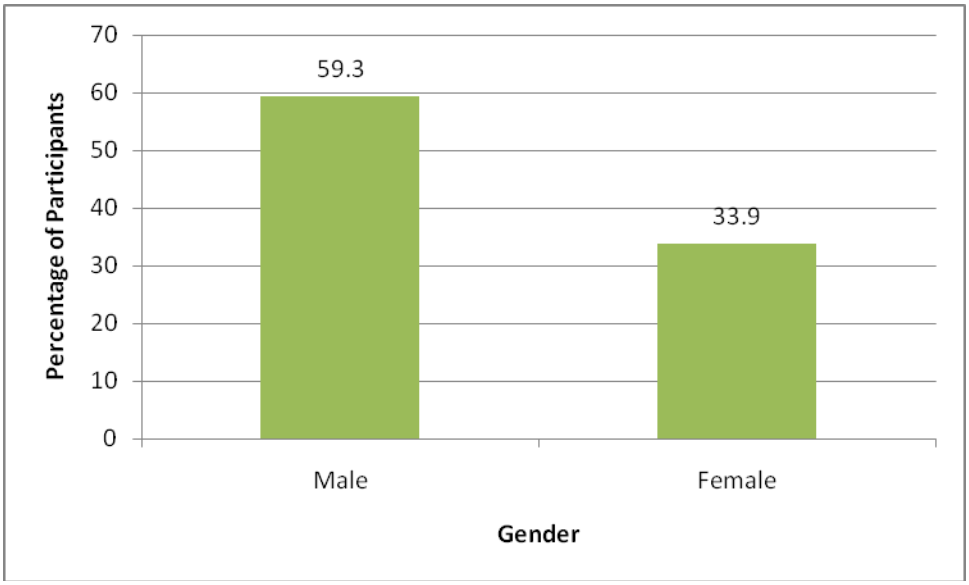
How long family has been farming:



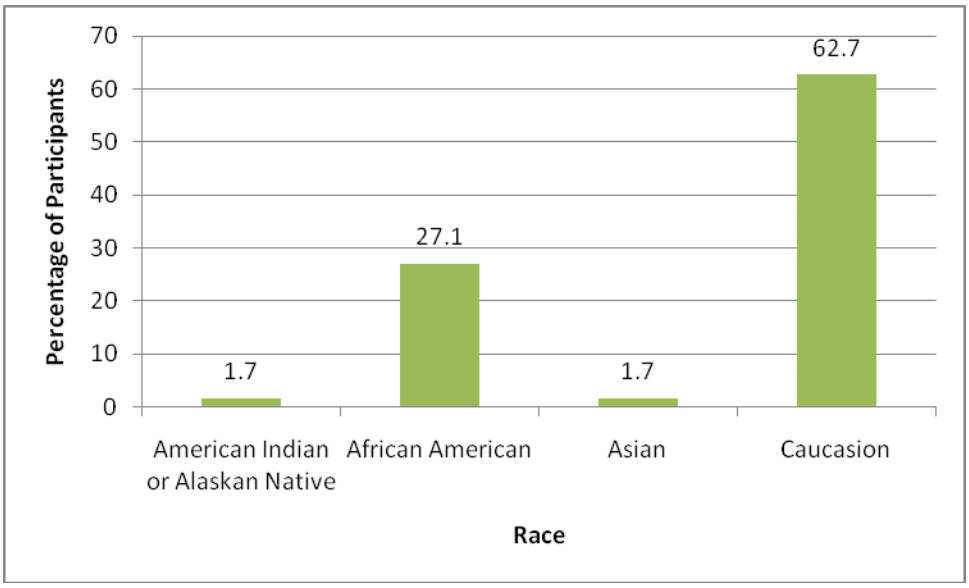
Age:



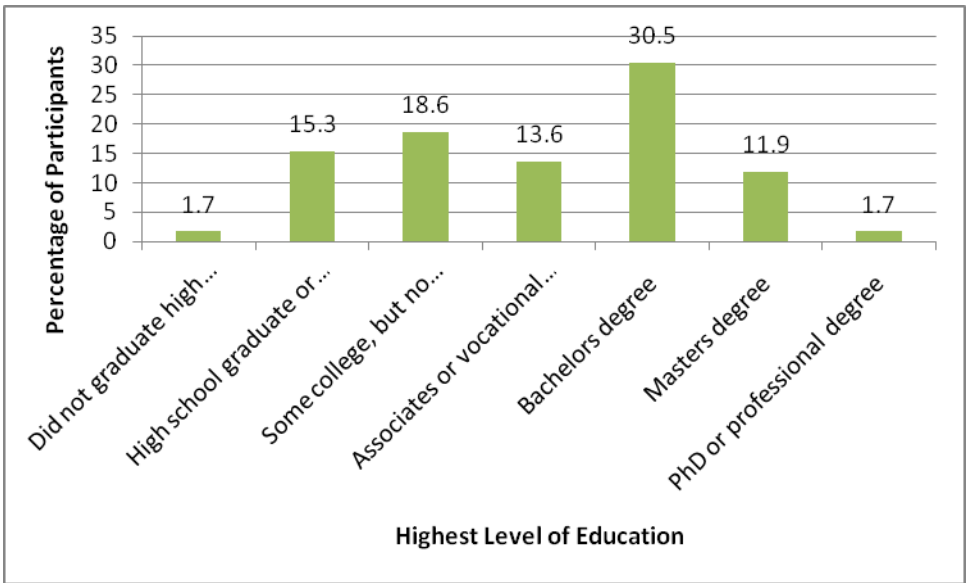
Gender:


70
60
50
40
30
20
10
0
Percentage of Participants
59.3
33.9
Male
Female
Gender

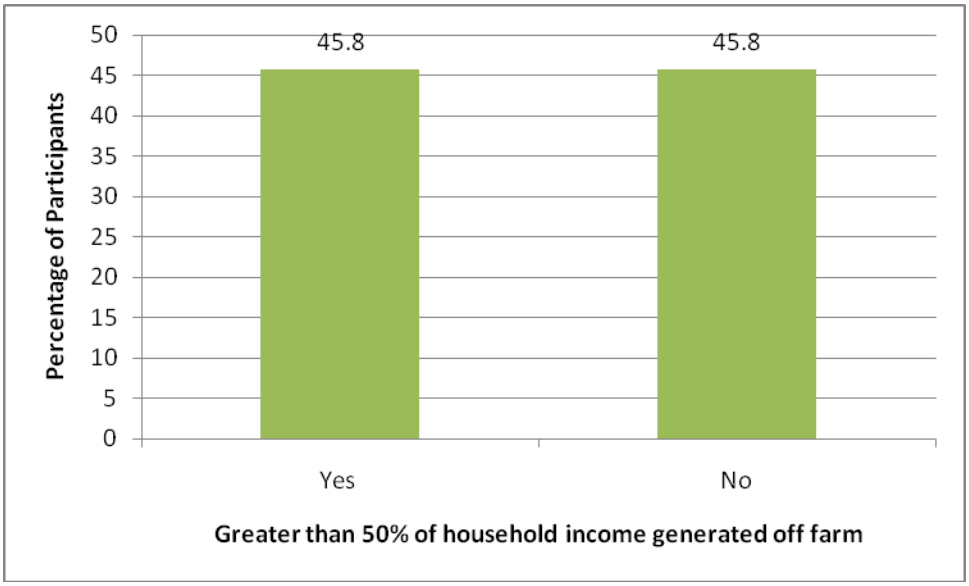
Race:


70
60
50
40
30
20
10
0
Percentage of Participants
1.7
27.1
1.7
62.7
American Indian or Alaskan Native
African American
Asian
Caucasion
Race

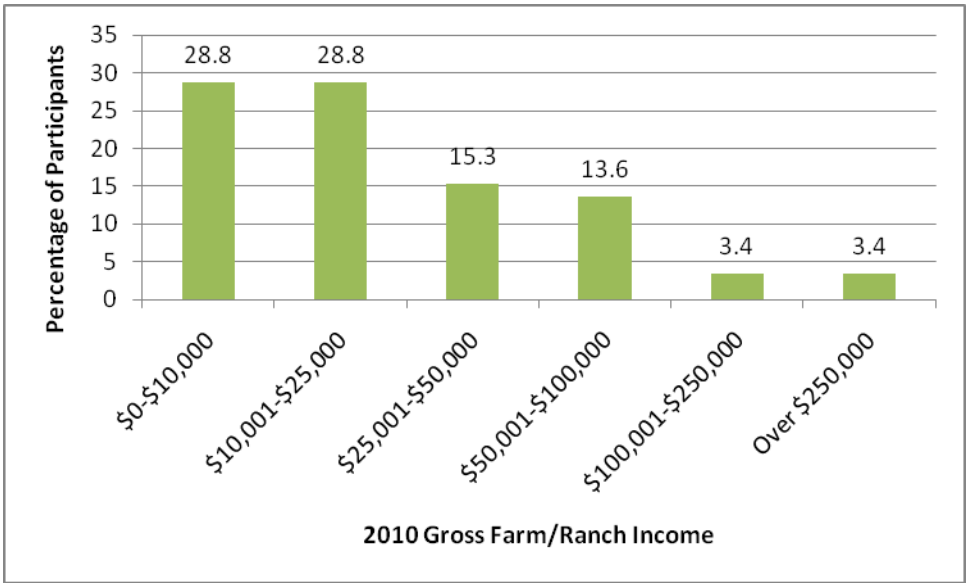
Highest Level of Formal Education:



Greater than 50% of Total Household Income Generated off Farm:



2010 Farm/Ranch Gross Income:



Focus Group Results

Commodities:

Livestock – at least one participant in all six groups raised livestock
Vegetables – at least one participant in all six groups raised vegetables
Fruit – at least one participant in 5 of the 6 groups raised fruit
Trees – at least one participant in 4 of the 6 groups raised timber or nursery products

Now that you have completed your tic-tac-toe boxes lets discuss what challenges you have identified.

All six groups discussed the costs of expendables as being a challenge to their small farm:

- QUOTE: "I have the cost of expendables, and I have in parentheses; feed, fuel, power, things that are outside of our control."
- QUOTE: "That is absolutely correct, fuel, fertilizer, chemicals, pots, soil, distribution, labor are all the costs plus the price of gasoline for delivery. All of those input costs are going up. And there is no question that that is true."
- QUOTE: "I would relate the fuel costs that you are talking about into the total costs, period, because fertilizer, seed." (Another participant follows with) "Yeah, operating expenses."

- QUOTE: "Also, to find a reasonably priced source for organic chicken feed. Right now we are doing it kind of co-op, and we have it shipped in from Virginia once I get 42 bags of something and delivered to the farm. But legally, I am supposed to have a pet food license to be able to sell the feed. But it is $30 for a 50 pound bag of organic chicken feed.

- QUOTE: "Feed prices. Feed prices for animals. Huge, huge challenge. I know most of you all are growing, but when you are trying to grow chickens, or you are trying to grow hogs, or feed cattle or anything like that, it's not advantageous. Because the feed prices are just too high."

- QUOTE: "And I have fertilized three times this year. First time I fertilized, it was $525. Next time I fertilized it was $533. Third time it was $575. I don't know what's happening. Every time I buy fertilizer, the price is going up."

Five of six groups discussed the difficulties of obtaining grants/funding as a challenge:

- QUOTE: "The ability to get funding when you need it. As a small farmer, some of the larger scale places do USDA grants and those kind of funds. I've been going through that for the last several, last year and a half, trying to get grants. In my previous job, I had some experience with some grants and you find out that they are 18 months out before the calls come in or the paperwork is voluminous or you have to have a grant writer. Some of those things are accessible through USDA, like grant writers, for instance, but that is something that you have to aggressively seek and when you work on a small farm and you are a 'mom and pop' and you do everything, you know, you are already running like a 16 hour day, it is difficult to have time to sit down and help somebody word your grant for you. Or you keep hearing that, "Oh there is plenty of money out there for the small farmer, for the small business." But you try to access that. It is not as easy as they make it sound. I have tried to tap into every one. There is about 200 on the list and I have tried to tap into every one, and getting close to one. You know? It is very difficult for the small farmer when you don't have a big lobby group behind you to get that. I am starting to learn ways to get those groups to help me, but to just to reach out there, make a phone call, fill out a form, get the money, it's not that easy. You know?"

- QUOTE: "So, one of the things that would be nice is if there were a way to get a loan when you are a low income farmer and need the money. If you have money, you can get a loan, but if you can just get loans. I have tried the FSA, they claim that worm farming is not farming so, (laughter) I tried to explain to them that it was the very essence of farming, but to them a worm is an exotic creature. (laughs) So, right now I am in an appeal process with them. So those are the things that I am dealing with. Just trying to find a way to get some funding to keep trying different systems. Like I said, I think I have got one worked out."

- QUOTE: "I put first and foremost as being able to be financed. To be able to go to the bank or wherever you need to go to and get the operating capital you need to do what you need to do."

- QUOTE: "We explored flash freezing. Fresh frozen, flash freezing, which amounts to the same thing but it is way out of our financial range. You can't even walk into a financial institution around here and present a farm plan that they will even look at on that scale, being a small farmer"

- QUOTE: "Funding for a larger land that is available is also an issue for me, this is very small, my footprint is in my back yard and I have a lot of verticals. 55 verticals, but it is, there is 3 acres, which is a big jump up for me, closer to downtown that is available but funding for that start up is.... (trails off and doesn't finish sentence)"

Five of six groups discussed regulations as being a challenge to their small farm:

- QUOTE: "I echo that, weather and regulations is one of mine."

- QUOTE: "I think the health and safety regulations are far too restrictive."

- QUOTE: "The biggest problem, the most aggravating problem I'm working with right now is wrong size regulation. A lot of regulations that farmers deal with are written for large scale operations and if you're not a large scale operation then there's a mismatch. Specifically one that I've been dealing with for the last couple of years is eggs. To sell one dozen eggs, under current Florida regulations, I've gotta build a 15 thousand dollar facility to wash them in. And that makes sense if you've got 10 thousand hens in one house, you should build a place separate that you are gonna work the eggs in. But, you know, I've got 50 chickens and I just want to sell a few dozen eggs and I've got to build a 15 thousand dollar facility. So the state studied that for a year and made recommendations to fix it and then somebody in the department of agriculture advertised the report and it's not gonna happen. So, I'm very frustrated by that."

- QUOTE: We are probably both in the same boat here. In order to comply with federal regulations, as an egg producer, the licenses, permits and physical facilities, are gonna cost you about $800 a year. Just for the paperwork. So that is your first $800, not of income, but first $800 of profit has to go just to satisfy paperwork. So most of us are small enough that we just fly below the radar and essentially ignore all of the regulations. Well, you know, we don't like to do that. (crosstalk) We would like to comply."

- QUOTE: "That's part of it, it's knowing the regulations. Just knowing them, it's hard to (unintelligible). I wouldn't have known anything about an ag tag. You know, just by networking with the people. You go to do everything, I have given up, you just go do it and you deal with the problem later and, what do they say, 'ask for mercy?'"

Four of six groups discussed economics as being a challenge to their small farm:

- QUOTE: "And along with that, if we only had to pay our property taxes, we would be fine, but our counties and our states are putting our water districts and all, putting these add-on assessments, which are higher than our actual property taxes. Which makes it, going back to the economics and funding, it is becoming very difficult for you to have fairly sizable acreage in order to farm to try to make a profit. So, I don't whether anybody else is running into that or not, but I have a feeling that you are."

- QUOTE: "I have prices which, you can look at it from every prospective end to produce, equipment, what it costs from the start to the finish. There is always a change. Yes, its true. Prices. Up, down, up, down. You can't sit and put a projected situation out there like if you have some plan and keep it on that level. There are so many changes. You know? So if you've got this project here, and it's gonna cost me a thousand dollars to grow this particular crop and I'm projected out to make three thousand dollars off that crop then by the time I get halfway through I've done spent two thousand by then. That gives the farmer a hit and that's one of the biggest challenges that we are faced with."

- QUOTE: "The cost of the products that you have to use to stay organic and the price you are getting for your product when you do manage to get it through."

- QUOTE: "Citrus, we were feeding the cattle citrus pulp. The citrus companies, they turn the rind and the skin into a pellet for the cattle and for the goats. And it was very economical to feed that last year. This year it is more than double."

Four of six groups identified organic guidelines/rules as being a challenge to their small farm:

- QUOTE: "The organic guy is the one who pays attention to what your neighbors are doing. And we have wonderful neighbors so we, it's nice, but again it is a little bit of a concern there. And it is labor intensive when one of you said that. When you are the only one working, just he and I, and my son-in-law comes and tries to help us some too, and when you are organic, it is labor intensive. You have lots of pests and lots of things and you have to know, you have to read the labels to find out if this can be used for that. And sometimes everything in it is organic, but it won't be approved for you to use.

  (Another participant's response) Yeah, in the organic outline, I mean the products on the NOP, there is no list of products. There is nothing. They give you clues. It's very klugey. I looked at it too. (Agreement heard) Just to see if I should transition..."

- QUOTE: "Growing specialty crops, there are just so few pesticides that are labeled today that we can use."

- QUOTE: "I have something, I put the push to be organic. We are not certified, but we do the same thing. The fertilizer is not, but all the sprays and stuff are, some of it's expensive. Especially when you get into the fungicides."

- QUOTE: "I had recent drop-outs from the CSA membership, but I wanted to address something that (name omitted) had said about hydroponics not being organic, that, I don't think is accurate anymore. The aquaponics is fish and it is in a soilless medium and it can be certified organic, it has and it is. Oregon Tilth certifies. They have certified Friendly Aquaponics in Hawaii. And I've also spoken with QSC, he is shaking his head no, is why I'm saying it."

Four of six groups discussed weather as being a challenge to their small farm:

- QUOTE: "And then also, most people, they don't understand what role Mother Nature plays and what we have and what we don't have. And why at times there is a shortage of a product and at other times there is an overabundance. And, you know, so we live and die by what Mother Nature does. (Agreement heard and crosstalk) And we have no control over that."

- QUOTE: "And I feel, and I looked at one other things here, weather conditions without irrigation. You know? We talk about it all the time how to try to build a poor man's irrigation system. There is no such animal. (lots of laughter) You can get a lot better bucket."

- QUOTE: "I'd say the last two years it has been the weather. It has been an extreme challenge, and we going to more protected agriculture. We are building hoop houses, even for the small kid's gardens that we have, we bought one of those benders from Johnny's Seed Catalog and we are building these hoop houses and we are conducting these studies on covering them with different colors of shake moss as well, but that has been a real challenge. We are in Pinellas County, supposedly Zone 10, but we have had some extreme winter conditions here the last two years."

- QUOTE: "Another problem I have, a lot of times it rains, and it floods me out.

Four of six groups discussed marketing as being a challenge to their small farm:

- QUOTE: "Marketing, it is really hard, although a lot of people now-a-days have heard of worm castings, they are not familiar enough with them to want to really buy them. So the buyers I have are mostly small home growers who like to try things. But the larger businesses don't want to try a new product without some kind of back up. So those are some of my challenges."

- QUOTE: "My problem right now that is the market is flooded with people that are thinning and you gotta thinning when the time comes that you are gonna be plagued with disease or competition from undergrowth and all. So there is no win/win situation. You gotta move when the time comes or else you gonna lose your trees."

- QUOTE: "Marketing is a big problem with us. The big fish always eating up the little fish. Small farmers don't have good access, cannot get in on a lot of the larger good markets and all of the conditions that goes along to explore that particular issue."

- QUOTE: "I never have enough time in the day to create a website which is a challenge. And satisfying local markets is a problem for me. I don't have a problem, you know, taking a couple thousand pounds of blueberries to the packing house, but all the local people want to know when your blueberries are in and they want to buy them. But it's not convenient to sell, really, to local markets. And high risky investment that we have. We risk everything."

Four of six groups discussed competition as being a challenge to their small farm:

- QUOTE: "The flip side of that is that the fear of what comes in from overseas creates a market and we sell a lot of trees to backyard people who want to grow their own fruit. And that is the same with everybody buying locally, but that is the opportunity. And they are willing to pay more. It still doesn't stop the cheap competition, we don't face imported competition but we face it from the large mega-nurseries that sell to the chain stores. And people expect us to match the chain store price and to have a guarantee. "Well, you don't guarantee that?" It was in good shape when you picked it up here at the farm, what you did with it afterwards, I can't control. (laughter)"

- QUOTE: "I put competing with large farmers or resellers. I know a lot of the markets we go to, most of the produce vendors don't grow anything or very little. And to compete with that..."

- QUOTE: "But, you try to come up with ways to facilitate what you need to do to be competitive. But the real world here, until you can play ball with the big boys, or get us to do what we got to do."

- QUOTE: "I put crop insurance. I plant around 500 acres of vegetables, primarily peas and butter beans. Under USDA you can't get crop insurance for non-irrigated crops. My issue I got is the USDA and even talking to them. I can't understand how I'm about a half mile from Alabama and about three miles from the Georgia line and a lot of my friends in Georgia and Alabama, they have insurance on non-irrigated crops and Florida does not have that. All of that is federal dollars. That's a federal program. Why Florida does not have that? For example I had an issue with deer/hogs. I had about a hundred acres of peas down on the river and they got about 4 inches or 6 inches tall and the deer went down there and just ate them all up. And so I lost all that. When a farmer have a dry year, he could lose all that and the government won't help you out in the state of Florida. I can't see why the state of Florida does not have it."

How do you make business decisions about your farming operations?

All six groups discussed market awareness as helping them make business decisions:

- QUOTE: "Well, we just got in with starting the vegetables and things, so there is the need out there, but we have got to try now to decide, like we talked about the farmer's market and what you would like is really, for people to come to where you are. So that you can get the stuff fresh to them instead of picking and then going to the farmer's market and not knowing what they want."

- QUOTE: "What I did my second year was, I had already gotten an individual clientele of household people that either come by and did their own picking or I would see if I could meet them at the farmer's market. Well, we come up with this idea, people say, "Can you grow this, can you grow this?" So last year, I had a questionnaire at my stands, we had four produce stands set up. And they wanted certain things so my wife, she should be sitting here, the brain. She put that together versus the cost of how much

we would have to plant, with a half of a commitment. Almost like a CSA, almost like that, but nobody committed. And we based some of our decision on if we were going to plant a quarter acre, a half acre or just a couple hundred foot rows or whatever. That is keeping it simple and we did very well doing that. We didn't over plant, in fact, a few things we under planted."

- QUOTE: "Yeah, you use all those strategies, but your main business decisions in agriculture is based on the market. That's what is going to determine how you operate."
- QUOTE: "Well, you go back to what you were talking about, about the labels that are ORMI approved and think about what you are actually using on your own farm. And look at how many of those you are using. The things that stop it from being organic, I'll use cantaloupe for example because I located a cantaloupe plant a while ago. A Hale's Best cantaloupe is not a hybrid, you can call that organic, but an Athena cantaloupe is a hybrid grown in identical conditions you cannot call it organic because it is a hybrid. But it goes back to the human factor you were talking about, the most perfect tomato in the world has got all kind of pesticides and stuff on it. And an organic tomato over here has got a couple blemishes on it, got where string burn has been on it, which one are you going to, as a consumer, which one are they going to buy? They are going to buy that perfect looking tomato first. They are not going to buy a blemished, even though this is an organic product, I don't think. I think there is always going to be a niche for it, but it's going to have to be found and it's not in this area.
- QUOTE: "I'd say that mine are pretty much market driven. Your comments are very good, but the way I do it, rather than putting in the two acres of tomatoes and then trying to sell them, I try a little bit of this and and a little bit of that and find out what I have got a market for. For instance, I've got, much to my surprise, I've got a small, local enthusiastic market for collards. Never would have though you could sell collards. They are so easy to grow. And they are not a very popular vegetable. (crosstalk) But there is no reason for me to put in 5 acres of collards because I have a few customers that want them. Okay, so I put a little patch of collards and feed those folks. And then, likewise for everything else."
- QUOTE: "What they prefer. I have got about 40 different kinds of mangoes that I grow and every year I get customers that come in and prefer one over the other. So after about ten years, one variety may take preference over another, I will go in and wipe out or cut down a row of trees and top-work them and put on a different variety. My trees are there, I don't have to do a crop year after year or replant year after year, but I do have to change the type of tree that I am growing from one variety to another"

All six groups referenced cost as impacting their business decisions:

- QUOTE: "Okay, I know with me, anyway, and hopefully with you, it starts with whether we think we would enjoy that particular kind of thing because if we don't want to get out of bed to do it, then it's a no-starter. So, we start with whether or not we think we would enjoy it. And then we do research about how it is being done around us, and even internationally. You know? We studied pastured poultry through the French Label Rouge Program. And looking at different things, looking at costs that we can identify,

looking at labor. How much time, we call them cycles. How many cycles do we have for that? And then we also look and see, is this going to complement the other industries that are going on, on the farm, the other species. Or is this going to be one off? And in that same line, when it comes to marketing, is this going to be a compliment to what we are already doing, or is this going to be one off and we are spending extra, you know? So that's how we look at a lot of things."

- QUOTE: "And what can you afford to try? You try so many things that you run out of money and you think, "Omigosh I should have tried something else." Too late now"
- QUOTE: "This is based on ROI, return on investment. What you put into the ground, you expect to get out of the ground. However, the biggest key is that you aren't guaranteed a price. Like I said right now, there is no farm program right now. It's planting time and you don't know what the farm program is gonna be. That's what is killing us and we need to know up front what it is. If we can get that, we will know what direction to go. If we know that we are going to get $10 a bushel for corn, then guess what? We will plant corn. Your input costs right now on peanuts is nowhere near what it used to be, that you gonna get the return out of. That's the biggest key."
- QUOTE: "Coming from me a limited resource, limited smaller farmer, everything is risk based. If I grow this crop what am I risking? How do I mitigate that risk? What is the payoff, is it worth it? Everything for me is a decision based on what happens if it don't rain, or we don't get labor in. Thats...(sentence trails off)"
- QUOTE: "I think the difference being is that you said people come to your gate to purchase so they have a little more hands on, versus I know (name omitted) does the markets and it's very hard to predict what is going to sell and you hope that you put in the right crops. That is a big part of business, trying to figure out what crops you are going to put in, who you are going to sell it to, and how much you are going to sell it for. (agreement heard). Like (name omitted), we sell right off our property. We haven't expanded enough to make it feasible to go to the market. And do we just sort of look at the whole picture and decide what path to take or whatever is the most urgent thing to take care of?"
- QUOTE: "Well, I try to do a business plan, to where people come to you and say, "Oh, you should do alpacas." And you are like, "Okay, well tell me how much am I going to get for the wool? How much wool am I going to get per year? How much is it going to cost per year to house them? How much is it going to cost for the animals?" You have got to have a business plan. Well, people don't seem to have any concept of that. They just say, "You should do turkeys, or you should do hogs." You know they just come up with this stuff because they heard somewhere that it was fun to do and you could make money, but I have found that almost never to be true. You don't make money with alpacas or hogs or most any other animal because of the feed prices and there is no market for alpaca wool, even though people like to pretend there is. So, it is something that if you don't dissect it out into a business plan and really look at it as opposed to talking to the breeder of the alpacas who is telling you that it is a great investment, you have got to look at all the sides."

Five of six groups referenced avenues of information, such as acquaintances, as leading them to make business decisions:

- QUOTE: "For our rabbit production. We learned from the first small farmer's conference we attended, we met Beth Sealy down there and she, that's why we decided to get into it, because we knew we had a market. I can't imagine getting into some of these things and then making your own market. People that are getting into the business, and then going out to make their own market, that is two or three jobs right there, a marketer and a...(sentence trails off)"

- QUOTE: "I have taken to calling around the state or even other states that are in a similar climactic zone. I was getting some dirt delivered for raised beds. I thought I needed something else, I didn't want to spend $1000 on dirt and find out I got the wrong dirt or whatever. I eventually found somebody in the Panhandle who could talk to me on my level and who really knew what they were saying, but it took a lot of calls, a lot of calls. A lot of unanswered emails and such."

- QUOTE: "I have friends, people at the chemical places and places like that for the finer points."

- QUOTE: "Another thing that I have found, and it probably wouldn't work for a larger operation. I am a partner with a CSA where I have a surplus of something coming, kumquats, for instance. Doesn't seem to be a very big demand for kumquats this year and I'm going to have a surplus. I'll partner with a CSA down the road and they do go to the farmer's market. It isn't worth me going to the farmer's market just to sell some kumquats. They will add my kumquats in so if they have a nice spread there, it increases their diversity at the market and helps me unload a few things that aren't moving."

- QUOTE: "I think on the choices, is the education of the farmer, your periodical articles, your magazines, anything, any educational group you can go to, you are just so surprised where you learn a good way to make a good decision. Learning doesn't come from sitting here, but maybe in the hall I will learn something from (name omitted) about something that she is doing with her fish. You have got to open all of your avenues."

Do you feel you could benefit from information about business skill development?

Five of six groups responded with agreement:

- QUOTE: "(Sounds of agreement, Absolutely, Yes, Yes)"

- QUOTE: "(Agreement heard, Yes, Sure) We desperately need that."

- QUOTE: "I see some heads nodding, would you like to expand a little bit more on what areas you think you could use information about, like specific areas?"

- QUOTE: "I do, we do, I think."

- QUOTE: "(Agreement heard~ Yes, Absolutely, Yeah.)"

Five of six groups indicated that they needed "fresh" information about business skill development:

- QUOTE: "I have been to a lot of those, how to market products and how to, in reference to your question, and after you have been to 7 or 8 of them, they seem to be regurgitating the same information and a lot of this sounds good, but you know, a lot of it is not really useful. You can only hear it so many times and, on my scale, I can only use so much of it. It may be different for a big corporation but, after a while that stuff is kind of the old tricks kind of thing. If you had no knowledge at all, it might be important to sit through a few of those, but after you sit through a couple of them, personally, I don't get any more benefit out of them after I have seen it two or three times."

- QUOTE: "My impression of the University system is that it spends a tremendous amount of time focusing on how to grow, and very little, from an Extension standpoint, very little information on how to market. Everyone of us becomes the salesperson. And there is not extensive information, there is tons of stuff on how do you produce the crop, but very little on how you sell it. And I think that is a real, from an accounting standpoint, unless you go and teach yourself how to be an accountant, there is not a tremendous amount of bookkeeping stuff available, at least through the current information available."

- QUOTE: "I'm a Gator grad, Go Gators. But that is one of the things I fall out of favor with, with UF and the Extension Service, is they are for the big guys. Sometimes when I speak to them here in Jackson County and my hat is off to Mr. Brasher. He is working his butt off for the small farmer, the vegetable farmer. Ed Jowers?, I like Mr. Jowers?, known him for a long time. But you go in and talk to them now and say, 'I got a cow here that I need some help with.' He doesn't want to hear about a cow he wants to hear about 1000 cows. He wants to hear about 500-600 head of calves. He don't want to hear about, 'I got a cow that's got a problem, what can you help me with, give me an idea of which way?' And he doesn't realize that by telling you that information for a cow, that that will translate into years later, several cows down the road. You know?"

- QUOTE: "I have looked into that. Standard business models, and tried to get ahead on something better than the traditional shoe box full of papers. And, my situation at least is so diverse, and so fluid from one year to the next, that any of these models that are presented in textbooks or the software just doesn't have the flexibility to reflect what is required in the real world. It is a great theoretical construct so it gives you an idea of, this is kind of how you should be thinking about things. But as far as actually using it on a real life basis or generating documents that the IRS will like, I just can't get interactions between reality and software or even bookkeeping models. There is always those things, like where does this go?"

- QUOTE: "I was looking at Facebook last night and thought how can I create a page? (crosstalk) Because I was looking at other people's blueberries information and they weren't talking prices or anything. What should you say on Facebook? Should you say a price? Because it seems like daily you would have to be posting to it or taking a picture of yourself doing whatever, it's just a constant....

How do you feel about setting goals for your farm?

Four of six groups referenced unpredictable circumstances impacting their goals:

- QUOTE: "I think that is the hardest thing, is the crystal ball, because you know, every year you are going, "Okay, we sold this amount of this many items last year, now where is the market going to be next year?" And a lot of times, the crops are three to four years, and it has got to be the same with animals. We are looking at production times of three to four years. Is the market going to be there? I just finished dumping a bunch of magnolia trees for 30 cents on the dollar because there ain't nobody buying magnolia trees. Or oak trees. (Sounds of amazement; Wow, Really?)"

- QUOTE: "It's really hard to set a goal because, take if you growing corn, if you contract your corn for, say $5 a bushel, okay, if you don't contract your corn you won't own the contract for $5. I know a farmer, this is true, I know a farmer, contracted 10,000 bushels of corn for $4 a bushel. He had to make the contract. Now corn is $7.60 a bushel. He got to fulfill that contract before he can sell any at $7.60 a bushel. That's $3.60 more a bushel lost. And then if you don't have a contract, if corn $5 a bushel, he'll start off paying you maybe $4.95. For two or three days then it's gonna hit the bottom and stay there until you get all the corn in and then the price will jump back up again. That's the truth."

- QUOTE: "I would comment on that too, and the five year plan sounds about like my time horizon, and your comment about the severe weather. I planted a lot of key limes, because it was a tree I was familiar with in a prior life and that. So I had a nice grove of key limes which were just coming strong into production. I developed a market for the key limes and was beginning to get calls at night, 'Hey, can you bring me some, can you bring me some?'. And then two years ago we got one cold night and this past winter again, and I now find myself with a huge market for key limes and I don't have a single live key lime tree. It would be foolish to replant. I should learn my lesson that basically you don't plant key limes north of the Caloosahatchee River, so there goes the five year plan. The five year plan up through year four was working great. Plant the trees, develop the market, there was the demand, the trees were increasing in production, everything looks good. Except for two or three cold nights and suddenly your five year plan is trash. You gotta just take a deep breath and go in a completely different direction. And I suspect that is true probably for vegetable crops too. You have everything up, you've got set fruit and you get one of those nights, and you are just suddenly out of business"

- QUOTE: "They (goals) are fine, but they have to be flexible and you have to change all the time. Because somebody down the street is going to grow. Or somebody is going to come up to the market that is going to compete with you."

Four of six groups discussed planning in a realistic sense as helping them set goals:

- QUOTE: "Well, I mean, like our strawberry production, we would take one of our houses, we would want 10,000 plants in it, so we did the math. You know, from 10,000 plants producing a pound per plant, produces this kind of revenue based on how much you charge, for us. We did, our whole business model

is designed around the idea that it is a successful business. You can't sell anything that somebody is going to invest in, they have got to have a return on investment. I don't know if most farms do start out as start out as 'build it and they will come' type of thing. But we kind of backed into it a little bit."

- QUOTE: "A plan, to me, is the key of everything. If you don't have nothing planned then you just shooting in the dark. Okay? I've been planning for the next four years. And that's everything. I've got 10 different books at home, I keep records of. Every night I go and do record keeping. Every night. Cause I already know what I'm gonna plant next year at this time. I know what I'm gonna get when I sell it. How do I know? When I wholesale it, I know what price I'm gonna get on them, cause I already got that done. If I'm planting peas for example, I'm gonna have to sell those in stores here, (unintelligible). Well no problem, I'm gonna plant enough for next year. I got 100,000 bushels. I already got a contract and a price. I know I'll have this already sold and if the price goes up I got enough to sell individual or wholesale somewhere else. Everything is in the planning. Even in the case of fuel. What it's gonna cost me in fuel. I got to put all the into consideration in my planning. I even got to plan if I make $100,000 this year, where's I'm gonna do with that money. Do I invest it back into the farm or put it in savings or I put it in a CD or what? So from the time, before the seeds go in the ground, you need to be already planned. Plan for everything, if you make a dollar, if you lose a dollar. But you got to plan for everything. And so planning is the key to anything. If you ain't got no plan that means you just don't know what is gonna happen."

- QUOTE: "Well, you have to know where you are going. You have to know where you are going so you have to set goals on a five year basis and you have to have a plan on how to get to your goals. You have to know what you want in order to get there. You have to be able to see it to get it."

- QUOTE: "We started with a five year plan and this is our fourth growing season and unfortunately we could add another five years because so many doors have opened. But what many of these folks have mentioned is really a matter of location. We are in a location where we are only a 100 feet wide and we have chefs lining up at the gate and saying, 'Can I come in and get something?' And we can't possibly grow enough. But I can't drive down and get her tomatoes. I would love to have her tomatoes, you know? And how we can do something like that. And how we could do something like that. We did have a plan and have it all laid out and it looked so pretty on paper..."

How do you set goals?

Four of six groups discussed that their goals are driven by market needs:

- QUOTE: "But what does really work in his favor is the locally grown element. (Agreement heard) I think it is real. We have made a whole business shift over to a whole new product based on the fact that people would like to know where their food comes from."

  (Another participant states) "Exactly, I agree with that."

" And that is a lower demographic too. It is younger people that are wanting that to happen. Younger people are going to be the new market of the future, so (name omitted), if you can get a CSA up and going, it probably has a chance of being a pretty strong success."

- QUOTE: I set it based on the element of competition out there. You've got to feel it. It's just like walking in the woods, something slip up on you, you feel it before it gets you. And, just like me, I told James Bailey?, I told the gentlemen in Georgia, I said, "man, this cut green business is fixing to get outrageous." Because see, people watch you. When you go to the store you drive the nice truck, your product is nice, they figure you making money. So guess what, you go looking and everything you go is like the guy from South Carolina, or the produce providers in Mobile call me and say, 'we got a guy from North Carolina buying your greens out of South Carolina.' Well he's buying them cause I invented the cutting. It was only after, I hid my secret for about 10 years, hid, all right? Back home we got two types of greens, we got a frying green and we got a boiling green. For years, all you saw in the store was boiling greens. Well, I did what I called a frying cut, and you couldn't find them in no store nowhere. And boy, I just had a gravy train. But I know eventually the big man gonna catch up with me because once he saw. Now he wasn't losing, but when he's used to selling 50,000 bags a week, and he dropped down to maybe, oh, 47,000 or 48,000 then he got to see where it's dropping off. And he saw it dropping off in the south because I was selling them to Alabama, Mississippi, Georgia and Florida. He said, "let's see what is going on there, why nobody buying greens." So he sent a representative down here and they said, "fine cause I don't like to cut them, but if they selling good, do it." So what I do in my business is I see where the big guy is coming from and you can't beat them so a lot of times what I do, is I say, 'I got 5 years to diversify and move beyond him.' And so like, I went from selling to stores, well I start off selling to schools, then I went to the stores because the school would buy but the store would pay you cash every week. So it helps your cash flow out. Well, all of a sudden, the big guy want to push in on that market. So I find myself going back to the institutional market. And that's what makes small farmers have to network together. And you going to have to go there, and one PhD, Dr. Russ? down here in Quincy told me what I'm fixing to say now. It's not that it don't exist, he says you got to create a business friendly relationship. Men that if, I call Calhoun County right now, and say, 'Paula, I got an acre of turnip greens, and I need to move bad (unintelligible).' Guess, what she's gonna say? "Bring 'em on." See? I can call Doton? City Schools and say, 'Tanya, got some excess watermelon that I need to move bad.' Guess what she going to tell me? "Bring 'em on." I think being a visionary and making decisions on what to do, for a small farmer how to do now? Is that we going to have to pull, we going to have to pull some political moves. And by going in and creating that portion of the market where the procurement person feels like, it's like, look Leon County told Sysco. Sysco saw their collard green order drop totally off the map. Leon County wouldn't buy collard greens from them no more, wouldn't buy them from Sysco. Sysco called it's food rep and said, "I see you all ain't buying collard greens no more, what's wrong?" Leon County stood up for us and said, "Look, we gonna buy what we buying from you, but the collard greens, we gonna get from the small farmers." See you don't have to have all the business, just a little bit. But you've got to personalize it. So a lot of times you gonna have to make your decisions based on that unknown competition out there that

you feel that's sneaking up on you. Then you can get your five years to make a change. And after that, they gonna cave in on you."

- QUOTE: "It really does seem to be consumer driven. We get a lot of requests from LocalHarvest of people saying, 'Are you open to the public, do you have a farm stand?' They have gotten pretty savvy, they come to a farmer's market and there is not a farmer to be found. At least in our area, they are all produce peddlers. And so people really want to know the farmer. If they have been a member of a CSA in another area, they find us through LocalHarvest or what have you. We aren't set up that way, there is only four of us who could possibly man a produce stand and wait for someone to come and buy vegetables. But it is consumer driven, and we were naive enough early on, that we gave our CSA members and all of our chef's seed catalogs so then they came back with all these wonderful ideas of things we can grow. (agreement heard) Bad idea."
- QUOTE: "I guess, I am just looking as an up and coming person, trialing things and looking at market niches, I guess. From there, maybe creating a business plan and setting goals off of that."

How do you market your farm products?

Five of six groups discussed marketing their products at farmers markets:

- QUOTE: "We go to farmer's markets."
- QUOTE: "We do pre-sells, using email and then we deliver to farmer's markets."
- QUOTE: "There's some farmer's markets. The one here in Marianna, and a brand new one fixing to open up. There's Piggly Wiggly Stores in Graceful?, Bonifay, Chipley, Port St. Joe, Bristol, Doton?, Bainbridge. Mainly just like that. But you have to know what they want and where. I mean, a speckled butter bean, if all I got is speckled butter beans and I take them to the lady in Doton? at the Piggly Wiggly up there, she's gonna say, "uh, no."
- QUOTE: "Oh, so my original concept when I opened was, since I am downtown, and I'm only growing a few thousand plants, literally, a few people from the neighborhood is all I really need as customers. Well, that never happened, so I finally threw up my hands and said, "the hell with this", and I went and joined the farmer's market downtown and that's interesting because you have to build a clientele. Against not only the crop vendors at the end, but then you've got a (name omitted) who has been growing amazing product forever and been there forever, that has a loyal following that I can't dent. But..... (sentence trails off)"
- QUOTE: "My husband makes flyers and passes them out. We con people into taking them. We put them in mobile home parks. We sell at downtown farmer's markets. We have a farm stand. I use the internet."

Four of six groups referenced selling their farm products directly off the farm:

- QUOTE: "We still actually use the newspaper for local business for when we have open houses, because we have a store, the alpaca products store. The garments and whatnot. And it is expensive, but we have certainly had success with it. And in the newspaper ads, the result has been very kind to us with what is called the Beacon. It is an insert on Friday, and we seem to end up in there quite a bit. It is really nice, people like that. It is not just pictures of us, it is pictures of you there, holding the alpaca when you came to visit or something else there. It has done well."
- QUOTE: "Primarily two varieties. The rest of them I convert to the olive oil. But I sell right at the farm"
- QUOTE: "I opened in a downtown location, as an experiment for a bunch of reasons. For one, I couldn't find any reliable information out there on the numbers of what a hydroponic farm will do. And everyone was saying, there's no land, there's no land. So I put it on a warehouse roof downtown. I mean, there is plenty of land, but no one looks up. The beauty of the land that you look up for is that it is pretty much paid for already which certainly helps on the cash flow. Where do we go from here?"
- QUOTE: "Primarily two varieties. The rest of them I convert to the olive oil. But I sell right at the farm."

Four of six groups mentioned directly marketing their products to customers:

- QUOTE: "We direct market end users."
- QUOTE: "direct marketing"
- QUOTE: "I'm trying to have it direct marketing so I know what I'm doing. That's the best way, but sometimes you have to go to the market.
- QUOTE: "Right on my, I have a fruit market right at my grove and I sell everything right out of there pretty much, unless it is a good year. Then I have to go out and peddle it. But I go to, I market mostly to Asians, and so I have to find where the Asians hang out. I go to a lot of nail salons and peddle my goods there."

Four of six groups referenced marketing their products through wholesale outlets:

- QUOTE: "wholesale"
- QUOTE: "Well, with this wholesale co-op we have a person that do market. That's what they do, they go out there and make deals so it's sold before it's put into the ground. Good thing about the co-op."
- QUOTE: "wholesale"
- QUOTE: "We have a flashing light and a store and a couple of churches. (laughter) One church has less than 10 people that are members. I mean, our farm gate is just not available. So we take all of our berries

to a packing house. Because when you have a couple thousand pounds of berries you just don't sell them at the local market."

Other marketing outlets mentioned during the focus groups included retail outlets, restaurants, schools, CSA's, and pre-sale orders.

How do you get the word out about your operation? How do consumers find you?

Five of six groups mentioned word of mouth as how people find out about their operation:

- QUOTE: "Word of mouth." (agreement heard)

  (Another participant states) "Word of mouth is the biggest thing."

- QUOTE: "You just go out of you way to say, "Hey, tell your friends." If you actually make a habit of saying, "Tell your friends," people actually will tell their friends."

- QUOTE: "Word of mouth. Everybody knows who I am."

- QUOTE: "And you guys mentioned about internet and word of mouth, so I think those are kind of how you get the word out, but I just wanted to offer that question and see if it...(sentence trails off)"

- QUOTE: "Again, word of mouth."

Four of six groups indicated that email was how they stayed in contact with their customers:

- QUOTE: "I survey everybody. I always ask them, "Do you have a minute? Can I ask you a question?" And then I ask them what their favorite vegetable is, or whatever indicates at the moment where we are. And then when they start laughing about their favorite food, I ask them for their email."

- QUOTE: "Google Adwords. It has been very effective for driving traffic to the website and then we use Constant Contact which is an email blast program for talking to our mailing list."

- QUOTE: "My wife sends an email out every week telling what we are going to have at the farmer's market and it's grown to over 1500 people that she sends it to and a lot of them forward it to their friends. We have found that really, really effective. The other vendors at the main farmer's market that we go to comment that when we don't come, less people come to the farmer's market. So that email thing, she doesn't let anybody get the list and she tells people that up front when they sign up. She says, 'I'm not going to give your email address to anybody else.' It just keeps building. She writes a little something about what is going on at the farm this week and people really like that. But the main thing for us is for them to know what we are gonna have so that they start thinking, 'well I'll get that at the farmer's market.' I won't pick it up at the grocery store. So they know ahead of time. That email thing works really good for us."

- QUOTE: "We haven't tried market bulletin, but LocalHarvest has really been a source of emails almost every week with people having questions or wanting to tour the area. But we have no advertising. It has all been word of mouth. Educating the consumer has been our best friend, because they tell someone else, and they tell someone else."

- QUOTE: "We started out just taking products to the market and selling them and that kind of evolved into people wanting the same thing over and over again and so we developed a customer base. And one of the most helpful things we did, and I didn't realize it, we started putting out an informal newsletter once a week. We collect, you know, let them sign their name on the sheet at the market. We started putting out this little, started out as just an email and then we took our letterhead and then we started putting out a little newsletter, and talking about products. Reminding them which market we would be at on what day, and maybe little pictures. Start dropping a little picture on there and on our farm, the goat farm, there is always some funny story. Every day there is a funny story of something that the goats did. So I started putting those little funny stories on there and come to find out those would get forwarded to people that weren't even on the list. And then we have a following and then we started getting emails and then some of our regular customers, our products are in high demand and sometimes we sell out, so they started sending us an email. "Hey can I get you to bring this to the market?" So then we started taking orders from that. And then we had some illnesses and deaths in our family and I didn't put that email out for about a month. And our sales dropped. I couldn't figure out why, but I didn't relate it to the email. Then I started sending the newsletter out again, and our market picked up again. So, I'm like, okay, it is directly related to the newsletter, so now I never forget to put the newsletter out. It always goes out, no matter what, even if it's one in the morning, the newsletter goes out because it keeps selling. And sure enough, I'll hit send, and in just a few minutes, I'll start getting some orders. And it reminds people, oh yeah, the market is Friday, I'd better get my order in. So when we got to the market, probably a third of the stuff we take is already spoken for. So we know we have those sales committed. And then the rest of the stuff we just sell are just spontaneous buys, people walking up to our booth."

Four of six groups mentioned online media as a way of reaching and staying in contact with their customers:

- QUOTE: "I have a website."

- QUOTE: "I want to say one thing, we are living the direct sales of produce. You would be surprised what you get out of a website, Facebook page, the whole nine yards. We rolled out the whole social media, all the cliches, we are in this deep into all of it. And you would be surprised the business it drums up. You can build that reputation, you can really, there is liability there, but man, there is a ton of opportunity. Particularly when people want small farmers, want small farm operations. They want fresh produce, local stuff, they've gotta know how to find it. You have to meet them, you ain't gonna meet them halfway, you are gonna have to meet them most of the way."

- QUOTE: "I got a website on Facebook."

- QUOTE: "We have done a little bit, there's a couple of people that have an online market and you put some products on there and then they read about you and they see that you are at the farmer's market or whatnot and try to find you that way"

Do you participate in any kind of training programs on your farm? Do you or your workers attend any training programs off your farm?

Four of six groups discussed IFAS/Extension training programs:

- QUOTE: "And then that connected us with the Master Tree Farmer Program. We went to the Extension office in Quincy once a month or I don't know, anyway, it was over a period of time and the thing was televised and there were people in Clemson and Gainesville and all these different experts and that was a real help. Yeah, getting hooked up with Extension and available programs has been real important for us. We learned a lot about long leaf pines."
- QUOTE: "Project Annie which was put on through the IFAS Extension here and I think they have had their second class. Yeah, they were rotating the class between the different offices and that was a program that was geared towards women in agriculture."
- QUOTE: "Yes, I participate when I can in IFAS things and I do have an employee that I am hoping is going to be a farm manager. I will send him to the IFAS blueberry information meeting."
- QUOTE: "The University of Florida's North Florida Research Division, Bob, up there, teaches a full day of food safety. It's free. You just have to get on their schedule and see where they are, but it's a whole day thing. 'Cause it is really complicated. And it has to involve a 100 different kinds of products."

Other IFAS/Extension programs mentioned included "Chicken 101" and the "small farm network" based out of the Sarasota office.

Four of six groups discussed receiving training through various expos, seminars, conferences, and trade shows:

- QUOTE: "I go to most trade shows, especially since I made a shift in industries. I went to almost every trade show that I could and Small Farms, in particular, for me was a really good training for me."
- QUOTE: "We have a thing scheduled in June where, I don't know it's UF, actually it's people from Florida Organic Growers, that have organized a soil building workshop that are going to come into our farm to do it. They wanted to do one in this part of the state and they contacted us. As I said earlier, my wife and I go to conferences for training. We go to the Florida Small Farms things, the Georgia Organics, to the Southern Sustainable Agriculture Working Group, and things like that that they we participate in and get a lot out of. Oh, and the Florida Forest Stewardship Program has been really good for us. We have been participating in that since 99, we've got into that. And through the Florida Forest Stewardship program

we get invited to several tours of other farms that are in the Forest Stewardship Program and that has been really good."

- QUOTE: "Right, I went to the SARE conference and the small farms conference and anyone that will let me in, I'll go."
- QUOTE: "We go to a lot of the, IFAS will put on some events like the Florida Ag Expo. We go to that every year. And then a few other things because to keep your pesticide license you have to get CEU's."

Others mentioned include the small farms conference and the Range Forage seminars.

Four of six groups discussed attending trainings that were specific to certifications/licenses:

- QUOTE: "We do. We have to have HACCP training and GAP training. You've got to keep everything legal and on the up and up. Food handling. So we go and we send our employees. We make sure at least one person knows something about something. You know?"
- QUOTE: "One of the best programs I think any farmer can take is probably the ServSafe Food Manager Program."
- QUOTE: "New North Florida Cooperative, we go through the GAP training program that entails the beginning to the end, what you put in the ground."
- QUOTE: "We have to have, from our perspective, we use pesticides and stuff and it is mandated that anybody that works with us, works with anybody really, there is a DVD that they give you. They need to see that DVD. It explains what reentries and stuff like this means. Piece of paper doesn't mean a lot but when it's got their signature and they have seen that. Believe it or not in the state of Florida, to shell a pea or butter bean, you've got to have a kitchen manager's license. So I emphasize a lot of times with the food handlers, that this is the way it's got to be. If we don't do it we are gonna get in trouble if we don't do this."

When you have a question, need more information about something, or are looking for advice on a topic that affects your farming operation, who or what do you turn to for this information?

All six groups discussed turning to acquaintances for needed information:

- QUOTE: "Well, I'd like to go back to a story that my neighbor told me. He said if you want to get rich farming look for the man who's wife is driving a Lincoln, living in a brick house and in the cow business, just follow him around about a year and you will know exactly how to make money."

- QUOTE: "That seems to be the more trusted source is if you have somebody you know who is already doing it. And you go to them. That seems to be far more trusted."
- QUOTE: "Our organization is already tied in with FAMU, you give us most everything we need."
- QUOTE: "Somebody that does it. Somebody that does it successfully. Or I find somebody that has failed at it so I know what not to do."
- QUOTE: "I do Robert, but I do other farmers too. That is probably first."
- QUOTE: "I talk to the local farmers."

Five of six groups discussed turning to the Internet for needed information:

- QUOTE: "First, Google."
- QUOTE: "Internet."
- QUOTE: "Internet for a starting place before I call. ATTRA and like that."
- QUOTE: "Online"
- QUOTE: "Networking online for me, with other aquaponic farmers and I have become friendly where we actually have our phone numbers and all. But everybody in that, there's lots of different ways to grow that way as well."

Four of six groups discussed turning to their local extension agent for needed information:

- QUOTE: "I go to IFAS first. And then I go to the county guy. Lot of information in that IFAS, but it is confusing, so that is why I have to call the county guy up.
- QUOTE: "I always call the Jackson County Extension Office for any information I need. They are very helpful."
- QUOTE: "There's times where I'll ask Mr. Brasher something or an Extension agent a specific question about what is going on. Week before last, I had snap beans coming up with a white leaf. I had never seen that before. Mr. Brasher asked me, "did you daylight 'em?" Yeah, I daylighted them. That's what happened. The roots hadn't gotten out to be fertilized yet. Well, that made sense because they was turning green in two days. You need to have your Extension agents and your people that you are supposed to be able to trust, they need some practical knowledge too. And I can guarantee a lot of the PhD's out in Gainesville and Knoxville and Tallahassee and Athens and Baton Rouge and all that they don't know what daylighting means."
- QUOTE: "Robert Kluson (agreement heard)"

Do you feel that accessing needed information comes easily?

Four of six groups indicated that it was situational whether needed information came easily:

- QUOTE: "It depends on which information that you are looking for."
- QUOTE: "Once you find a source that is willing to share it."
- QUOTE: "I'd say generally that's true, but every now and then, we don't have a Robert down in my county, anybody at AG Extension is ornamental horticulture, like you said, and grass."
- QUOTE: Not initially. When you find the right person. But not initially. You've got to break the ice to get through.

Do you use extension programs or resources?

All six groups were in agreement that they use extension programs or resources:

- Affirmative yes's heard from all groups

- **Various extension programs and resources were mentioned. However, none of them were mentioned by more than three groups. Those that were mentioned include**

  - Seminars
  - Publications
  - Newsletters
  - Meetings
  - Programs/Trainings
  - Extension agents
  - Online extension resources, including the small farms website
  - EDIS
  - Other state's extension services
  - Small Farms Conference
  - Handbooks

What do you think when you hear the word food safety?

Five of six groups indicated that the word food safety made them think of regulations:

- QUOTE: "The regulated farms are the opposite of what I would consider 'safe food,' the dairies I have been to, it doesn't look very safe. And those are the ones that are Grade A dairy."
- QUOTE: "Too many different standards, the FDA already has all the power in the world to regulate and it just isn't doing it. It is wanting more power. Just recently, a thing happened up in the Northeast where,

maybe this is going back a ways, but basically, the little town decided, several townships, and you guys probably saw this on the internet, decided that they were going to abolish the regulations for food safety in their area. And if I grew it and sold it to you, there were no regulations that were to be afforded any attention. But it had to be direct. I couldn't sell it to you and then you bake it and sell it to her. So there are three towns in the Northeast that basically said, "Our state constitution allows us to have this freedom," and they are doing it. None of these illnesses are traced back to our kind of farming. None of them. So I love to have my documents in order, and I want to have hand washing stations, and I don't want anyone to ever be ill, much less myself. But the kind of record keeping will put us out of business the way that they want us to do it."

- QUOTE: "One of the things I wrote down was regulations. To hear that the health department is going to come out and inspect you, will scare you to death. But you also got to know what the regulations are. They will tell you that they want you to have a fully enclosed building to shell peas and beans in. I don't know if you all know how loud a pea sheller can get, but you couldn't stand it inside an enclosed building. In Florida, all you got to have is a cement floor and a roof. You don't have to have fully enclosed. So we passed our inspection, but you have got to know your regulations, and you have got to be able to show that person that comes out there that we are safe, this is our HACCP plan. Now they want you to have your name and address on every product you sell, especially to stores and stores don't like that, but they are not the ones dealing with them."
- QUOTE: "Rules and regulations. (laughter)."
- QUOTE: "I think of rules that are skewed toward industrial farms and ignore other risks in our food system like GMO's or things that are untested for their safety, you know. Forced on to us."

Four of six groups discussed concern regarding the food safety of imported foods:

- QUOTE: "But it has got good points and bad points. We have to have it, but they over-regulate. (Sounds of agreement) But I don't think it is really the US grown produce that is really causing most of the problems, it is probably imports, but I still think we are being regulated and the foreign imports are not. I have been on the border, I have seen it."
- QUOTE: "I think it is important. I mean, I want our food to be safe. But what I worry about, I worry about the safety of the food that comes into our country. A lot more than I worry about the produce and the food that is grown here. (agreement heard and crosstalk)"
- QUOTE: "Because they thought it was tomatoes from Mexico, turned out it was peppers. Lot of people went out of the tomato business. So now we all got to wash our tomatoes in bleach water. (people talking at once) That is what I think about when I hear food safety."
- QUOTE: "Where did this produce come from? When the pepper or tomato thing blew up. That was the first thing that we thought of. Back in '75 I became a nurse epidemiologist dealing with infection control.

And I can remember the first outbreak that I heard about and it was cantaloupes that came in from Ecuador was sent to Washington, Washington State and that Oregon area. But they ended up finding out that it wasn't the cantaloupe itself, it was the water that was shipped over here, the ice water, it was contaminated with the bad water in Ecuador that came. So every time, I think of that. Where was the possibilities that this came from? The Plant City Farmer's Market, the Red Barn Flea Market, where did it come from?"

Four of six groups discussed the lack of consumer education in regards to food safety:

- QUOTE: "People cooked their food and they understood that you shouldn't have your chicken juice running around with your lettuce, you know? And I think a lot of the issue in food safety is at the end consumer level, they are so dumbed down by going to get chicken nuggets all the time that a lot of them have no idea, any idea how to cook. I am giving a class in Gainesville called Chicken and Egg 101 and we are going to learn how to cut up chickens and cook eggs. (laughter) You know? But anyway."

- QUOTE: "I am hearing some skepticism from the average person that I know that shops in the supermarket. Things like when Beech-Nut put out the baby food, the apple juice for infants turned out to be colored, flavored water. There was zero nutrition in it. Beech-Nut! (crosstalk and amazement)."

- QUOTE: "I would kind of go back to public perception of how that spurred this on. You can look towards the E-Coli outbreak in California with the spinach and you can go to the tomato, well the jalapeno peppers that got in the salsa and caused all the damage particularly to the north Florida tomato industry. (crosstalk) The public's perception is that they need to be protected from us, that somehow, what have we got 350 million people in this country? They all eat 3 meals a day every day of the year. I don't know the math on that, but it's a lot. And then you get 1500 people that get sick from food borne illness. I think 1500 people die, maybe 40,000 or 50,000 people get sick every year. The sheer, you are more likely to be struck by lightening than to get a food borne illness. But look at the lengths we have to go to to get a tomato. We have to practically be in almost a hospital type sterile environment to pack a tomato. They take it and put it on a Walmart counter with this open display. What does everybody do? Everybody puts their hands on it, they squeeze it, they look at it and they put it right back. And God knows what was on their hands. They could have just changed a diaper, they could be sick with something. And all that we have done and all the expense on this, particularly on a small farm, it puts it out of reach. It's all for naught. The presumption with the food safety regs is that if we do all this, then nobody ever gets sick. It's absurd. And it is crucifying small farmers. Because for us, point in fact, Primus Labs, is now the standard go-to food safety inspection agency. A Primus Labs audit for a field pack is about three grand, if you are going to shed pack, then you are going up to about ten grand."

- QUOTE: "Lack of education on the part of the consumer."

Four of six groups discussed that food safety usually was not an issue on small farms:

- QUOTE: "Almost without any exception, I cannot find any exception and I did a lot of research, just as a laymen on the CDC websites. I just get so, this just drives me crazy, there is no data that can be traced back to any kind of food borne illness from small farms. None. All of it is big agribusiness. All of it. So for the them to try to cram a so-called food safety bill to control seeds, to control who can walk where on whose farm and when. It is just smoke and mirrors, but it is very dangerous and very few people knew that that bill almost passed full bore without any alteration. And I actually, once that started moving through the House and the Senate, I was actually very upset with IFAS. There was not a word mentioned last summer, and I felt pretty betrayed, to be honest with you."

- QUOTE: "Yeah, and so for a small farmer, you can put (unintelligible) on the computer. From a small farmer perspective, food safety could be the early exit. And we probably the safest people you gonna find. (crosstalk) Because of the small scale. If we trying to sell to the institution, I remember when I first started selling to the store. I have a packet I carry with me on food safety, I had my product liability insurance, I had all my, everything, I said I'm ready now. And you know what the store told me? We don't need that. That's what scared me. I said, "you don't need to see this?" Anybody can bring anything in. I had labels, I had barcodes, and all that I thought I had to have. Not to get into that, but when we go into the school level, and then a lot of times, the schools require a little less than a proof of (unintelligible). And it's just, it's expensive. You paying $500-$600 a month for insurance and Fresh Point may not even buy from you. But just to get them to entertain buying from you, you got to have all this stuff."

- QUOTE: "Bad micro-managing, industrial agriculture. Usually not the small guys who are at fault."

- QUOTE: "That has been a big topic, we have to educate when it comes to food safety and the inspectors and all that, we really have to educate them because, you know, people want free-range chickens, I got free-range chickens. But they don't want the chickens underneath the citrus tree or in my garden and all this. How many people get sick on my farm compared to a corporate farm? And they just need common sense. Like when (unintelligible) came in, there was cows and cows across the fence. And he said, "This isn't safe, this isn't safe!" But the land slopes down, and they just don't know and there has to be an even playing field."

Do you feel that food safety is an important issue?

Five of six groups agreed that food safety was an important issue:

- QUOTE: "(Sounds of agreement: Yes, Yeah, Mmm,hmm.)

  (A participant states) "You have to have a safe food source. You have to."

- QUOTE: "(Affirmative answers; Yes, Absolutely)"

- QUOTE: "(Lots of sounds of agreement, 'Yeah, Very, Absolutely.')

  (A participant stated) "Talking about food safety, five years ago whenever I get my calves up to have them castrated, and dewormed and all. They used what you call an implant, and they put a little, I don't know what it was, but we implanted it in the cow's ear. That same year, they had all these steroids and ball players and home runs and all, and outlawed that, you can't use that no more because it's something that's not natural. It's some kind of chemical that they implant in the ear and it will grow fast. You can't get it no more. They outlawed it for food safety. So the people in that area is doing a good job. People think it's wrong, but I don't know about none of you all, but I want to live just as long as I can. (Unintelligible) (laughter) I want to live another ten at least. The food safety, you know, that prolongs your life."

- QUOTE: "(Sounds of agreement heard, Yes, Yeah, etc.)"

  (A participant stated) "Knowing where and how your food was grown and not only as a farmer but as a consumer. I look and I say, 'okay, those onions came from Mexico.' Do I really, I can't drink the water when I go to Mexico, do I really want the produce from there? Looking at it from a farmer's point of you and from a consumer's point of view. It's important."

- QUOTE: "(Agreement heard~ Absolutely, Yes, Most definitely)"

Five of the six groups indicated that the government has too much involvement, or is out of touch with the realities, in food safety:

- QUOTE: "I think having to do anything like that is ridiculous! I hate government intrusion in my life! I hate the government standing between me and my customer and telling my customer he can't buy from me and I can't sell to them! If a customer wants my stuff and knows how I raise it, then I ought to be able to sell it to them, it's not their business!"

- QUOTE: "Yeah, but, at the same time, I watched some of the committee hearings, and here are the senators, very well educated men, some of them were lawyers, I'll take exception to that, (laughter), asking the guys who ran the nasty egg farm that had gotten in such trouble in New Jersey that they were banned from New Jersey and moved to another state. These were bad guys, but at the same time, they were looking at photographs on the projector and asking why there were flies in the cow barn. I am like, "Ah, maybe you should take a tour."

- QUOTE: "I would make a similar point with you because when you are talking on the scale of production, you can go to the US Department of Agriculture and they can give you a food safety audit and that can be passed, but they are still writing the rule book and they are changing it as they go because now, you can pass that USDA GAP audit and even though that is from the government, that is insufficient to a lot of, General Produce in Atlanta won't buy from you unless you have a Primus Labs, a private company, unless they do your audit. It's non-standardized. They are making up the rules as they go."

- QUOTE: "I think it is ridiculous that I can't sell my next door neighbor a gallon of milk or I am breaking the law."

What do you identify as sources of potential on-farm contamination in your operation?

Four of six groups mentioned animals or pests as being sources of on-farm contamination:

- QUOTE: "Vermin. Bugs, Rats."
- QUOTE: "The big one that stands out to me is feral hogs."
- QUOTE: "Number one is animals."
- QUOTE: "Water source, animals. How your animals are, where and how your animals are versus your water source."

Other sources of on farm contamination mentioned, but did not reach a consensus in four or more groups included:

- Water
- Bacteria
- Zoonotic diseases
- Storage containers
- Manure/composting
- Packaging
- Employees
- Pesticides or other farm chemicals
- Dirty equipment
- Neighbors

Do you feel that you minimize food safety risks on your small farm?

Five of six groups affirmatively agreed that they minimized food safety risks:

- QUOTE: "We do."
  (Agreement heard: Yes, Yeah)
- QUOTE: "I would say yes."
- QUOTE: "As much as possible."
  (Another participant stated) "Oh yes, yes."
  (Another participant stated) "We are required."

- QUOTE: "Yes, I do because most of our stuff is going from here to the consumer so it is minimizing all that risk in between. To me, the risk isn't in the farmer, it is the broker you sell it to and then the produce guy who might not wash his hands when he is in the bathroom, so I just think that direct sales to consumers minimizes the risk."

- QUOTE: "We go to great lengths to be sure the food is safe."

Four of six groups referenced food safety training courses or certifications:

- QUOTE: "Oh yeah. That is one of the reasons that we took the ServSafe course."

- QUOTE: "Most everybody is trained. I got a book that's put out by (unintelligible) and it shows you all the steps such as washing your hands, washing your shoes and everything before you even go out into field. Not only would it hurt the individual who buys the produce, but it's going to hurt the plants. Just like when you leave one field, planting or cultivating or anything. They gonna clean the planters up, they going to clean the sweeper and everything up, so you don't take no disease or no nutgrass? from this field to another field, okay? So everything is clean. Clean is the key. Has everything been cleaned? Everything been cleaned except the planter, well, no then, everything not cleaned. All right, I see a person coming out in the morning got a cold or something, I say, 'look here, take the day off.' Like they don't feel good that day. My philosophy has always been prevention is better than cure. If you think it might be a problem, then don't do it. Let them have the day off, you know. That's very important, it's knowing your people and what they are doing. Some people, you can't trust to go out in the field. People who are gonna pick peas, they gonna make sure their hands are washed and everything, okay? If you are gonna use them, just like anybody working with produce, if you have long hair like mine or hair longer than mine, you are going to have a net over it. Okay, because I don't know what you got in your hair or this and that, or your hair is going to fall into the produce. So those types of things you got to prevent. Okay? And it's just common sense. Make sure that someone checks to see if you got hand soap and some cleaner all around the places they work and in the bathrooms and all that. And clean running water in the bathroom. A lot of times you go in a bathroom and it's nasty and that is where you pick up germs. You got to make sure you got someone. Every morning, I check the bathrooms. Two or three times a day, I'm going to make sure they clean. Everybody got a part to play, everybody help clean them. If I clean it, you clean it, then it going to stay clean. I'm picking up trash and all that stuff around the place. Runoff water and things of that nature. Water is very important, what you use for spraying. Irrigation and all that is part of your safety program.

- QUOTE: "One thing about HACCP, it makes you think about what you are doing and how you are going to fix the problem if a problem creates."

- QUOTE: "We did get our USDA certifications just so that the restaurants we deal with and the consumers that we deal with know that we are doing what we say we are doing. Obviously we get inspected every year. We have to keep loads of paperwork."

Other ways to minimize food safety risks were mentioned, but did not reach a consensus in four or more groups included:

- Wearing gloves
- Keeping things organized
- Hand washing
- Proper irrigation
- Clean equipment
- Sanitary conditions
- Limiting visitors
- Paying attention
- No animals
- Testing the well
- Not allowing employees to work when ill

How could UF/IFAS and FAMU help you improve your knowledge of food safety principles?

Various suggestions were given to help small farmers improve their knowledge of food safety principles:

However, none of the suggestions were mentioned by more than three groups. Those that were mentioned include

- By including courses similar to those offered by the National Restaurant Association
- By offering free training
- By focusing on the farm instead of the restaurant
- By not insulting our intelligence (reference to a training they attended that they felt covered elementary topics)
- By focusing on the details
- By continuing to offer classes/workshops
- By conducting on-site visits
- Small Farms Conference
- Books, bulletins, brochures
- Put it in simple terms & be able to define the regulations
- Hold trainings in local areas
- Online resource
- By offering a kitchen training
- They already are
- Nothing – it scares us and there are some things you can't avoid

Would you be interested in attending food safety training designed specifically for small farmers?

Five of six groups were in agreement that would be interested in attending food safety training designed specifically for small farmers:

The one group that did not have an affirmative yes, indicated that maybe they would be interested.

- Affirmative yes's heard from five groups

Delivery mechanisms were suggested in regards to whether they would attend:

However, the same delivery mechanisms were not mentioned by more than three groups. The delivery mechanisms that were mentioned include

- If it was web based
- If there was a certification
- If it was free or reasonably priced
- If it was production method specific
- If they didn't have to travel far
- If there was a clear cost vs. benefit
- If they knew about the training well in advance
- If it was on DVD

What do you think consumers think about farmers like yourselves?

Four of six groups indicated that they believed consumers thought they were great:

- QUOTE: "They think we are close to God. They think we are making huge sacrifices and we are. We have had many, many careers and I can't tell you how many people have come up to us on a weekly basis or email us and say, "Thank you for everything that you are doing, we know that it's a ton of work." Boy, they don't know the half of it, you know? But, I think, I don't know exactly when, but I think at some point small farmers are going to be the rock stars that celebrity chefs are now. True small farmers."

- QUOTE: "They (consumers) love them (small farmers) and want more."

- QUOTE: "I think for a growing segment of the population there's a tremendous respect and appreciation for farmers that there wasn't even 10 or 15 years ago. It has really grown a lot, I've noticed. And that's really a welcome development, I think. That they see all these things that have entered our lives like disappearing bees, and food safety and reasons for them to really respect and appreciate the small grower and the healthy food that we produce. I get people at the market on a regular basis that just come up and say, 'Thank you for what you are doing.' It's become pretty common to hear that."

- QUOTE: "Every consumer has a farm story. And I think that they really like the farmer. Most of the Yankees that come through my place, all they want to do is talk and walk around the farm and take all of my time. Because they have a farm story. "Oh, remember at Aunt Betty's? We used to get the eggs. Just like this."

Four of six groups referenced a need for consumer education:

- QUOTE: "That brings up a real interesting point for the University to look at, is the education that these younger children and young adults should be getting on what they are putting in their mouths, now, so that when they get to be as old as I am, they know what it means to eat something fresh, what it is. I mean, there was the big thing at the Small Farms Conference about selling to schools. (crosstalk and laughter) Try to get involved in that process. Try to sell lettuce to a school district unless you get elected to it. But realistically, the education to the children, I mean we are too old to learn now, we think we know. But it is the generations coming up that we really need to start banging them on the head and say, "Hey, enough is enough." And I'm not even talking about the obesity crisis or anything else which I am very sensitive about. (laughter) But, just healthy eating."

- QUOTE: "My two-fold view of the consumer is this. I went to Washington D.C. on a farm meeting the year before last, talking about the farm bill this and that. One of the congressman said, I think it was a republican, said "I buy all my groceries out of the grocery store." He don't even think about the farmer have to grow before the grocery store. Some people don't have the knowledge of it, about farming. Another thing about farming, my philosophy is this, you have to grow it to get it in fresher. And what I mean about that is, I know what I plant, I know how to harvest it, I know how to process it, and I know how to cook it. Because I learned. Young people today, when it comes to peas or butter beans or certain things, they don't know anything of how to process it. Or how to cook it, or how long the shelf life is. I've got to be the expert on anything that I sell, I got to be the expert on it. And I got to give training for people. I run the Country Market over there for the last four or five years. Every six months I have what I call a Cook-Off. So everything that I grow, I cook it and give people a taste. And so, I got to make sure I'm a good cook. I got to say I'm the best cook of this in the world. I got to let them think I'm the best cook in the world. I am good. I am good. But I got to let the consumer believe that I am the best. Nobody can cook peas better than I can, nobody. Nobody, I am the best. And that's not me saying it, that is consumers saying it. The consumer's word is more important than my word. The consumer is always right. I tell the customers, 'the consumer is always right, we wrong.'

- QUOTE: "Consumers come in different ages, too. Children don't know who farmers are. And then you have the older, the adults who just, I don't know what they think. They pretty much think we are out of our minds. People don't really understand where their food comes from...(sentence trails off)"

- QUOTE: "I think the consumer is talking about how things is because it was cheaper back then, then it is now. That is the major problem. They want to know why things cost more here than, you know. I compare my prices to Walmart or Publix and stuff like that. And I say, "Well you know, my tomatoes are

$2.29 a pound." They say, "Well, I can go to Walmart..." I say. "Yup, go to Walmart and pay $2.99 a pound." You know what I mean? It's about pricing with the consumers now days. They want to pay you a quarter for a cucumber, that you paid a dollar for. That is 80% of the people now days. Especially the northerners like you was talking about."

(Another participant adds) "They get that mindset of "Oh, we are getting it fresh from the farm, it ought to be real dirt cheap."

(Another participant adds)"Right, the perception is that we can raise it cheaper."

Four of six groups indicated that consumers were unaware of the work and money that goes into farming:

- QUOTE: "They have no idea how much work and money is involved. (Agreement, laughter and crosstalk)"
- QUOTE: "It is sad to say when I say, my generation, I am 40, fixing to be 41 years old and I think a lot of it started with my generation, they see a person out there farming and you go talk to him. 'He just dumb,' they think. They don't realize they are talking to an engineer, a mechanic, a physicist, a botanist, (lots of laughter and crosstalk). All that wrapped up into one person."
- QUOTE: "Yeah, you don't know what time I start in the morning with doing everything. A lot of it, I think they look and it's really cool because I have all sorts of animals and gardens, but I don't think that they really realize what we put into it and why we ask the prices that we do, because my time is worth something. You know? The hours and hours that I put into it is definitely worth something. (Agreement heard all around)"
- QUOTE: "A lot of people tell us that we get it for free. "Oh, so you get free food?" And they don't realize that we had to buy the cow, keep the cow for two years before, and then pay the butcher. And then pay for the freezers to house the meat. And there is so much cost that goes into it. But they don't really see it that way, a lot of times they think that you are getting it at no cost. They don't see the back labor and costs that go into it.

What do you think corporate agriculture thinks about farmers like you?

Five of six groups indicated that corporate agriculture sees small farms as a threat:

- QUOTE: "They actually see us as a threat."

  (Another participant adds) "Not specifically to our farm or an individual farm, but small farms in general."

- QUOTE: "I think they are starting to seriously look at small farmers as competition. (agreement and crosstalk)"
- QUOTE: "One thing is competition, but the bottom line, it's the dollar there. A small farmer has a very impact on the large corporation. What a lot of farmers don't realize if I got 10 acres of watermelons and you a big farmer that's got a 100 acres of watermelon. I can probably make just as much money, I can make more money off 10 acres than you can 100 acres. Cause I am doing one of two things, U-Pick, or I'm retailing. Where as if you got 100 acres, you got to wholesale. So you are not going to make 10 or 12 cent a pound for your watermelons. But I'm going to get 30 or 40 cent a pound for my watermelons. Cause you are selling directly to the consumer, you are selling retail price. Big corporations are selling wholesale price so they are not going to get the same price. So they are a big threat to you, the small farmer. They don't want you as part of the system."
- QUOTE: "They give us more, I don't know if they give us more credit than we deserve, but they really, they afraid of us. Farm To School prove that to us. All these rules and regs, like geographical preferences and all this stuff, it comes because some big guy like Fresh Point, Chartwell? Aramark. All them guys got lobbyists they can send to Washington and say we got to change the rules on how, the procurement rules. Because it is too easy for (name omitted) to go to Jackson County and sell them fresh collard greens, fresh peas. And it's gonna hurt our business. So all of a sudden, boom, the next year, the rule changes."
- QUOTE: "We may be the pea under the mattress and the princess may start to feel us before long."

Five of six groups discussed that corporate agriculture was trying to pass for things that small farmers are known for, like local and organic:

- QUOTE: "Tyson will use it, now they have Fresh from Florida that came out of FDACS Tyson Chicken, Fresh from Florida, you will see the label."
- QUOTE: "Or they (corporate ag) want to catch up, they see this trend and they want to capitalize on it."
- QUOTE: "To give you an example of how the impact of a small farm can be, I can't really tell you the name because I don't remember if you can give the name or not, (crosstalk) but in Los Angeles, California every morning, there is 10 pickup trucks sitting and waiting on a semi to get there from out of the Valley. And that semi is bringing produce and breaks it up into the small pickup trucks. And that's a large farmer, one of the major producers, Dole or somebody like that, who is really doing this and they are sending their culls out to the local markets and they don't care about the small farmer, but they certainly are trying to push him out and take their spot. They said they was making more money off them, 5 semi loads of produce a week, then they was some of the other stuff, big stuff."

- QUOTE: "Well, I was at the Florida Ag Expo and they were saying that Walmart is, these are some big tomato guys, guys that have thousands of acres of tomatoes, and they were saying that Walmart wants to sell, wants to market local. Right?"

  (Another participant adds) "Actually, Walmart does. This Walmart down the street has Florida grown potatoes."

  (The original participant responds) "I know and that's great, but for a small farmer to produce for somebody like Walmart. It's not realistic."

- QUOTE: "Well, that goes back again, who is defining our definitions of local? Major corporations. Walmart's definition of local is if it's grown in the state of Florida.

Four of six groups discussed that corporate agriculture pushes for regulations that only benefit themselves:

- QUOTE: "I think I agree with you (name omitted). I didn't realize in that scope that actually we are not just gnats, they do care about us. And basically they are getting their regulations to protect their industry. And basically they ...(sentence trails off)."

- QUOTE: "I think some are, the feedlot for example. When this natural thing on beef was being pushed, the decision on what could be labeled as natural was held up while the feedlots lobbied to get their definition of natural. (crosstalk) And their definition was, and that is what happened, the feedlot could be natural and all they have to do was to open the gate to the next pen to have more room to walk. (crosstalk)"

- QUOTE: "See the definition of hurting my business to a large producer, is like you said earlier, 50,000 bags and you see 2,000 bags missing, but that 2,000 bags that is missing is a livelihood for a small farmer. (crosstalk) It comes down to greediness. People going and getting rules changed so that they can control everything. You know this country always talks about monopolies and everything. And there is a lot of monopoly going on in the agriculture world. Where they don't really want small farmers around. And rules are being changed, regulations are being changed. A lot of things are being changed. Just a little tweak of a something, and small farmers can't keep up with all that stuff. They have got people that's full time, lobbying full time, administrating full time, grant writing full time, full time. And farmers like (name omitted) said, doing every little thing. He's a mechanic, he's an engineer. And nobody has got time to keep up with the changes. I don't know if I'm answering your question, but...(sentence trails off)."

- QUOTE: "They want us regulated out of business."

What do you think higher education (land grant) thinks about farmers like yourselves?

Many ideas were presented:

However, none of the ideas were present in more than three groups. The ideas that were presented include

- They are surprised by our roadblocks
- They realize the importance of agriculture
- They like small farmers
- They want to support small farmers
- They only fully support what they get money from (i.e. research money)
- They don't care about us

Do you think Florida small farmers need to create their own organization?

Four of six groups indicated that there would be strength in numbers:

- QUOTE: "I'll give you an example. In California, about thirty years ago when the greenhouse system had just started in hydroponics, everyone was fighting each other. And none of the regulations were getting through. And I organized that group into California Greenhouse Grower's Organization and within five years every one of them were friends, every one of them were pulling together, every one of them were fighting the government and we fought a dumping order out of Canada and won. Without that, and I have been president of the association for a long time and without that numbers. Strength in numbers, okay? That's the only way you are going to do, folks. Strength in numbers."

- QUOTE: "That is one of the things that we are hopeful that, with having the opportunity to open a market, that we will be able to promote agriculture, the American family farm, and educate. We want to educate. I am in education, and our son graduated from UF just 2 years ago now from the Ag school..."

  (Comment interrupts) "Go Gators."

  (First participant continues) "Yup, and our daughter-in-law also, so they are going to be real involved in what we are doing and that is a big part. I think people are interested, but I think that really, only you know what your experience is. And so, by trying to share that, and we all need to share with others."

- QUOTE: "Okay, number one, we looking at the wrong level. Federal government ain't got nothing to do with what we talking about. Okay, everything is coming from the state down to us. It's not through the federal government. It is coming through the state of Florida. And everything in Florida coming from Florida. It ain't got nothing to do with Alabama, Georgia, or nowhere else. Okay, when you going to the state, you talking about people that are lobbying for these same people that you talking about right here who are bigger than you are. They are lobbying to the legislature to get what they want. Until you got somebody lobbying for you, to get what you want, you not gonna get nothing. They gonna get it all. It's

just that simple. That's really what she's asking. Do she think that we need a small organization of small farmers that can help small farmers? Yes! That's what you need."

- QUOTE: "There is power in numbers and then we can influence legislation a little bit.(Agreement heard) We can actually get some of this crap out of our way so we can do what we should be doing."

Four of six groups indicated that it would be a good idea.

- QUOTE: "It wouldn't hurt."

  (Another participant adds) "They should have their own organization."

- QUOTE: "I think it should have been did it. Cause it's on it's way out. You want to know the bottom line? Small farmer's on their way out. Big farmers are shutting them out. And they using the government to help them. That's the bottom line. Whether we look at it or not. And that's really why there is no market."

- QUOTE: "It would be nice."

- QUOTE: "Yes."

  (A participant adds) "Yeah, I think that would be good."

Four of six groups expressed concerns with a small farmer's organization:

- QUOTE: "Well, I agree with you, a small farm organization would be another thing to do and as small farmers, our time is already limited. And because most of us are 'mom and pop' type organizations, but I also understand the strength in numbers bit. So where do we draw the line? We need the strength in numbers, but where do we find the time to do it?"

- QUOTE: "It is doable, but I'd say if it was a state wide organization, the things that would benefit Live Oak and Gainesville and Alachua and Bradenton and Manatee may not benefit Marianna and Difuniak Springs. You could have a state wide organization, but it has to have a regional theme to it."

- QUOTE: "I think it is good to have an organization where everybody can have an opinion, but farmers have always been a breed, at least the ones I know, that can never agree on anything. (laughter and crosstalk)"

- QUOTE: "It is not worth my time to leave the farm."

Assume the Dean of Extension came into this room right now and asked for 30 seconds of your advice about the best way to help small farmers. What would you tell them?

Many suggestions were given:

However, none of the suggestions were present in more than three groups. The suggestions include

- Extension agents need to get back out on the farm
- Focus on water
- Improve knowledge of funding and grants
- Lobby to coordinate regulations across local, state, and national governments
- Establish a political stance/representation
- Get organized, make information easily accessible
- Offer more cross-disciplinary services (i.e. marketing & business)
- Promote farmer to farmer education
- Let me talk to someone who will listen, get out of the way
- Talk to your extension agents, they know what is going on
- Educate the public
- Conduct more research (i.e. organic, aquaculture, worm castings, more research money).
- Help us with marketing & advertising
- Free gas, kill white flies, give us money (unrealistic responses)
- They are doing good

Recommendations

Based on the results from this study, the PIE Center recommends the following:

- The small farmer population in Florida represents a diverse array of individuals with vastly different communication requirements. The demographics collected on the participants suggest that small farmers in Florida represent a broad age range, as well as a diverse length of farming involvement. Just as different generations of individuals require different communication methods, those with little farming experience need communicated with differently than those with many years of farming experience. To research this possibility further, it is suggested that extension continue to monitor program effectiveness via follow-up surveys in each county. This will allow for a comparison between counties to be conducted and analyzed. Additionally, it will identify the suite of tools that could to be used in each county in order to communicate and educate as effectively as possible.

- Due to the diversity of responses on programming delivery, small farms team should continue to seek avenues to deliver educational programming and information via multiple and new channels (social media, for example) in order to comply with the cultural, geographical, and agricultural needs of different parts of the state.

- Participants in these focus groups indicated that they like to learn from others in their social environment. This validates the small farms conference approach, but also suggests opportunities to build on this success via development of additional social learning platforms, such as mentoring programs, “master farmer” type program, etc.

CENTER FOR PUBLIC ISSUES EDUCATION IN AG & NAT RESOURCES/UNIVERSITY OF FLORIDA/IFAS/AEC

FOCUS GROUP MODERATOR'S GUIDE
FOCUS GROUP INTERVIEW – SMALL FARMERS PRACTICES AND AWARENESS OF FOOD SAFETY

Location: Marianna, Gainesville, Sarasota
Date: April 2011

WELCOME/GROUP PROCESS & PURPOSE (5 minutes)

Moderator reads: My name is Joy Goodwin I am a graduate student at the University of Florida and I will be moderating this session. This is Becky Raulerson and she is my assistant moderator.

You have been invited here tonight because we are interested in having a general discussion with you about your small farm practices.

My role here is to ask questions and listen. I won't be participating in the conversation, but I want you to feel free to talk with one another. I'll be asking around 30 questions, and I'll be moving the discussion from one question to the next. Sometimes there is a tendency in these discussions for some people to talk a lot and some people not to say much. But it is important for us to hear from each of you today because you have different experiences. So if one of you is sharing a lot, I may ask you to let others respond. And if you aren't saying much, I may ask for your opinion.

We welcome all opinions and will keep them confidential, so please feel free to say what you think. There is no particular order for the responses, and there are no correct/incorrect answers to any of the questions. This session will be audio and video recorded so that we are able to consider your views later. For the sake of clarity, please speak one at a time.

You can see that we have placed name cards on the table in front of you. That is because we will be on a first-name basis, but in our later reports there will not be any names attached to comments. You may be assured of confidentiality.

Our session will last about two hours with a short break about half way through. If you have your cell phone with you, we would appreciate it if you could turn it off while we are in the discussion.

I hope that everyone will feel comfortable with the process, and will feel free to share their opinions as we proceed. Also, I ask that you please sign the release/waiver form. This is a form that we, as a representative of the University of Florida, are required to collect. It basically states that we are collecting information from you during this discussion, but that you will not be harmed in any way. Are there any questions before we begin?

ICEBREAKER/GROUP INTRODUCTIONS (10 minutes)

Let's find out some more about each other by going around the room one at a time. Tell us your name and a little about you, including the farm products that you grow/raise on your small farm.

DISCUSSION SESSION

Participatory Questions (20 minutes):

- To start off our discussion, I'm going to ask all of you to help me identify the challenges that farmers like yourselves face. Each of you will receive a piece of paper with a tic-tac-toe type diagram on it. In the boxes write down all the challenges you can think of that small farmers face (Greenbaum, 2000). You may place more than one challenge in a box if you feel that they are as equally challenging as each other. You can have as few or as many challenges as you want in each box and you can also add more boxes if you wish.

    - Now that you have completed your tic-tac-toe boxes lets discuss what challenges you have identified.
        - **Probes**
            - What lead you to group certain challenges together?
            - What did these groupings mean to you?

Small Farms Operations (35 minutes):

Now that we have identified the challenges that farmers like you face, we are going to continue our discussion of farm operations.

Business

- How do you make business decisions about your farming operations?
    - **Prompts**
        - Data
        - Records
        - Evaluation
            - How often?
        - New farming practices
        - New recording keeping programs/methods
        - New marketing options
        - Inventory
        - Resources

- Do you feel you could benefit from information about business skill development?
    - **Prompts**
        - Setting goals
        - Marketing
        - Budgeting
        - Record keeping
        - Evaluation techniques

Goals

- How do you feel about setting goals for your farm?

- How do you set goals for your farm?

    - **Prompts**
        - Do you have goals
        - Short term goals
        - Long term goals

Marketing

- How do you market your farm products?
  - **Prompts**
    - Direct marketing
    - Wholesale
    - On-farm sales
    - Restaurants
    - Farmers markets or grocery outlets
    - Community supported agriculture
    - Web based marketing
    - Other

- How do you get the word out about your operation?
  - **Prompts**
    - Easy vs. hard
    - Challenging vs. simplistic
    - Regulations
    - Barriers

- How do most of your customers find you?

Training

- Do you participate in any kind of training programs on your farm? Do you or your workers attend and training programs off your farm?
  - **Prompts**
    - Training for yourself
    - Training for employees/ other operators
    - Types of training
      - Likes and dislikes of different types of training

Information Gathering

- When you have a question, need more information about something, or are looking for advice on a topic that affects your farming operation, who or what do you turn to for this information?

  - Do you feel that accessing needed information comes easily?

  - Do you use extension programs or resources?

    - **Prompts**
      - Extension agents
      - Training
      - Newsletters
      - Small farms website
      - Small farms conference

BREAK (10 minutes)

Food Safety (30 minutes)

- What do you think when you hear the word "food safety."

- Do you feel food safety is an important issue?
  - Probes
    - Production
    - Harvesting
    - Processing
    - Storage
    - Packing
    - Cooking

- What do you identify as sources of potential on-farm contamination in your operation?

- Do you feel that you minimize food safety risks on your small farm?
  - Probes
    - Through training
    - Hand washing
    - Proper irrigation
    - Clean equipment
    - Sanitary conditions
    - Prevention of cross contamination
    - Limit visitors (animals and humans)
    - Proper fertilization (specifically with manure)

- How could UF/IFAS and FAMU help improve your knowledge of food safety principles?

- Would you be interested in attending food safety training designed specifically for small farmers?

Perceptions of Small Farms

- What do you think consumers think about farmers like yourselves?

- What do you think corporate agriculture thinks about farmers like you?

- What do you think higher education (land grant) thinks about farmers like yourselves?

- Do you think Florida small farmers need to create their own organization?

Advice to Extension

- Our discussion is almost over, but we have one final question that will help complete our focus group.
    - Assume that the Dean of Extension came into this room right now and asked for 30 seconds of your advice about the best way to help small farmers. What would you tell them? (Greenbaum, 2000).

CONCLUDING DISCUSSION (10 minutes)

As we've talked today about the challenges and operations of small farms:

- Have you thought of anything else you'd like to say that we have not discussed?

I am now going to try to summarize the main points from today's discussion (key messages and big ideas that developed from the discussion). The main topics were ….

- Is this an adequate summary?

As was explained at the beginning of the session, the purpose of this focus group was to gain an understanding of small farm practices. Your comments today will be useful in developing materials to better communicate with and aid small farmers.

- Have we missed anything or are there any other comments at this time?

Thank you for taking time out of your day to share your opinions. Now that we have finished, I can now tell you that I represent the Center for Public Issues Education in Agriculture and Natural Resources at the University of Florida. We are conducting this research in collaboration with IFAS Extension Small Farms Office. Your participation is greatly appreciated and has provided valuable insight into this topic.

I - First, we want to ask you a few questions about Food Safety:

I - First, we want to ask you a few questions about Food Safety:

By following appropriate guidelines and procedures regarding food safety and hygiene the food industry can reduce the risk of food-borne illness.

- True
- False

The "Tester-Hagan Amendment" to the Food Safety Modernization Act gives full exemptions to small farmers with:

- Less than $100,000 in gross annual food sales
- Less than $250,000 in gross annual food sales
- Less than $500,000 in gross annual food sales
- None of the above

If you only have male workers in the field, you neeed one toilet for every how many workers?

- 5
- 10
- 15
- 20
- 25

Which of the following will result in an automatic failure during a third party food safety audit?

	Yes	No
Adequate toilet facilities present, but not operational at time of audit.		
Pesticide applications are not recorded.		
Neighbor's dog's fecal material found on edge of field (one old, dry pile).		
Raccoon fecal material found on edge of field (one pile).		

Answer the following True/False questions:

	True	False
Hand washing facilities should be within a 1/4 mile or 5 minute walk from employees work areas.		
The audit considers the use of municipal biosolids and fresh manure to require the same precautions in a food safety plan.		
A food safety plan only pertains to the property you are farming as delineated on the County Property records.		
Pesticide regulations are not a required part of the food safety plan because they are taken care of via State and EPA regulations.		

	True	False
Since the Food Safety Modernization Act was signed by the President in Jan. 2011, very few concerns regarding food borne illnesses associated with produce have been reported.		
Necklaces are allowed to be worn by harvest workers as long as it is tucked inside the shirt.		
A plain band ring (finger ring) is allowed to be worn by harvest workers.		
Prior to the Food Safety Modernization Act which will enact regulations, there were no regulations in effect on fresh produce as the buyers were triggering all food safety plans.		
If fresh manure is stored in a protected structure for at least 12 months, it can be considered a composted source.		

Which of the following times are workers required (written policy in the food safety plan) to wash their hands?

	Yes	No
Prior to beginning work.		
After break.		
After using toilet.		
At the end of the work day.		

How **Easy** or **Difficult** to understand was the information that you received in today's training?

- Very Difficult
- Difficult
- Unsure
- Easy
- Very Easy

How would you rate the intensity of your learning from today's training?

- None
- Very low
- Low
- High
- Very high

II - Next, we want to explore your feelings towards Farm Food Safety and the use of online planning tools:

II - Next, we want to explore your feelings towards Farm Food Safety and the use of online planning tools:

Using the scale below, please indicate how much you **Agree** or **Disagree** with the following statements regarding food safety:

	Strongly	Disagree	Neither Agree	Agree	Strongly Agree

	Disagree		nor Disagree		
Every farm should have a food safety plan in place.					
It is beneficial for me to learn more about farm food safety					
I will likely contact an Extension agent to clarify information or request advice on designing and/or implementing a food safety plan for my farm.					
Farmers in my county understand the importance of developing and adhering to a farm food safety plan.					
Food safety outreach programs are a necessary component of current or future programming in my county.					
I am comfortable working in a web environment.					

Using the scale below, please indicate how **Confident** or **Unconfident** you feel to perform the following tasks:

	Totally Unconfident	Somehow Unconfident	Somehow Confident	Totally Confident
Designing a food safety plan for a farm.				
Implementing a food safety plan in a farm.				
Working in a web environment.				
Identify when changes in a plan are needed.				

Using the scale below, please indicate how **Likely** or **Unlikely** you are to do the following:

	Very Unlikely	Unlikely	Undecided	Likely	Very Likely
Learn more on your own about food safety.					
Design a food safety plan for a farm.					
Implement a food safety plan in your farm.					

Block 2

III - Next, we are interested in knowing your satisfaction with the training that you have just received. Please answer the following:

Did the workshop meet your expectations?

- Yes
- No

Please explain your answer to the previous question.

Compared to all other workshops that you have completed, how would you evaluate the quality of this Food Safety workshop?

Bottom 20%	Bottom 40%	Middle 20%	Top 40%	Top 20%

Do you believe the hands-on training was required to accomplish your learning objectives?

- Yes
- Maybe
- No

Do you believe the training could be delivered as successfully via web-based modules, without a "live" instructor?

- Yes
- No

Thinking about the Food Safety workshop that you have just completed, please indicate how **Satisfied** or **Dissatisfied** you are with the following elements:

	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
Overall quality of the workshop					
Organization of the workshop					
Relevance of topics presented					
Clarity of workshop objectives					
Expertise of instructors					
Quality of educational materials					
Location of workshop					

Would you recommend this workshop to other farmers?

- Yes
- No

Please explain your answer to the previous question.

Block 3

IV - Finally, we would like to know a little more about you.

Answer the following **Yes/No** questions:

	Yes	No
Have you received previous		

	Yes	No
training on farm food safety?		
Have you previously developed a food safety plan for a farm?	○	○
Have you previously implemented a food safety plan for a farm?	○	○
Do you use a telephone to access email and/or internet on the job?	○	○

How many acres do you currently have in your farm producing fruits and/or vegetables?

- Number of Acres:
- Not applicable

For how many years have you been farming?

- Number of Years:
- Not applicable

If you develop a food safety plan for your farm, who will be responsible for its implementation?

- Self
- Manager
- Other:
- Not applicable

If this class had not been held, would you have attempted to develop a food safety plan for your farm on your own?

- Yes
- No
- Not applicable

Once you have a food safety plan in place in your farm, what type of audit strategy do you intend to implement? (Check all that apply)

- ☐ Self-audit
- ☐ Third party audit
- ☐ Regulatory audit
- ☐ Customer audit
- ☐ None
- ☐ Not applicable

Who are you selling your produce to? (Check all that apply)

- ☐ Directly to consumer
- ☐ Restaurant
- ☐ Retailer/Wholesale
- ☐ Other:
- ☐ Not applicable

Are you being required by any of your customers/markets to get your food safety plan audited?

- Yes
- No
- Not applicable

Please use the box below for any additional comments that you would like to share with us.

Florida Small Farms and Alternative Enterprises CONFERENCE

Cultivating Networks, Opportunities, and Sustainability

Hosted by:

UF UNIVERSITY of FLORIDA IFAS

FLORIDA A&M UNIVERSITY — COLLEGE OF ENGINEERING SCIENCES, TECHNOLOGY AND AGRICULTURE

July 15-17, 2011 • Kissimmee, FL

http://smallfarms.ifas.ufl.edu

Florida Small Farms and Alternative Enterprises CONFERENCE

Cultivating Networks, Opportunities, and Sustainability

Hosted by:

UF UNIVERSITY of FLORIDA IFAS

FLORIDA A&M UNIVERSITY COLLEGE OF ENGINEERING SCIENCES, TECHNOLOGY AND AGRICULTURE

July 15-17, 2011 • Kissimmee, FL

http://smallfarms.ifas.ufl.edu

Florida Small Farms and Alternative Enterprises CONFERENCE

Welcome,

On behalf of your hosts, the two Florida Land Grant Universities, University of Florida and Florida A&M University; welcome to the 2011 Florida Small Farms and Alternative Enterprises Conference. There have been many dedicated individuals involved with the vision and planning of this conference since its inception over three years ago and we are happy to see you here in our third year of the conference.

The frame work of this year's conference is a bit different from the first two years as a result of great feedback from past attending producers, ranchers, agencies, and industry representatives. The most notable changes include: preconference tours and special workshop offerings on Friday, a preview of the Exhibition area Friday evening, a networking social event on Saturday evening, and a full slate of uniquely arranged discussion sessions on Sunday morning. We hope this conference will help Florida farmers to prosper by learning how to meet the current market demands for locally produced food and fiber of all types. This conference will offer you a very special opportunity for locating that hard-to-find specialized information by attending sessions of your choice, meeting other farmers and industry representatives and networking with them on a wide range of topics. The one of a kind venue here at the Osceola Heritage Park brings new opportunities for the small farms industry in Florida to come together to reflect on the past and discuss your future as a small farms industry.

The conference's trademark has become the fantastic meals with the food provided by our own Florida small farmers. We will again celebrate the diversity of Florida's bounty with breakfasts and lunches made by Chef Tony with delicious food from Florida small farms. But this year, you will get a special treat as the local food theme will be expanded even more with a Saturday networking social including a meal, local beverages and a local band to entertain you.

We would like to thank the farmers and stakeholders who continue to guide us through the planning process for each conference. There have literally been hundreds of individuals working behind the scenes to make all three of the conferences successful. Please take time to thank the generous sponsors and partners who have supplied the funding to build this conference to the high standards set by the stakeholders early in the planning process. Enjoy the conference with all its offerings, but be sure to make time to network with the allied industry and support organizations in the Exhibition area. You will be amazed at what you will find and learn there.

Your feedback is always welcome and is listened to intently by the planning committee as we try to improve the conference each year. Please take time to let us know how we can make the conference even better in 2012 by participating in the evaluation process.

Enjoy, learn, and prosper.

Sincerely,
2011 Conference Executive Committee

Robert Hochmuth
UF/IFAS
North Florida REC

Rob Kluson
UF/IFAS
Sarasota County Extension

Danielle Treadwell
UF/IFAS
Horticultural Sciences Dept

Susan Kelly
UF/IFAS
Sumter County Extension

Table of Contents

Welcome Letter 1
Sponsor Recognition 5
Outstanding Scholarship Contributors 6
Committee Listings 7
Agenda-at-a-Glance 9
Pre-Conference Workshops 12
Pre-Conference Tours 13
Conference Kick-Off Speakers 14
Florida Innovative Farmer Award 16
Detailed Session Listing 17
Poster Directory 23
Fresh from Florida Small Farmers to You 25
A Taste of Florida – Luncheon Menu 26
A Taste of Florida – Social Menu 27
Food and Beverage Contributors 28
Exhibitor Listing (Alphabetical) 29
Exhibitor Listing (Booth Number) 38
Exhibit Room Floor Plan 39
Overall Osceola Heritage Park (OHP) Layout 40
Exhibition Building Layout 41
Extension Services Building Layout 42
KVLS Pavilion Layout 43
Additional Information 44
Notes 45

A Special Thank You to Our Conference Sponsors

Sustaining Partner

Florida Department of Agriculture & Consumer Services

University of Florida/IFAS

Gold

Florida A&M University/CESTA

Silver

Aramark

Southern SARE – Sustainable Agriculture Research & Education

Verti-Gro

Whole Foods Market

Bronze

Bowen Brothers, Inc.

Triangle Chemical Company

General

Farm Credit

Florida Farm Bureau Federation

OIA NORTH AMERICA

Outstanding Contributors to the Florida Small Farmer Registration Scholarship

Contributions from the following individuals and organizations provided scholarships for the attendance of two or more Florida Small Farmers at the conference.

◊ **Atlas Manufacturing, Inc.**

◊ **North Florida REC - Suwannee Valley**

◊ **Orange County Extension Service**

◊ **Polk County Small Farms Program**

◊ **Jodi & Darrin Swank, Swank Farm**

◊ **The Florida Olive Council**

◊ **UF/IFAS Alachua County Extension Service**

◊ **UNFI - United Natural Foods, Inc**

Thank you to everyone who has contributed to the Florida Small Farmer Registration Scholarship Fund.

Your donation helped Florida Small Farmers participate in the conference who otherwise would not have been able to attend.

Committee Listings

Core Stakeholder Advisory Group

Dina Clingman-Bell, AGvocacy, LLC, and InterNatural Marketing, Lake Worth

Vonda Richardson, Extension Specialist, FAMU College of Engineering Sciences, Technology & Agriculture

Norma Tillman, Southeast Small Farmers Network

Eva Worden, Worden Farms, Punta Gorda

Executive Committee

Bob Hochmuth, Multi-County Extension Agent & Small Farms Statewide Coordinator, UF-IFAS North Florida Research and Education Center- Suwannee Valley

Susan Kelly, County Extension Director, UF-IFAS Sumter County Extension Service

Robert Kluson, Extension Agent II, UF-IFAS Sarasota County Extension Service

Mandy Stage, Conference Coordinator, UF-IFAS Office of Conferences & Institutes

Danielle Treadwell, Associate Professor, UF-IFAS Horticultural Sciences Department

Nola Wilson, Extension Agent, UF-IFAS Marion County Extension Service

Exhibitor Committee

Chair, *Susan Kelly*, Director, UF-IFAS Sumter County Extension Service

Tim Carpenter, Owner, Verti-Gro, Summerfield

Kelly Monaghan, Program Assistant, Sustainable Agriculture Research and Education

Linda Seals, Agent II, UF-IFAS Brevard County Extension Service

Katherine Williams, Brandt Consolidated

Evaluation Committee

Chair, *Sebastian Gallindo-Gonzales*, Department of Agricultural Education and Communication, UF-IFAS

Glenn Israel, Professor, UF-IFAS Department of Agricultural Extension Communication

Linda Landrum, Regional Marketing Specialist, UF-IFAS North Florida Research and Education Center- Suwannee Valley

Farmer Scholarship Committee

Chair, *Alex Bolques*, Assistant Professor FAMU & Extension Agent, UF-IFAS Gasden County Extension Service

Robert Halman, County Extension Director, UF-IFAS Collier County Extension Service

Lynn Steward, Mr. Citrus Organics, Arcadia

Norma Tillman, Southeast Small Farmers Network

Farm Tour Committee

Co-Chair, *Mary Beth Henry*, Agent I, UF-IFAS Polk County Extension Service

Co-Chair, *Richard Tyson*, Director, UF-IFAS Orange County Extension Service

Jessica Sullivan, Agent I, UF-IFAS Osceola County Extension Service

Food Committee

Chair, *Rob Kluson*, Agent II, UF-IFAS Sarasota County Extension Service

Roy Beckford, Agent III, UF-IFAS Lee County Extension Service

Nola Wilson, Agent I, UF-IFAS Marion County Extension Service

Fundraising Committee

Chair, *Bob Hochmuth*, Multi-County Extension Agent & Small Farms Statewide Coordinator, UF-IFAS North Florida Research and Education Center- Suwannee Valley

Dina Clingman-Bell, Agvocacy, LLC, and InterNatural Marketing, Lake Worth

Innovative Farmer

Chair, *Angela McKenzie-Jakes*, Extension Animal Scientist Specialist, FAMU College of Engineering Sciences, Technology & Agriculture

Susan Beddy, Thunderbolt Sheep Farm, Quincy

Bobbie Golden, Golden Acres Ranch, Monticello

Linda Hart, Crazy Hart Ranch, Fellsmere

Willonese Tillman Adams, Southeastern Small Farmer's Network and Florida Meat Goat Association, White Springs

Gilbert Queeley, FAMU Cooperative Extension

Labor Pool Committee

Chair, *Mike Alligood*, Biological Scientist, Horticultural Sciences Department, UF-IFAS

Allison Beyer, MS Graduate Student, Horticultural Sciences Department, UF-IFAS

Maggie Goldman, PhD Graduate Student, Horticultural Sciences Department, UF-IFAS

Libby Rens, MS Graduate Student, Horticultural Sciences Department, UF-IFAS

Local Arrangements Committee

Chair, *Jessica Sullivan*, Agent I, UF-IFAS Osceola County Extension Service

Joe Walter, Agent II, UF-IFAS Brevard County Extension Service

Networking Committee

Chair, *Dina Clingman-Bell*, AgVocacy LLC, and InterNatural Marketing, Lake Worth

Gail Eggeman, Florida Association of Community Farmers Markets

Kevin Osburn, Vertical Horizon Farm, Hobe Sound

Natalie Parkell, Vertical Horizon Farm, Hobe Sound

Poster Committee

Chair, *Dan Fenneman*, Agent I, UF-IFAS Madison County Extension Service

Bridget Carlisle, Agent II, Polk County Extension Service

Susan Haddock, UF-IFAS Hillsborough County Extension Service

Publicity Committee

Chair, *Mandy Stage*, UF Office of Conferences and Institutes

Tara Cohan, Small Farms Program Assistance, Gainesville

Lydia Von Borstel, UF-IFAS North Florida Research and Education Center- Suwannee Valley

Educational Program Committee

Program Chair, *Danielle Treadwell*, UF-IFAS Horticultural Sciences Department

BUSINESS AND MARKETING

Chair, *Teresa Olczyk*, Director and Agent IV, UF-IFAS Dade County Extension Service

Linda Landrum, Regional Marketing Specialist, UF-IFAS North Florida Research and Education Center- Suwannee Valley Francine Schwartz, Creative Consumer Services, Fort Myers, FL

Al Wysocki, Interim Assoc Dean and Professor, UF-IFAS Food and Resource Economics

HORTICULTURE

Chair, *Aparna Gazula*, Agent II, UF-IFAS Alachua County Extension Service

Gary England, Agent II, UF-IFAS Sumter County Extension Service

Juanita Popenoe, Agent III, UF-IFAS Lake County Extension Service

Crystal Snodgrass, Agent I, UF-IFAS Manatee County Extension Service

LIVESTOCK

Co-Chair, *Pat Hogue*, Agent III, UF-IFAS Okeechobee County Extension Service

Co-Chair, *Bridget Carlilse*, Agent II, UF-IFAS Polk County Extension Service

Randy Gornto, Agent I, UF-IFAS Highlands County Extension Service

Allison Meharg, Agent I, UF-IFAS Escambia County Extension Service

Joe Walter, Agent II, UF-IFAS Brevard County Extension Service

POLICY AND REGULATION

Chair, *Brad Burbaugh*, Agent I, UF-IFAS Duval County Extension Service

Elena Toro, Agent II, UF-IFAS Suwannee County Extension Service

PROTECTED AGRICULTURE

Chair, *Bielinksi Santos*, Assistant Professor, UF-IFAS Gulf Coast Research and Extension Center, Wimauma, FL

Mercy Olmstead, Assistant Professor, UF-IFAS Horticultural Sciences Departmeny

Teresa Salame, UF-IFAS Gulf Coast Research and Extension Center, Wimauma

Ed Skvarch, Agent II, UF-IFAS Okeechobee County Extension Service

William Wendt, Alternative Crops Program Manager, West Florida Research and Education Center, Jay

ORGANIC AND SUSTAINABLE FARMING

Chair, *Jim DeValerio*, Agent I, UF-IFAS Bradford County Extension Service

Chris Bell, President, Internatural Marketing, Lake Worth

Marty Mesh, Florida Organic Growers, Gainesville

Chris Worden, Worden Farms, Punta Gorda

Agenda-at-a-Glance

Friday – July 15, 2011

Friday Events Consist of Setup, and OPTIONAL Pre-Conference Workshops, Tours.
The CONFERENCE begins with the Evening Exhibit Preview and Reception for Conference Attendees, Sponsors and Exhibitors.

Refer to the Saturday and Sunday Agenda for the CONFERENCE Educational Program and Activities.

10:00am-5:00pm	Livestock Educational Demonstrators ONLY: Animal Arrival and Housing *KVLS Pavilion*					
10:00am-5:00pm	Food Safety Plan Workshop (Optional) Building Your Own Farm's Food Safety Manual Pre-registration required; Space is limited					
10:00am-5:00pm	Beginning Farmer to Rancher Workshop (Optional) Pre-registration required; Space is limited					
1:00pm-5:00pm	EXHIBITORS ONLY - Registration Open for Exhibitor Arrival and Setup *Exhibition Hall and Exhibit Area A*					
MEETINGS						
Time	**1:00pm-5:00pm (Variable); See Below for actual times**					
Location	*Extension Services Building*		*KVLS Pavilion*	*Exhibition Building*		
	162	*160/161*		*Kissimmee AB*	*St. Cloud B*	*Kissimmee C*
	Reserved for Beginning Farmer and Rancher workshop 10 am - 5 pm	Reserved for Food Safety Plan Workshop 10 am - 5pm	This Area Not Available	IPM NRCS Agency Roundtable (Invitation Only) 1 pm - 5pm	Florida Food Policy Council Meeting 3 pm - 5 pm	Small Farms Stakeholder Meeting; (Invitation Only) 1 pm - 3 pm
Time	**OPTIONAL FARM TOURS (Pre-registration required)**					
1:00pm-5:00pm	**Livestock Tour**			**Horticulture Tour**		
5:00pm-7:00pm	**Conference Registration Open**					
5:00pm-7:00pm	**Exhibit Preview and Opening Reception for Conference Attendees, Sponsors and Exhibitors** *Exhibition Building*					

Agenda-at-a-Glance (continued)

Saturday – July 16, 2011						
7:00am-9:00am	**Registration; Morning Refreshments, Visit Exhibitors, View Posters, Visit Livestock Arena**					
9:00am-9:45am	**Conference Kick-Off and Innovative Farmer Awards**					
9:45am-11:00am	**Break, Visit Exhibitors, View Posters, Visit Livestock Arena**					
	CONCURRENT SESSIONS #1					
Time	**11:00-12:00**			**11:00-12:30**		
Location	**PROTECTED AGRICULTURE**	**BUSINESS & MARKETING**	**LIVESTOCK**	**HORTICULTURE**	**ORGANIC & SUSTAINABLE FARMING**	**POLICY & REGULATIONS**
	Extension Services Building		*KVLS Pavilion*	*Exhibition Building*		
	162	*160/161*		*Kissimmee AB*	*St. Cloud B*	*Kissimmee C*
	General Principles in Protected Ag and Types of Structures	Market Research at Your Fingertips	Stocking Rate: The Key to Successful Livestock Production	Irrigation & Nutrient Mngmnt: Keep Water/Nutrients in the Root Zone	Advancing IPM and Sustainable Agriculture Practices on Your Farm	Food Policy Councils 101
Noon-2:00pm	**Florida's Finest: A Celebration of Local Food - Lunch Provided** **Visit Exhibitors, View Posters, Visit Livestock Arena** *Exhibition Building / Livestock located in KVLS Pavilion*					
	CONCURRENT SESSIONS #2					
Time	**1:30-3:00**			**2:00-3:00**		
Location	**PROTECTED AGRICULTURE**	**BUSINESS & MARKETING**	**LIVESTOCK**	**HORTICULTURE**	**ORGANIC & SUSTAINABLE FARMING**	**POLICY & REGULATIONS**
	Extension Services Building		*KVLS Pavilion*	*Exhibition Building*		
	162	*160/161*		*Kissimmee AB*	*St. Cloud B*	*Kissimmee C*
	Best Management Practices under Protective Structures	A beginner's guide to business cooperatives for farming success	Weed Control for Small Acreages	Growing and Marketing Specialty Tree Fruits	Mycorrhizae to Improve Water/Nutrient Management	Selling into Wholesale Markets Part 1: Keys to Success
3:00pm-4:30pm	**Afternoon Break, Visit Exhibitors, View Posters, Visit Livestock Arena** *Exhibition Building / Livestock located in KVLS Pavilion*					
Exhibit Hall Closes at 4:30pm; Exhibitors break down (Exhibit hall is not open Sunday)						

-- SATURDAY CONTINUED ON NEXT PAGE --

Agenda-at-a-Glance (continued)

Saturday – July 16, 2011 (continued)						
CONCURRENT SESSIONS #3						
Time	**4:30-5:30**			**4:30-5:30**		
Location	**PROTECTED AGRICULTURE**	**BUSINESS & MARKETING**	**LIVESTOCK**	**HORTICULTURE**	**ORGANIC & SUSTAINABLE FARMING**	**POLICY & REGULATIONS**
	Extension Services Building		*KVLS Pavilion*	*Exhibition Building*		
	162	*160/161*		*Kissimmee AB*	*St. Cloud B*	*Kissimmee C*
	Managing Pests under Protected Agriculture	Manage Processes to Increase Profits	Game Bird Production on Small Acreages	Community Supported Agriculture (CSA)	Agricultural Equipment for Small Vegetable Farms	Selling into Wholesale Markets Part 2: Meet the Buyer
Livestock Barn Closes at 6:00pm						
5:30pm-8:00pm	**Networking Social: Entertainment, Hors d'oeuvres and Beverages** *Exhibition Building, Lunch area*					

Sunday – July 17, 2011						
7:30am-9:00am	**Breakfast - Exhibition Building; Exhibit Hall B**					
In-Depth Workshops and Farmer to Farmer Roundtable						
Time	**9:00-10:45**					
Location	*Extension Services Building*		*KVLS Pavilion*	*Exhibition Building*		
	162	*160/161*		*Kissimmee AB*	*St. Cloud B*	*Kissimmee C*
	Beginning Farmer and Rancher Roundtable	Future Opportunities and Challenges of Protected Ag in Florida	Ag Exemptions, Right to Farm, and Other Regulations	Selling Produce and Value-Added Farm Products: Do I need a Permit	Birds, Bees, and Bats Can Really Help Your Bottom Line	How to be Heard in a Noisy World
10:45am-11:00am	**Break - Lobby of Exhibition Building**					
	In-Depth Workshops and Farmer to Farmer Roundtable Continued					
Time	**11:00-12:00**					
Location	*Extension Services Building*		*KVLS Pavilion*	*Exhibition Building*		
	162	*160/161*		*Kissimmee AB*	*St. Cloud B*	*Kissimmee C*
	Beginning Farmer and Rancher Roundtable	Future Opportunities and Challenges of Protected Ag in Florida	Ag Exemptions, Right to Farm, and Other Regulations	Selling Produce and Value-Added Farm Products: Do I need a Permit	Birds, Bees, and Bats Can Really Help Your Bottom Line	How to be Heard in a Noisy World
12:00pm	**Conference Adjourns**					

Pre-conference Workshops

Advance registration was required

Food Safety Plan Workshop: *Building Your Own Farm's Food Safety Manual*

Friday, July 15, 2011, 10:00am – 5:00pm
UF, IFAS Osceola County Extension Office, Room 160/161

If you plan to develop a Food Safety Program for your vegetable farming operations, field or greenhouse, this workshop is for you! Most intermediate or large chain store buyers now require some level of food safety program from each farm before they buy. Even smaller operations selling directly to consumers may be advised to develop a manual for their farm. This issue will become even more important in the future.

The University of Florida/IFAS Cooperative Extension Service is offering a workshop to help growers actually develop their own food safety manuals. When you complete the workshop, you will have an electronic, printable copy of your own manual. This hands-on workshop is conducted on computers using a web-based food safety manual development program.

Extension Agent Team Teachers
Bob Hochmuth, Multi County Extension Agent, North Florida REC – Suwannee Valley
Linda Landrum, Regional Specialized Agent, North Florida REC – Suwannee Valley
Elena Toro, Extension Agent, Suwannee County

Contact: Lydia Von Borstel, Tel: 386-362-1725, ext. 109; Email: lvonborstel@ufl.edu.

* * * * * * * *

Introductory Beginning Farmer Workshop: *The Science of Farming*

Friday, July 15, 2011, 10:00am – 5:00pm
UF, IFAS Osceola County Extension Office, Room 162

You may not need a PhD to farm, but Dr. Rose Koenig, longtime producer now UF faculty member thinks that beginning farmers can benefit from the experience of others. She offers this workshop to provide you with a chance to learn some basic scientific principles that will improve your understanding of how to grow crops. The information will help beginning farmers make the right management decisions based on a better understanding of plant biology, soil science and plant nutrition. Participants will be active learners in this workshop. You will engage in group activities where you will analyze information and solve problems. So if you think you want to be a farmer or you just want to earn some extra income on the land you own, join us and take advantage of this opportunity to learn some fundamental principles of crop production.

By the end of this workshop, participants will be able to:

1. Understand what a plant needs for optimal growth and production.
2. Analyze fertilizer products to make decisions about how to meet the nutritional needs of plants.
3. Select a piece of land with the most optimal soils for growing crops.
4. Determine water availability for crop production and choose the best irrigation system for their farm.

This workshop is supported by the Beginning Farmer and Rancher Development Program of the National Institute of Food and Agriculture, USDA. Participants will be charged a small fee for lunch and snacks. No prior knowledge of farming is necessary. The workshop is designed for people with little or no scientific background in agriculture.

Teacher: Rosalie Koenig, Lecturer, Agronomy Department at the University of Florida;
Owner of Rosie's Organic Farm
Contact: Tel: 352-273-3422; Email: rlkoenig@ufl.edu

Pre-conference Tours

Advance registration was required

Friday, July 15, 2011, 1:00pm – 5:00pm

12:45pm -- Busses load for departure at side of Exhibition Building

HORTICULTURE TOUR

Kissimmee's Green Place for Natural and Organic Vegetables
Cardinal Ln Kissimmee, FL 34744-9128
Contact: kissgreenplace.com; Tel: 407-348-4699 4130

Operated by Susan Marsicano and Bruce Weaver this new one acre hydroponic venture grows an extensive variety of produce and sells direct to consumers. Learn about their media and nutrient program which includes extensive soil amendments like worm castings. See greens in hydroponic stackers, and ask about their experience growing winter vegetables in pots. Crops expected to be in production for the tour: tomatoes, peppers, and eggplant.

Organic Country Farms
Andy Chen
1675 Nora Tyson Rd, Saint Cloud, FL 34771-8673
Tel: 407- 588-7778

Operated by CK and Wendy Chung, this forty-three acre USDA organic certified farm location produces a host of field and greenhouse Asian vegetables including: bok choy, bamboo, bitter melon, and cucumbers. Ask about their soy fermenting process for beneficial microbes and their experience contracting with a large organic label. Find out about their plans for organic muscadine grapes and figs. Get ideas for your operation when you learn about the field trellising and greenhouse tomato components of their farm. Crops expected to be in production for the tour: bamboo, fuzzy gourds, Chinese okra, and bitter melon.

* * * * * * * *

LIVESTOCK TOUR

Ed Foshee, Champion Boer goat breeder
5780 Jack Brack Rd Saint Cloud FL 34771-9234
Tel: 407-506-7529; Email: edgarfoshee@earthlink.net; Web: www.fosheefarms.com

Spend some time with this experienced breeder and see his heard of about 100 Boer goats, the premier meat goat in the United States. Learn about his production and breeding system and his success with artificial insemination and embryo transfer. With 55 years of experience in raising goats you'll glean wisdom on questions you may not have even thought to ask. See how he groups the heard and learn about his shelters and fencing to save yourself some time and grief in learning in the hard way!

Lake Meadow Naturals
10000 Mark Adam Rd Ocoee, FL 34761
Tel: 321-206-6262
Email: dale@lakemeadownaturals.net; Web: www.lakemeadownaturals.net

This operation has completed the process of becoming a USDA certified egg packer but also offers much more to see! Learn about their small scale egg washing and sorting machines and incorporate the marketing and agri-tourism ideas you'll see. Ask about producing for local hotels and restaurants and the farm's experience with finding a chicken processor. Also see their specialty flocks such as soy fed chickens, and their venture into goats and grass fed beef.

Conference Kick-Off Speakers

Jack Payne

Senior Vice President for Agriculture and Natural Resources
University of Florida

Jack Payne is the Senior Vice President for Agriculture and Natural Resources at the University of Florida. Appointed senior vice president in June, 2010, Payne is the administrative head of the Institute of Food and Agricultural Sciences (IFAS) which includes the College of Agricultural and Life Sciences, the School of Natural Resources and the Environment, the School of Forest Resources and Conservation, elements of the College of Veterinary Medicine, the Florida Agricultural Experiment Station, 13 Research and Education Centers throughout Florida, and the Florida Cooperative Extension Service with offices in each of the state's 67 counties.

Prior to his current position he served as the Vice President for Extension and Outreach at Iowa State University and before that was the Vice President and Dean for University Extension at Utah State. Jack also has experience at two other land-grant institutions: Pennsylvania State University, where he served on the faculty of the School of Forest Resources, and, later, at Texas A&M University, where he served as a faculty member in the Fisheries and Wildlife Department.

After leaving Texas A&M University, Payne had a long career with Ducks Unlimited (DU), as their National Director of Conservation. While at Ducks Unlimited, some of his successes included the development of DU's private lands program with agriculture, the development of a national conservation easement program and the expansion of their Mexican program to Central and South America.

Payne received his M.S. in Aquatic Ecology and his Ph.D. in Wildlife Ecology from Utah State University and is a graduate of the Institute for Educational Management at Harvard University. He is a tenured professor in the Department of Wildlife Ecology and Conservation at the University of Florida. Jack currently is the Chair of the Policy Board of Directors for the Board on Agriculture Assembly, Association of Public and Land-grant Universities.

Conference Kick-Off Speakers

Vonda Richardson

Extension Marketing Specialist
FAMU Cooperative Extension Program

Vonda Richardson is the Extension Marketing Specialist for the FAMU Cooperative Extension Program and serves as Program Leader for Marketing and Small Farm Outreach. She is currently a Co-Lead for the UF-FAMU Small Farms/Alternative Enterprise Focus Team. She has 16 years of experience working with small-scale producers in Florida and surrounding states in market development and farm business management. Her background is in Agricultural Economics, and she holds a Bachelor and Master degree from Fort Valley State University and University of Georgia, respectively.

The goal of the Marketing and Small Farm Outreach Program is to enhance the economic viability and competitiveness of small-scale farm operations through effective marketing and business management practices. The program provides access to information and opportunities to change attitudes, gain knowledge, develop skills and change behaviors so that agricultural clientele can enhance income generating potential. The program encompasses information dissemination, training, assistance, outreach and demonstration activities for small-scale farm operators, new and beginning farmers, youth entrepreneurs, school districts and other market representatives, and public and private entities.

The program also seeks to develop partnerships with other public and private entities to promote small- scale farm sustainability. Some of the collaborative efforts have involved the following entities:

- UF-IFAS-FAMU Small Farm/Alternative Enterprises Focus Team Co-Leader
- New North Florida Cooperative Association, Inc.
- Community Food Security Coalition/National Farm-to-School Network/8 Regional Lead Agencies
- Panhandle Fresh/Team Santa Rosa
- Heifer International
- USDA
- Renaissance Park Youth Camp
- Resource Conservation &Development (RC&D) Councils
- Local County Extension Offices
- Florida Department of Agriculture & Consumer Services
- Florida Department of Education

Florida Innovative Farmer Award

The goal of the Florida Innovative Farmer Award is to recognize farmers and ranchers who are leaders and innovators based on the following criteria:

- Success in making farming systems more profitable over the long term
- Ability to use farming practices that enhance, rather than harm, natural resources
- Leading - or participating in - activities that support viable communities, either through economic development or contribution to regional food systems
- Effective outreach and/or education about sustainable agriculture ideas and practices to others, such as producers, community leaders, agricultural educators and the general public

The quality of applications we received was outstanding, and we thank everyone for the time they took from their busy farm schedules to share their stories with us. We are pleased to award this year's Florida Innovative Farmer Awards to three very deserving farmers:

Alan and ***Yvonne Hart***
Windmill Acres Farm and Goat Milk Dairy LLC
Ocklawaha, FL

Roger Twitchell and ***Ellyn Hutson***
Caney Branch Farm
Monticello, FL

Nancy Roe
Green Cay Produce and Farming Systems Research, Inc.
Boynton Beach, FL

Please take the time to congratulate these special farmers, and thank them for the good work that they do.

May the farm be with you,

The Small Farms Innovative Farmer Award Committee

Detailed Session Listing

SATURDAY

Protected Agriculture
Extension Services Building – Room 162

11:00-12:00. General Principles in Protected Agriculture and Types of Structures: "Protected agriculture" is a general term used to describe any structure that protects the crop. This session provides an overview of experiences and lessons learned using a variety of structures including high tunnels, open shade houses, and greenhouses.

Moderator: Bielinski Santos, Assistant Professor Horticultural Sciences, UF-IFAS Gulf Coast Research and Education Center, Wimauma, FL
Speaker: Robert Hochmuth, Multi-County Extension Agent, Vegetable Production, UF-IFAS North Florida REC-Suwannee Valley
Speaker: Jacque Breman, Tri-County Alternative Crops Extension Agent, UF-IFAS
Speaker: William Wendt, Specialty Crops Program Manager, West Florida Research and Education Center, Jay, FL

1:30-3:00. Crop Management and Cultural Practices Under Protective Structures: From vegetables to fruit crops, protected structures are used throughout Florida to extend the season and produce high-quality produce. Learn about new research findings, get tips and tools for producing a successful crop, and get motivated with examples of low-cost structures for your farm.

Moderator: Jacque Breman, Tri-County Alternative Crops Extension Agent, UF-IFAS
Speaker: Bielinski Santos, Assistant Professor Horticultural Sciences, UF-IFAS Gulf Coast Research and Education Center
Speaker: Dan Cantliffe, Distinguished Professor and Chair, UF-IFAS Horticultural Sciences Department
Speaker: Teresa Salame, Research Associate, UF-IFAS Gulf Coast Research and Education Center

4:30-5:30. Managing Pests Under Protected Agriculture: Cultural practices are very important in controlling insects and diseases in protected systems. Insects, mites, and diseases reduce yield and quality of high-value crops and require additional labor to manage. Learn about proven practices and emerging new technologies to keep your fruits and vegetables looking spectacular.

Moderator: Ed Skvarch, Extension Agent III, UF-IFAS St. Lucie County Extension
Speaker: Oscar Liburd, Professor, UF-IFAS Entomology and Nematology Department
Speaker: Xin Zhao, Assistant Professor, UF-IFAS Horticultural Sciences Department
Speaker: Gary Vallad, Assistant Professor Plant Pathology, UF-IFAS Gulf Coast Research and Education Center

Business and Marketing
Extension Services Building – Room 160/161

11:00-12:00. **Market Research at Your Fingertips:** Participants will learn how to make the most of the Florida MarketMaker website by actively exploring the website and its searchable database to collect market research for their businesses.

Moderator: Teresa Olczyk, UF-IFAS Miami-Dade County Extension Director
Speaker: Allen Wysocki, Professor UF-IFAS Food and Resource Economics Department and Interim Associate Dean College of Agriculture and Life Sciences
Speaker: Linda Landrum, Regional Specialized Agent, Marketing & Rural Development, UF-IFAS North Florida REC-Suwannee Valley
Speaker: Rohil Shah, Graduate Student, UF-IFAS Food and Resource Economics Department

SATURDAY (continued)

Business and Marketing (continued)
Extension Services Building – Room 160/161

1:30-3:00. Intro to Cooperatives (Co-ops): A beginner's guide to business cooperatives for farming success: Participants will have the opportunity to interact with a panel of people who are part of cooperatives. Participants will learn what a cooperative actually is, and will learn about the different types of cooperatives, explore ways to start a cooperative, and discuss the pros and cons of using a cooperative as a business structure.

Moderator: Teresa Olczyk, UF-IFAS Miami-Dade County Extension Director
Speaker: G.B. Crawford, Assistant Editor of *FloridAgriculture*, Florida Farm Bureau Federation
Speaker: J.R. Newbold, President, Florida Wildflowers Growers Cooperative
Speaker: Brian Crews, Florida Wildflowers Growers Cooperative
Speaker: Regina Thomas, Senior Vice President, Chief Business Development Officer, Farm Credit of Central Florida
Speaker: Allen Wysocki, Professor UF-IFAS Food and Resource Economics Department and Interim Associate Dean College of Agriculture and Life Sciences

4:30-5:30. Grow Your Bottom Line – Managing Processes to Increase Profitability: Participants will learn how to define those processes that are critical to farm operations in order to begin identifying opportunities for improved efficiency and developing business continuity strategies.

Moderator: Teresa Olczyk, UF-IFAS Miami-Dade County Extension Director
Speaker: Robert Myers, Certified Business Analyst, Small Business Development Center, University of North Florida, Jacksonville, FL
Speaker: Cathy Hagan, Certified Business Analyst, Small Business Development Center, University of North Florida, Jacksonville, FL
Speaker: Dr. Philip Geist, Certified Business Analyst, Small Business Development Center, University of North Florida, Jacksonville, FL

Livestock
KVLS Pavilion

11:00-12:00. Stocking Rate: The Key to Successful Livestock Production: Determine and achieve optimal stocking rates for your pastures based on your operation's available forage, fertilization, production cycle, and class of animals.

Moderator: Bridget Carlisle, Extension Agent III, UF-IFAS Polk County Extension
Speaker: Randy Gornto, Extension Agent I, UF-IFAS Highlands County Extension
Speaker: Darlene Pigman, Front Porch Dogs, Avon Park, FL

1:30-3:00. Weed Control for Small Acreages: Manage and control weeds that rob pastures of quality forage through best management practices. Identify the resources (biological or chemical) needed to manage them.

Moderator: Bridget Carlisle, Extension Agent III, UF-IFAS Polk County Extension
Speaker: Jason Ferrell, Associate Professor, Agronomy Department, UF-IFAS

4:30-5:30. Game Bird Production on Small Acreages: Produce quail, pheasant, and eggs on a small farm operation for game bird releases.

Moderator: Pat Hogue, UF-IFAS Okeechobee County Extension Director
Speaker: John Blake, Professor, Department of Poultry Science, Auburn University, Auburn, Alabama

SATURDAY (continued)

Live Animal Exhibits
KVLS Pavilion

Llamas. Lisa Dreggors, Sunshine State Llamas, Silver Springs, FL
Beef cattle and poultry. Jennifer Walter, Recycle Ranch, Christmas, FL
Florida Native Sheep. Doug Meyers, Meyers Sheep Farm and Meat Sheep Alliance, Apopka, FL
Milking Goats. Devin Kann, Heart of Christmas Farms, Christmas, FL
Pastured Poultry. George Lauterbach, Sarasota, FL
Akaushi Cattle. Justin Jackman, Jackman Cane and Cattle Company, Clewiston, FL

Horticulture
Exhibition Building – Kissimmee AB

11:00-12:30. Irrigation and Nutrient Management: Keeping Water and Nutrients in the Crop Root Zone: Efficient water management is key to effective nutrient management. The crop nutrients supplied either through organic amendments or through conventional fertilizers are highly water soluble in their available state. During this session participants will learn about small farm irrigation systems management (including drip irrigation systems). Attendees will also have an opportunity to ask questions of a panel of specialists.

Moderator: Gary England, Extension Agent III, UF-IFAS Sumter County Extension
Speaker: Aparna Gazula, Extension Agent II, UF-IFAS Alachua County Extension
Speaker: Rick Lusher, Director, Florida Automated Weather Network, UF-IFAS
Speaker: Jeff Williamson, Professor, Horticultural Sciences, UF-IFAS

2:00-3:00. Growing and Marketing Specialty Tree Fruits: Interested in having a diverse produce portfolio? This session will feature UF-IFAS fruit crop specialists and a local specialty tree fruit grower. Information will be presented on the production and marketing of specialty tree fruits such as pomegranates and olives.

Moderator: Gary England, Extension Agent III, UF-IFAS Sumter County Extension
Speaker: William (Bill) Castle, Professor Emeritus, UF-IFAS Citrus Research and Education Center, Lake Alfred, FL
Speaker: Richard Williams, Olive producer, FL

4:30-5:30. Community Supported Agriculture (CSA): Interested in establishing or managing a successful CSA? This session will build upon information learned in earlier sessions and will feature information about crop scheduling and crop rotations to effectively supply product for your CSA throughout the growing season. The speakers are UF-IFAS extension agents and successful CSA operators in Florida.

Moderator: Aparna Gazula, Extension Agent II, UF-IFAS Alachua County Extension
Speaker: David Nistler, Extension Agent II, UF-IFAS Clay County Extension
Speaker: Chris and Eva Worden, Worden Farms, Punta Gorda, FL

Organic and Sustainable Farming
Exhibition Building – St. Cloud B

11:00-12:30. Advancing IPM and Sustainable Agriculture Practices on Your Farm: Florida growers interested in advancing Integrated Pest Management (IPM) strategies won't want to miss this session. Learn about advanced IPM systems, Natural Resource Conservation Service (USDA, NRCS) conservation/IPM programs and financial incentives, technical support to design and implement IPM practices, and enjoy a question and answer session with expert speakers.

Moderator: Norm Leppla, Professor and Director of the UF-IFAS statewide IPM Program
Speaker: Galen Frantz, Crop Advisor, Glades Crop Care, Florida
Speaker: Aaron Malek, Crop Advisor, Glades Crop Care, Florida
Speaker: Tom Green, President of the IPM Institute of North America, Wisconsin
Speaker: Peter Werts, Project Coordinator, IPM Institute of North America, Wisconsin
Speaker: Steve Boetger, State Agronomist, USDA NRCS Florida

SATURDAY (continued)

Organic and Sustainable Farming (continued)
Exhibition Building – St. Cloud B

2:00-3:00. Using Mycorrhizae Fungi to Improve Water and Nutrient Management: Mycorrhizae are naturally occurring soil fungi that colonize the roots of crop plants forming a mutually beneficial relationship. Participants will learn about the benefits of mycorrhizae including: improved nutrient and water uptake, soil quality and stability, and increased tolerance of drought, salts, heavy metals, and root pathogens. These benefits are essential to soil management. This session also will cover the use of mycorrhizae in applied research, ecological restoration, and phytoremediation practices.

Moderator: Jim DeValerio, Extension Agent III, UF-IFAS Bradford County Extension
Speaker: Abid Al Agely, PhD, Microbial Ecologist, Soil and Water Science Department, UF-IFAS

4:30-5:30. Agricultural Equipment for Small Vegetable Farms: Learn about essential equipment for tillage, planting, cultivation, pest control, and harvesting in organic farming. Participants will learn from a local farmer who will share insights on the roles of equipment in sustainable agricultural systems.

Moderator: Jim DeValerio, Extension Agent III, UF-IFAS Bradford County Extension
Speaker: Chris Worden, Worden Farms, Punta Gorda, FL

Policy and Regulations
Exhibition Building – Kissimmee C

11:00-12:30. Food Policy Councils 101: Local and state governments can be powerful partners for changing the food system. Learn how Food Policy Councils and Coalitions are engaging individuals to become allies in the local food movement. This session will include several discussions: what food policy councils are, the impacts they can have on community food systems, how to become involved, and current projects of the Florida Food Policy (FFP).

Moderator: Brad Burbaugh, Agent III, UF-IFAS Duval County Extension
Speaker: Trish Stawn, FFP Council and Deep Creek Ranch, Deland, FL
Speaker: Francisco Rodriquez, Board Member, FFP Council
Speaker: Robert Kluson, Agent III, UF-IFAS Sarasota County Extension
Speaker: Marty Mesh, Board Member, FFP Council and Executive Director of Florida Organic Growers
Speaker: Pete Kennedy, Board Member, FFP Council; President of Farm to Consumer Legal Defense and Vice President of Farm to Consumer Foundation

2:00-3:00. Selling into Wholesale Markets, Part 1: Wholesale Success: This is Part One of a two-part session covering successful wholesaling techniques for small to mid-scale farmers. The programming will inform farmers about what wholesale buyers are looking for as well as regulations and best practices in food safety, post-harvest handling, and packing. Participating producers will receive a FREE copy of the Wholesale Success Manual (a $50 value). This 256-page, four-color publication is a leading source of information to help farmers scale up and sell into wholesale channels.

Moderator: Elena Toro, Agent II, UF-IFAS Suwannee County Extension
Speaker: Jim Slama, FamilyFarmed.org

4:30-5:30. Selling into Wholesale Markets, Part 2: Meet the Buyers: This is Part Two of a two-part session that provides a forum for farmers to develop new sales opportunities. Attendees will hear from a produce buyers' panel regarding their businesses, current produce sourcing practices, future expectations, and local farms' places within the sourcing network. Attendees will have opportunities to ask questions and network individually with buyers.

Moderator: Brad Burbaugh, Agent I, UF-IFAS Suwannee County Extension
Speaker: Rachael Terrin, FL Department of Education
Speaker: Christie Meresse, FL Department of Education
Speaker: Lance Rodan, FL Department of Agriculture & Consumer Services

SUNDAY

9:00-12:00. Beginning Farmer and Rancher Roundtable

Extension Services Building – Room 162

For beginning farmers, designing a marketing strategy requires knowledge of customers, products, sales channels, production costs and competitive price setting in order to maximize profit and attract customers. Activities and group discussion will cover these topics and more. The Sunday session will be different from the pre-conference Beginning Farmer and Rancher event. This event will focus on introductory marketing concepts and is geared towards beginning farmers who are new to marketing or experienced farmers who want to improve their understanding of marketing.

Moderator: Malani Ram, Curriculum Development, Agronomy Department, UF-IFAS
Speaker: Malani Ram, Curriculum Development, Agronomy Department, UF-IFAS
Speaker: Juan Carlos Rodriquez, Post Doctoral Researcher, Organic In America, North America, Gainesville, FL

9:00-12:00. Birds, Bees, and Bats Can Really Help Your Bottom Line

Exhibition Building – St. Cloud B

This session will include discussions of exciting new research demonstrating the benefits of attracting birds, bees, and bats to production areas. Farmers will share their experiences and the group will discuss practical approaches to attracting these valuable pollinators and predators to their farms.

Moderator: Jim DeValerio, Extension Agent III, UF-IFAS Bradford County Extension
Moderator: Terry Byatt, Horticultural Sciences, UF-IFAS
Speaker: Jaret Daniels, Assistant Professor and Assistant Curator of Lepidoptera, UF Museum of Natural History
Speaker: Akers Pence, Post Doctoral Researcher, Department of Entomology, UF-IFAS
Speaker: Pablo Herrera, Graduate Student, Department of Entomology, UF-IFAS
Speaker: Katie Sieving, Professor, Department of Wildlife Ecology & Conservation, UF-IFAS
Speaker: Lynn Steward, Mr. Citrus Organics and Vegetables, Arcadia, FL
Speaker: Roger Twitchell, Caney Branch Farms, Monticello, FL
Speaker: Holly Ober, Assistant Professor, Dept. of Wildlife Ecology & Conservation, UF-IFAS

9:00-12:00. Ag Exemptions, Right to Farm, and Other Regulations

KVLS Pavilion

This session will feature two panel discussions. The first will guide producers through taxing, zoning, permitting, and ordinances relative to small farm livestock production. The second will feature a panel discussion on marketing, processing, and labeling livestock products.

Moderator: Pat Hogue, UF-IFAS Okeechobee County Extension Director
Speaker: Jim Strickland, Strickland Ranch and Exports, Inc. and Manatee County Property Appraiser
Speaker: Renee Strickland, Strickland Ranch and Exports, Inc.
Speaker: Staci Braswell, Director of Government and Community Affairs, FL Farm Bureau Federation, Gainesville, FL
Speaker: Danny Raulerson, State Farmers' Market Bureau Chief, FL Dept. Agriculture and Consumer Services
Speaker: Chad Carr, Assistant Professor Animal Science Dept. UF-IFAS
Speaker: Billy Nettles, Nettles Sausage, Inc. Lake City, FL

SUNDAY (continued)

9:00-12:00. How to be Heard in a Noisy World

Exhibition Building – Kissimmee C

This hands-on workshop features three segments. First, we will discuss farm branding. We'll explain how to create a brand that accurately represents your farm, products, values, and practices with the goal of establishing a cohesive, positive reputation in the marketplace. Next, we'll discuss basic public relations skills and the ways in which they relate to branding and marketing. Finally, we will discuss social media sites, such as Facebook and Twitter, and the ways in which these tools can benefit your farm's public relations, marketing, and sales efforts.

Moderator: Teresa Olczyk, UF-IFAS Miami-Dade County Extension Director
Speaker: Francine Wolfe Schwartz, President, Creative Consumer Services, Food Marketing and Public Relations
Speaker: Liz Felter, UF-IFAS Extension, Faculty-Production Horticulture & Exploration Gardens, Orange County
Speaker: Tracy Irani, Development Director, Center for Public Issues Education in Agriculture and Natural Resources, Agricultural Education and Communication Department
Speaker: Becky Raulerson, Coordinator of Research Programs, Center for Public Issues Education in Agriculture and Natural Resources
Speaker: Kevin Kent, Center Media Specialist, Center for Public Issues Education in Agriculture and Natural Resources

9:00-12:00. Selling Produce and Value-Added Farm Products: Do I Need a Permit?

Exhibition Building – Kissimmee AB

This session will address current regulations and on-farm processing for value-added products and cover current food safety regulatory updates. Additionally, a panel discussion of farmers who have completed the permitting process will provide insight and helpful hints on how to get started and comply with regulations. Lastly, this session will include these concurrent information exchange break-out sessions: food labeling requirements, leasing facilities for agricultural goods processing, and food preservation techniques and regulations.

Moderator: Brad Burbaugh, Agent III, UF-IFAS Duval County Extension
Speaker: Lee Cornman, FL Department of Agriculture and Consumer Services, Division of Food Safety
Speaker: Amy Simonne, Professor, Family Youth and Community Sciences Dept., UF-IFAS
Speaker: Elena Toro, Agent III, UF-IFAS Suwannee County Extension
Speaker: Brad Burbaugh, Agent III, UF-IFAS Duval County Extension
Speaker: Chris Dickerson, Corner Natural Foods
Speaker: Bobbie Golden, Golden Acres Ranch, Monticello, FL
Speaker: Linda Hart, Crazy Hart Ranch, Fellsmere, FL

9:00-12:00. Future Opportunities and Challenges of Protected Ag in Florida

Extension Services Building – Room 160/161

A forum for growers interested in learning from one another, this session emphasizes grower-to-grower interactions to discuss critical issues and opportunities in Florida's protected agriculture systems.

Moderator: Teresa Salame, Research Associate, UF-IFAS Gulf Coast Research and Education Center
Speaker: Bielinksi Santos, Assistant Professor, UF-IFAS Gulf Coast Research and Education Center, Wimauma, FL
Speaker: Bruce Templeton, Belleview Avenue, LLC, Lake Wales, FL
Speaker: Anna Coco, Belleview Avenue, LLC, Lake Wales, FL
Speaker: Jim Gibbons, Gibbons Farms Organics, Ft. Pierce, FL

Poster Directory

NOTE: Educational Posters are located in the Exhibit Room, Friday and Saturday.
(Listed in alphabetical order by title)

2011 Gulf Coast Agribusiness Conference – *J. Jeffrey Mullahey* | UF/IFAS West Florida Research and Education Center, Milton, FL, USA

Agriculture Diversity & Profitability Initiatives at UF-IFAS Partnership at Hastings that have Potential for Small Farm Enterprises – *Jacque W. Breman*[1], *David A. Dinkins*[2] and *Scott Taylor*[3] | [1]UF/IFAS St. Johns County Extension, St. Augustine, FL, USA; [2]UF/IFAS Putnam County Extension, East Palatka, FL, USA; [3]UF/IFAS Partnership for Water Agriculture & Community Sustainability, Hastings, FL, USA

AGRItunity Farm Tours: Education for a Better Rural-Urban Interface – *Megan Brew*[1], *Juanita Popenoe*[1], *Matthew Lenhardt*[2], *Joan Bradshaw*[2], *Gary England*[3], *Susan Kelly*[3], *Stacy Strickland*[4], *Brooke Moffis*[3], *Jim Moll*[4] and *Ed Jenning*[5] | [1]UF/IFAS Lake County Extension, Tavares, FL, USA; [2] UF/IFAS Citrus County Extension, Lecanto, FL, USA; [3]UF/IFAS Sumter County Extension, Bushnell, FL, USA; [4]UF/IFAS Hernando County Extension, Brooksville, FL, USA; [5]UF/IFAS Pasco County Extension, Dade City, FL, USA

Beekeeping: An Alternative Farm Enterprise – *Brad Burbaugh* | UF/IFAS Duval County Extension, Jacksonville, FL, USA

Beginning Farmers: Hmong Grower Meeting Series – *Mary Beth Henry*[1], *Crystal Snodgrass*[2] and *Alicia Whidden*[3] | [1]UF/IFAS Polk County Extension County Extension, Bartow, FL; [2]UF/IFAS Manatee County Extension, Palmetto, FL; [3] UF/IFAS Hillsborough County Extension, Seffner, FL

Expanding Your Market: The Multi-Farm Community Supported Agriculture Model – *D. B. Nistler* | UF/IFAS Clay County Extension, Green Cove Springs, FL, USA

Farmer's Market Research Technique – The DOT Survey – *Susan A. Kelly* | UF/IFAS Sumter County Extension, Bushnell, FL, USA

Feed-the-Farmer: Food and Fodder for the Body, Mind and Soul of Your Local Farmer – *Christine Kelly-Begazo*[1], *Ed Skvarch*[2], *Dan Culbert*[3] and *Fred Burkey*[4] | [1]UF/IFAS Indian River County Extension, Vero Beach, FL, USA; [2]UF/IFAS St. Lucie County Extension, Ft. Pierce, FL, USA; [3]UF/IFAS Okeechobee County Extension, Okeechobee, FL, USA; [4]UF/IFAS Martin County Extension, Stuart, FL, USA

Florida Small Farmers Build Food Safety Manuals and Plans – *Robert Hochmuth, Linda Landrum, Elena Toro, Lydia Von Borstel* and *Sarah White* | UF/IFAS North Florida Research and Education Center, and Suwannee County Extension, Live Oak, FL, USA

Marketing Small Farms and Expanding Partnerships that Promote a Historic St. Augustine Specialty Crop: Datil Pepper – *Steven C. Lands*[1] and *Jacque Breman*[2] | [1]UF/IFAS St. Johns County Extension, St. Augustine, FL, USA; [2]UF/IFAS St. Johns County Extension, Hastings, FL, USA

Northeast Florida Beef & Forage Group –Season Weed Control for Northeast Florida Calendar – *C.B.Sanders[1], B. Bactawar[2], D.L. Barber[3], B.J. Burbaugh[4] , M. Davis[5], D.K. Fenneman[6] , S.A. Gaul[7], D.B. Nistler[8], M.S. Sweat[4], E.M. Toro[9] , B.J. Wilder[10]* and *T.W. Wilson[10]* | [1]UF/IFAS Alachua County Extension, Gainesville, FL, USA; [2] UF/IFAS Union County Extension, Lake Butler, FL, USA; [3]UF/IFAS Columbia County Extension, Lake City, FL, USA; [4]UF/IFAS Duval County Extension, Jacksonville, FL, USA; [5]UF/IFAS Baker County Extension, Macclenny, FL, USA; [6]UF/IFAS Madison County Extension, Madison, FL, USA; [7]UF/IFAS Nassau County Extension, Callahan, FL, USA; [8]UF/IFAS Clay County Extension, Green Cove Springs, FL, USA; [9]UF/IFAS Suwannee County Extension, Live Oak, FL, USA; [10]UF/IFAS Bradford County Extension, Starke, FL, USA

Onfarm Research of Photoselective Shade Cloths in Parsley and Basil Herb Production – *Robert Kluson[1]* and *Kathy Oliver[2]* | [1]UF/IFAS Sarasota County Extension; [2]My Mother's Garden Farm, Wimauma, FL, USA and SWFSFN

Production Techniques for Beginning or Improving a Small Scale Agricultural Operation – *Derek L. Barber* | UF/IFAS Columbia County Extension, Lake City, FL, USA

Protected Agriculture On-Farm Demonstrations with UF-IFAS Partnership at Hastings in Northeast Florida have Potential for Small Farm Enterprises as well as for Large Farms – *Jacque W. Breman[1], David A. Dinkins[2], Daniel J. Cantliffe[3]* and *Scott Taylor[4]* | [1]UF/IFAS St. Johns County Extension Office, St. Augustine, FL, USA; [2]UF/IFAS Putnam County Extension Office, East Palatka, FL, USA; [3]UF/IFAS Horticulture Sciences Department, Gainesville, FL, USA; [4]UF/IFAS Partnership for Water Agriculture & Community Sustainability, Hastings, FL, USA

Small Farms Academy Orchard Management Series – *Linda Landrum, Robert Hochmuth, Debbie Gast,* and *Sarah White* | UF/IFAS North Florida Research and Education Center, Suwannee Valley, Live Oak, FL, USA

South Florida Beef-Forage Program Reproductive Management School – *B. Carlisle[1], L. Baucum[2], S. Crawford[2], C. Davis[3], R. Gornto[4], M. Hersom[5], P. Hogue[3], C. Holcomb[6], C. Kirby[7], G. Lamb[8], T. Prevatt[9]* and *L. Wiggins[2]* | [1]UF/IFAS Polk County Extension, Bartow, FL USA; [2]UF/IFAS Hendry County Extension, LaBelle, FL USA; [3]UF/IFAS Okeechobee County Extension, Okeechobee, FL USA; [4]UF/IFAS Highlands County Extension, Sebring, FL USA; [5]UF/IFAS Animal Science Department, Gainesville, FL USA; [6]UF/IFAS Dairy Science Department, Bartow, FL USA; [7]UF/IFAS Manatee County Extension, Palmetto, FL USA; [8]UF/IFAS North Florida REC, Marianna, FL USA; [9]UF/IFAS Glades County Extension, Moore Haven, FL USA

Specialty Crop Block Grant Program at the WFREC Jay Research Center – *Jeff Mullahey, Ronnie Schnell, William Wendt, M. Allison Meharg, Libbie Johnson* and *Cindy Anderson* | UF/IFAS

Vegetable Growers Using Plasticulture Improve Nutrient Management – *J.R. Fletcher, R. Hochmuth* and *G. Hochmuth* | UF/IFAS, Gainesville, FL

Fresh from Florida Small Farmers to You

The food committee and the SAVOR food service staff welcome all of the attendees to the 2011 Small Farms & Alternative Enterprises Conference. We are pleased to inform you that again you will be treated to memorable meals featuring locally grown foods fresh from Florida small farmers. We want you to know that we have been able to accomplish this feat only because of the participation of many small farmers and supporters across the state of Florida who answered our call. Therefore, please, take the time to read the food signage to learn about the farmers and programs that are providing the delicious and diverse foods that you will soon be enjoying. Hopefully, you will get a chance to meet some of these folks during the conference and be inspired to answer the call next year with foods that you produce.

This year there are two new additions of Culinary and Libation special highlights to the conference that deserve bringing to your attention. First, the menu will include dishes that feature locally and sustainably produced seafood from Florida's fisheries and aquaculture. This addition will be expanded in years to come to demonstrate the opportunities and successes in seafood small farming in Florida. Second, the new Saturday evening social event of the conference will provide the venue to enjoy tastings of fine beverages from Florida wineries, breweries, and fruit juice producers. We hope that these beverages along with a breath taking array of hors d'hourves made with foods fresh from Florida small farmers will make this event a memorable time for networking with your fellow attendees.

Last but not least, we want to acknowledge the special efforts of someone on the food team, i.e., Nola Wilson of UF/IFAS Marion County Extension. Nola was the visionary and driving force of providing you meals featuring Florida local foods since the inception of this conference. She is now making a transition to an exciting position with the northeast USDA SARE program. We wish her the best of luck in her new endeavors and we thank her for her untiring commitment to the highest food standards for our conference.

Robert Kluson
Chair, Food Committee
UF/IFAS Sarasota Co. Extension

Tony Donnelly
C.E.C., Executive Chef
SAVOR … Osceola Heritage Park

Showcase of Florida Farmers

4 Arrows Ranch - Marion
Bay Shellfish Co - Manatee
Beli Farms - Suwannee
Bell Seafood Company - Manatee
Bluefield Organic - Okeechobee
Crazy Hart Ranch - Indian River
Dakin Dairy Farms - Manatee
Equal Exchange - Boston, MA
Farming Systems - Palm Beach
Florida Crystals - Palm Beach
Florida Peanut Producers - Jackson
Gainesville University of Florida IFAS - Alachua
Haymaker Farms - Marion
Heart Of Christmas Farms - Orange
High Springs Orchard and Bakery - Alachua
Johns Honey - Marion
Kurtz & Sons - Alachua
Lake Meadows Naturals - Orange
Monterey Mushroom - Orange
Mote Aquaculture Park - Sarasota
New North Florida Co-Op - Jackson
Sweetwater Organic - Alachua
The Orange Shop - Marion
The Treehouse - Lee
UF/IFAS Blueberry Program - Alachua
UF/IFAS Potato Program - St. Johns
UF/IFAS Tropical Fruit Program - Miami-Dade
UF/IFAS-Palm Beach Extension - Palm Beach
Um-Boozi Farm - Lee
Uncle Matt's - Lake
Vintage Organic Acres - Manatee
Wild Ocean Market - Brevard

Savor…OHP
Welcomes the Florida Small Farms Conference Luncheon
7/16/2011

A mélange of hydroponically grown Lettuces and Greens w/ Florida Orange and creamy Vidalia Dressings, Pork Back Croutons and Pomegranate Glaze

~ ~ ~ ~ ~

Roast Pastured Berkshire Pork w/ Fresh Florida Peaches served with an Apple Chutney Demi Glace

Pastured Chicken "Coq au Vin" Pastured Chicken stewed with Mushrooms, Pearl Onions and White Wine

Grass Fed Angus Beef "Bourguignon"

~ ~ ~ ~ ~

Summer Squash Provençal
Florida "Maque Choux" with corn, okra, tomatoes, black eyed peas and hominy

~ ~ ~ ~ ~

Wild Rice Pilaf
Roasted Table Potatoes w/ Fresh Rosemary and Garlic

~ ~ ~ ~ ~

Florida Berry Bar, Buttermilk Biscuits and Minted Gran Mariner

Warm Peach and Mango Cobbler

VEGETARIAN / VEGAN MENU

A mélange of hydroponically grown Lettuces and Greens w/ Florida Orange and creamy Vidalia Dressings, and Pomegranate Glaze

~ ~ ~ ~ ~

Cedar Roasted Portabello Mushrooms Steaks w/ Soy, Mirin Glaze

~ ~ ~ ~ ~

Summer Squash Provencal

Florida "Maque Choux" with corn, okra, tomatoes, black eyed peas and hominy

~ ~ ~ ~ ~

Wild Rice Pilaf

Roasted Table Potatoes w/ Fresh Rosemary and Garlic

~ ~ ~ ~ ~

Florida Berry Bar, Buttermilk Biscuits and Minted Gran Mariner

Warm Peach and Mango Cobbler

Savor…OHP
Welcomes the Florida Small Farms Conference
"Getting to Know You" Social -- 7/16/2011

Come on down and See, Taste and Enjoy Bountiful Displays of "Farm to Table" Treats, Sweets and Delicacies from around Our Great State of Florida!!!

Some of the Items highlighted this evening…

~ ~ ~ ~ ~

Mushroom Madness!!!
Organically grown whites and brown mushrooms, stuffed with Pork Sausage, Mushroom Napoleons, Mushroom Risotto to name a few!

~ ~ ~ ~ ~

Florida Sunshine Paella
A mélange of Florida seafood served "paella' style with organic Vegetables and Crunchy Garlic French Baguette

~ ~ ~ ~ ~

Savvy 'SAVOR…' Skewers
Grass Fed Beef skewers served w/ Curried Dipping Sauce
Pastured Chicken Skewers with a Thai Peanut Sauce w/ Coconut Milk and Lemongrass
Goat on a Stick Marinated and served w/ a Sweet and Savory Lingonberry Rosemary and Garlic Sauce

~ ~ ~ ~ ~

Hypnotic Hydroponic Salad Station with SAVOR
OHP custom Hydroponically Grown Greens w/ an assortment of Dressings and Crossini Sticks

~ ~ ~ ~ ~

Butler Passed
Mango and Goat Cheese Bruschetta, Seafood stuffed Mushroom Caps,
Farm Raised Bronzed Sturgeon Thumbits w/ Muscadine Champagne Cream

~ ~ ~ ~ ~

For Our Vegan Guests
Organic Mushroom Risotto, Mushroom Napoleons, Wild Rice Pilaf, Hypnotic Hydroponic Salad Blend, Portabello Steak Thumbits, Cedar Roast Asparagus, Grilled Seasonal Squash

~ ~ ~ ~ ~

Decadent Desserts to include…
A variety of Crème Brule's, Mango, Peach, Blueberry
Honey Basil Mango Compote
Blueberries with fresh Mint and Tequilla
Fresh Fruits, Cookies and Cheeses

~ ~ ~ ~ ~

Spring Water, Iced Tea, Fruit Punch, Organic Coffee and Hot Tea

Food and Beverage Contributors

We would like to recognize the following Florida farms and allied industries for their donation to the conference.

◊ Uncle Matt's Organic

◊ Lakeridge Winery & Vineyards

◊ Equal Exchange

◊ Cigar City Brewing

◊ Mad Crow Brewery & Grill

◊ Rosa Fiorelli Winery

◊ FAMU, CESTA, Center for Viticultural Sciences and Small Fruit

◊ Beli Farms

◊ Schnebly Redland's Winery

◊ Orlando Brewing

◊ Highlands County Chapter of FL Grape Growers Association

◊ Florida Orange Groves Winery

◊ UF/IFAS Blueberry, Peach and Mango Breeding Programs

◊ Brewzzi CityPlace

◊ Hourglass Brewery

◊ Monticello Vineyards & Winery

Exhibitor Listing (Alphabetical)

Booth: 421
Advanced Drainage Systems, Inc.
Matt Palmer
115 W Crown Point Road, Winter Garden, FL 34787
Tel: 407-554-0046
Email: mcmpalmer@aol.com
Web: www.ads-pipe.com
ADS, Inc. is the world's largest manufacturer of corrugated HDPE pipe. We serve the storm, waste water & agricultural industry through a global network of 51 domestic and international manufacturing plants and more than 19 distribution centers.

Booth: 615 / 617
Agri Services International
Perry Hollingsworth
6490 N.E. Highway 70, Arcadia, FL 34266
Tel: 863-993-1400
Email: perry@agriservicesintl.com
ASI, Inc. designs, engineers, supplies and installs hydraulic delivery systems for agricultural entities, like citrus growers, tree farms and container nurseries, the dairy industry, packing houses, blueberry farms, row crop farmers and banana growers.

Booth: 609
Agri-Starts, Inc
Ty Strode
1728 Kelly Park Rd., Apopka, FL 32712
Tel: 407-468-4564
Email: tystrode@agristarts.com
Web: www.agristarts.com
Agri-Starts is a plant tissue culture lab specializing in liner production of small fruits, tropicals, & native plants. Our laboratories in Apopka, FL have the ability to produce millions of contaminant-free elite plants for all types of markets.

Booth: 405
Albert's Organics
James Day
6272 McIntosh Road, Sarasota, FL 34238
Tel: 800-996-0004 ext.26120
Email: jday2@albertsorganics.com
Web: www.albertsorganics.com
In 1982, Albert's Organics saw the potential of organic fresh produce. Today, we're the premiere distributor of organic fresh foods, working closely with local and regional farmers across the country.

Booth: 614
Animal and Plant Health Inspection Service
Celia Beamish
306 S. 10th Street, Haines City, FL 33844
Tel: 863-205-6025
Email: cecilia.e.beamish@aphis.usda.gov
Web: www.aphis.usda.gov
The Animal and Plant Health Inspection Service is a multi-faceted Agency with a broad mission area that includes protecting U.S. agricultural health, regulating genetically engineered organisms, administering the Animal Welfare Act and carrying out wildlife damage management activities.

Booth: 408
Animal Welfare Approved
Emily Lancaster
1007 Queen St., Alexandria, VA 22314
Tel: 202-546-5292
Email: info@AnimalWelfareApproved.org
www.AnimalWelfareApproved.org
Animal Welfare Approved is a national nonprofit that audits, certifies and supports farmers raising their animals according to the highest welfare standards, outdoors on pasture or range. The AWA label is recognized as the gold standard for animal welfare, pasture-based farming and sustainability.

Booth: 419
Apollo Sunguard
Rebecca Block
4487 Ashton Rd., Sarasota, FL 34233
Tel: 941-925-3000
Email: rebeccablock@apollosunguard.com
www.apollosunguard.com
Apollo Sunguard announces a new Horticultural Technology through color shade net. Different colors produce different results. May increase yields up to 100% and offers protected Agriculture. Use less water, pesticides, fertilizer and labor.

Booth: 605
ARAMARK
Sponsor
Dana Falstad
686 Museum Road, Reitz Union B73, Gainesville, FL 32611
Tel: 352.273.0733
Email: Falstad-Dana@aramark.com
Web: www.aramark.com/
ARAMARK provides award-winning food services, facilities management, and uniform and career apparel to health care institutions, universities and school districts, stadiums and arenas, and businesses around the world.

Booth: 310
Brandt, Inc.
Katherine Williams
382 C 478-A, Webster, FL 33597
Tel: 863-446-2089
Email: katherine.williams@brandt.co
Web: www.brandt.co
Brandt is an agricultural based company that manufactures micronutritionals, and crop protection products for both conventional and organic farmers.

Booth: 213
Chestnut Hill Tree Farm
Robert Wallace
15105 NW 94 Ave, Alachua, FL 32615
Tel: 386-462-2820
Email: chestnuthilltreefarm@gmail.com
Web: www.chestnuthilltreefarm.com
Low chill fruit and berry plants for commercial and backyard orchards - chestnuts, apples, peaches, pears, plums, persimmons, grapes, blueberries, blackberries, figs and much more.

Booth: 616
Conservation Trust for Florida
Ellen Dube
PO Box 134, Micanopy, FL 32667
Tel: 352-466-1178
Email: ellen@conserveflorida.org
Web: www.conserveflorida.org
Farmland is being gobbled up at an alarming rate. CTF works with landowners and farmers, who want to protect their land for the future and find the best land conservation solution to meet their long-term financial and management needs.

Booth: 417
David Lerner Associates, Inc.
Charles West
568 Yamato Road, Boca Raton, FL 33431
Tel: 561-226-4565
Email: rachael.jaffe@davidlerner.com
Web: www.davidlerner.com/
Tel: 561-226-4535
David Lerner Associates has information on investments and small business retirement plans

Booth: 407
Doublethumb Growing Solutions
Anna Coco
3948 Templeton Road, Lake Wales, FL 33898
Tel: 855-284-8627
Email: anna@doublethumb.net
Web: www.doublethumb.net
We provide a full range of cocopeat products to meet the hydroponic needs of small farmers, schools, and home gardeners. We sell grow bags, open-top containers, compressed cocopeat and coco chip bales, briquettes, grow cubes, pellets, and plugs.

Booth: 612
Douglas Speed & Associates
Karl Manges
5127 Otter Creek Drive, Ponte Vedra Beach, FL 32082
Tel: 904-543-9955
Email: Kminoculaid@live.com
Web: www.DouglasSpeed.Com
The Quantum Growth Series are revolutionary biological plant growth enhancement products proven to increase nutrient uptake, enhance root growth, and increase yields while reducing supplemental irrigation, fertilizer and fungicide usage.

Booth: 320
East Branch Ginger
Susan Anderson
PO Box 321, Pittsboro, NC 27312
Tel: 207-313-4358
Email: eastbranchginger@gmail.com
Web: www.eastbranchginger.com
East Branch Ginger is your source for certified organic, certified disease-free, high quality ginger seed pieces. The seed is from Puna Organics, a certified organic ginger farm in Hawaii. East Branch Ginger and Puna Organics provide you with the cultural support to grow and market your ginger crop!

Booth: 610
Farm Credit
Sponsor
Ron O'Connor
PO Box 8009, Lakeland, FL 33802
863-682-4117
Tel: 863-688-9364
Email: marketing@farmcreditcfl.com
Web: www.farmcredit.com
Farm Credit is a Member-Owned, agricultural lender serving Florida's ranchers, growers, and farmers, since 1916. We make loans for capital, operating, or residential purposes and sell crop insurance.

Booth: 522
Farm-to-Consumer Legal Defense Fund
Pete Kennedy, Esq.
8116 Arlington Blvd., #263, Falls Church, VA 22042
Tel: 703-208-3276
Email: info@farmtoconsumer.org
Web: www.farmtoconsumer.org

Booth: 503
FDACS - Office of Agricultural Water Policy
Darrell Smith
1203 Governor's Square Blvd., Suite 200, Tallahassee, FL 32301
Tel: 863-362-1001
Email: Darrell.Smith@FreshFromFlorida.com
Web: www.floridaagwaterpolicy.com/
OAWP is actively involved in the development of Best Management Practices (BMPs) for Florida's agricultural commodities. OAWP has six established field teams to help growers take advantage of services and programs provided by the OAWP in their area.

Booth: 603
Florida A&M University/CESTA
Sponsor
Ray Mobley
Perry Paige Bldg, Rm 215B, Tallahassee, FL 32307
Tel: 850-412-5252
Email: ray.mobley@famu.edu
Web: www.famu.edu/cesta/main/
The College of Engineering Sciences, Technology and Agriculture (CESTA) is the land-grant arm at Florida A&M University. CESTA offers opportunities for students to grow professionally and build for the future. We specialize in programs related to and for Florida Farmers.

Booth: 506
Florida A&M University Cooperative Extension - Marketing
Vonda Richardson
Room 215 Perry Paige Bldg South, Tallahassee, FL 32307
Tel: 850-599-3546
Email: vonda.richardson@famu.edu
Florida A&M University Cooperative Extension - Marketing & Small Farm Outreach Program focuses on educational and outreach activities including alternative marketing, Farm to School, Specialty crop development and Beginning Farmer development.

Booth: 520
Florida Association of Community Farmers' Markets (FACFM)
Gail Eggeman
104 Fareham Pl N, St. Petersburg, FL 33701
Tel: 727-823-6572
Email: gaileggeman@gmail.com
The Florida Association of Community Farmers Markets, Inc. (FACFM) is a member-driven organization whose purpose is to improve the link between farm and table by supporting farmers and educating consumers on the benefits of buying local and supporting their community farmers' markets.

Booth: 403
Florida Automated Weather Network
Rick Lusher
Building 162, McCarty Drive; PO Box 110350, Gainesville, FL 32611
Tel: 352-846-3219
Email: rlusher@ufl.edu
Web: www.fawn.ifas.ufl.edu
FAWN provides weather data and weather-related tools for growers.

Booth: 312
Florida Certified Organic Growers and Consumers, Inc. (FOG)
Christine Hale
PO Box 12311, Gainesville, FL 32604
Tel: 352-377-6355
Email: education@foginfo.org
Web: www.foginfo.org
Florida Organic Growers (FOG) is a 501(c)(3) not-for-profit established in 1989. FOG's Education & Outreach Program educates producers, consumers, media, industry and policymakers about the benefits of organic agriculture.

Booth: 600 / 602
Florida Department of Agriculture and Consumer Services
Sponsor
Marshall Wiseheart
407 South Calhoun Street,Mayo Building, Room 412, Tallahassee, FL 32399-0800
Tel: 850-488-4131
Email: Marshall.Wiseheart@freshfromflorida.com
Web: www.freshfromflorida.com/
The Florida Department of Agriculture offers services like Agricultural Dealer's Licenses and the Florida Agricultural Promotional Campaign to assist Florida's 47,000 agricultural producers, many of whom are small farmers.

Booth: 501
Florida Department of Education/Food and Nutrition
Rachael Terrin
325 West Gaines Street, Turlington Building, Tallahassee, FL 32399
Tel: 850-245-9320
Email: rachael.terrin@fldoe.org
Web: www.fldoe.org/fnm/
Our mission is to facilitate quality nutrition programs that support the growth and development of Florida's children. The Florida Farm to School Program supports this commitment by connecting local farmers to Florida schools to increase the use of Florida grown products.

Booth: 604
Florida Farm Bureau Federation
Sponsor
Frankie Hall
PO Box 147030, Gainesville, FL 32614-7030
Tel: 352-374-1542
Email: frankie.hall@ffbf.org
Web: www.floridafarmbureau.org
Farm Bureau exists to strengthen family farms and local communities. We apply a collective effort to solve farmers' problems. We speak on behalf of ALL farms. The majority of the states' family farmers are members.

Booth: 410
Florida FGT, LLC
Donald Rockwood
POB 357103, Gainesville, FL 32635-7103
Tel: 352-256-3474
Email: FloridaFGT@cox.net
Web: www.FloridaFGT.com
Florida FGT provides professional advice to forest and agricultural landowners on various aspects of the use of fast-growing Eucalyptus, Corymbia, Populus, Taxodium, and Pinus species

Booth: 307
Florida Grazing Land Coalition
Chad George
Tel: 352-338-9532
Email: chad.george@fl.usda.gov
Florida Grazing Land coalition is a network of individuals and organizations working together to ensure a healthy future for our state's grassland resource.

Booth: 505
Florida Meat Goat Association
Allyn Walker
1640 Tanner Cir, Edgewater, FL 32132
Tel: 386-423-3143
Email: nuts4boers@aim.com
The Florida Meat Goat Association was formed in 1986 to promote the meat goat industry in Fl; to develop a better meat goat; to expand existing markets for goat meat and value added goat products.

Booth: 306
Florida State Horticultural Society
Chris Oswalt
700 Experiment Station Rd, Lake Alfred, FL 33850
Tel: 863-956-1151
Email: fshs@crec.ifas.ufl.edu
Web: www.fshs.org/
FSHS is a non-profit educational organization that promotes horticulture in Florida. Visit our booth to tell us about your information needs, learn about the society, become a member, and learn about opportunities for small farmers to grow horticultural products in Florida's challenging environment.

Booth: 513
Global Organic Specialty Source, Inc.
Carl Ream
7345 16th St. East Suite 116, Sarasota, FL 34243
Tel: 239-919-9429
Email: carlr@globalorganics.ws
Web: www.globalorganics.ws
Global Organic Specialty Source, Inc. is the premier distributor of wholesale organic produce and other select items in the southeastern U.S.A. We are the bridge between the organic farm and the consumer. We pride ourselves on outstanding quality, and an excellent logistics program.

Booth: 625
Green World Path, Inc.
Ray Nielsen
1665 Donto Way, Brooksville, FL 34601
Tel: 352-799-0200
Email: ray@greenworldpath.com
Web: www.greenworldpath.com
Green World Path manufactures a complete line of innovative organic and sustainable products that fertilize, protect against fungus and insects, and reduce watering needs for anything that grows.

Booth: 518
Harvest of Hope Foundation
Philip Kellerman
PO Box 358025 Gainesville, FL 32635
Tel: 352-262-5421
Email: kellerhope@cox.net
Web: www.harvestofhope.net
The non-profit Harvest of Hope Foundation of Gainesville distributes emergency and educational financial aid to migrant farmworkers and families in Florida and across the country.

Booth: 622
Haygrove Inc
Kathleen Fouse
694 Kraybill Church Road, Mount Joy, PA 17552
Tel: 717-492-4955
Email: kfouse@haygrove.com
Web: www.haygrove.com
Haygrove is a worldwide leader in field scale crop protection aiding high value fruit and vegetable production.

Booth: 400
High Mowing Organic Seeds
Paul Betz
76 Quarry Road, Wolcott, VT, 05680
Tel: 802-472-6174
Email: paul@highmowingseeds.com
Web: www.highmowingseeds.com
High Mowing Organic Seeds is an independently-owned, farm-based seed company dedicated to providing organic farmers and gardeners with high quality certified organic seed. We offer heirloom, open-pollinated and hybrid vegetables, flowers, herbs, potatoes, garlic, and cover crops.

Booth: 510
Hillside Orchard Farms
Lynn McDaniel
105 Mitcham Circle, Tiger, GA 30576
Tel: 706-782-4995
Email: lynn@hillsideorchard.com
Web: www.hillsideorchard.com
Provider of quality jar products, private label and value added services.

Booth: 517 / 519
Hopkins Tropical Fruit Nursery
Billy Hopkins
25355 Shultz Grade, Immokalee, FL 34142
Tel: 239-658-0370
Email: tropicals@wildblue.net
Web: www.hopkinstropicalfruitnursery.com
Started in 1978 with over 100 years combined nursery experience. Specializing in production of fruit trees with emphasis on excellence. Our goal is to reduce chemical usage without reducing quality. We distribute in FL and the US.

Booth: 302 / 304
IFAS Extension Bookstore
Jenny Mooney
PO BOX 110011, Gainesville, FL 32611
Tel: 352-392-1764
Email: jmooney@ufl.edu
Web: ifasbooks.ifas.ufl.edu/
The Bookstore sells publications produced by UF faculty researchers about all aspects of agriculture including plant disease, pesticide management, horticulture, livestock, natural resources and wildlife.

Booth: 500 / 502
Island Grove Ag Products
Bert Sheffield
2600 SE 193 Ave, Hawthorne, FL 32640
Tel: 352-481-5558
Email: bertatignp@aol.com
Web: www.islandgroveagproducts.com
Island Grove Nursery produces High Quality Florida Fresh edible plants for Farmers, Garden Centers, and the Landscape trade. Island Grove Winery produces Florida Fresh Fruit Wines.

Booth: 418
It's Our Nature®
Linda Taylor
1293 Hollister Road, Babson Park, FL 33827
Tel: 727-430-8284
Email: linda@itsournature.com
Web: www.itsournature.com
It's Our Nature® - Healthy-Wear For People Who Care ®; Since 1996, It's Our Nature has connected people with nature experiences & sustainable eco-friendly, socially responsible products. Our Palm Frond Garden Hats, Organic Cotton - Hemp Clothing & Bags are durable, wonderful to wear and fun!

Booth: 413
Johnny's Selected Seeds
Maria Reynolds
955 Benton Ave, Winslow, ME 04901
Tel: 800-854-2580
Email: mreynolds@johnnyseeds.com
Web: www.johnnyseeds.com
Johnny's Selected Seeds: Seed Breeders, Growers, and Merchants since 1973.

Booth: 623
KY Burley Moldings, Inc.
Dawn Riley
234 Highway 433, Mackville, KY 40040
Tel: 502-552-5849
Email: dawn.riley@insightbb.com
Web: www.kyburleymoldings.com
KY Burley Moldings is providing a quality float tray for the hydroponic production of plants. Our business began in the tobacco industry in Kentucky and we are now expanding into the fruit, vegetable, and perennial markets around the country. Please stop by our booth.

Booth: 514
Living Towers Farm
Jan Young
19621 Lake Lincoln Lane, Eustis, FL 32736
Tel: 352-357-6979
Email: info@livingtowers.com
Web: www.livingtowers.com
Living Towers Hydroponic Farm of Eustis Fl, heralded as a prototype of future community food production, presents the Tower Garden; a state of the art Hydroponic Growing Unit for home or commercial use.

Booth: 415
Magna Bon II, LLC
Frank Miele
2045 Sw 127th Avenue, Davie, FL 33325
Tel: 954-275-1830 ext.1831
Email: mielemgt@yahoo.com
Magna Bon II, LLC Okeechobee, FL: An advanced OMRI Listed Liquid Copper Fungicide. Made in the US. Stop by booth 415 to get your free sample of CS2005 while supplies last.

Booth: 611
MerchantSource®
Kim Lyons
18069 Laurel Valley Road, Fort Myers, FL 33967
Tel: 800-313-5198
Email: KimL@merchantsource.com
Web: www.merchantsource.com
MerchantSource® powered by TMS, in business 17 years providing credit & debit card merchant services. We have 6 years as hands on specialist with Farmers' Market Wireless EBT, credit & debit card program. We are proud FMC members. Contact us at 1-800-313-5198.

Booth: 316
Moore Ranch
Freddie Moore
3721 SR 50, Webster, FL 33597
Tel: 352-516-9641
Email: moore@puregrasspurebeef.com
Web: www.puregrasspurebeef.com
Moore Ranch is a family-owned company in Sumter County, Florida. We raise grass fed beef using all natural products. We also sell many of the products we use with our animals and on our pastures to assist other small farms in achieving a sustainable and organic approach to agriculture.

Booth: 619
Mothers Organics Humus Farm
Nathan Wax
6727 CR 579
Seffner, Florida 33584
Tel: 813-628-0600
Email: nwax@mothersorganics.com
Web: www.mothersorganics.com/
Mothers Organics is Florida's premier Composting facility. Operating on a 60 acre site in Seffner, we produce Organic compost and soil amendments for the agricultural industry. Our grow systems allow you to start farming organically Today.

Booth: 221 / 223
Natural Forces LLC
Devlin Reynolds
PO Box 2601, Davidson, NC 28036
Tel: 704-892-9952
Email: Jennifer.Lawton@naturalforcesllc.com
Natural Forces, LLC is committed to developing and marketing new technologies, products and services with natural and organic based foundations. Natural Forces, LLC will be launching several new products this year.

Booth: 305
Natural Resources Conservation Service
Steve Boetger
USDA-NRCS 2614 NW 43rd St, Gainesville, FL 32606
Tel: 352-338-9548
Email: steve.boetger@fl.usda.gov
Web: www.fl.nrcs.usda.gov/
NRCS puts over 75 years of experience to work in assisting owners of America's private land with conserving their soil, water, and other natural resources. We deliver technical assistance based on sound science and suited to a customer's specific needs.

Booth: 504
New North Florida Cooperative Association, Inc.
Glyen Holmes
3806 Union Road, Marianna, FL 32446
Tel: 850-352-2400
Email: nnfc1995@yahoo.com
NNFC is a non-profit, farmers cooperative focusing on outreach and assistance to small and medium sized farmers. Primary efforts since 1995 have included Farm to School.

Booth: 509
O-C Grown
Nancy Pratt
335 Oakhurst Cir., Kissimmee, FL 34744
Tel: 407-777-0602
Email: osceolacountygrown@gmail.com
Web: www.osceolacountygrown.com
O-C Grown seeks to implement a local network of farmers/producers with consumers/businesses to provide citizens with the option to buy local, healthy food while at the same time directly contributing to the local economy of Osceola County.

Booth: 607
OIA North America
Sponsor
Jonathan Austin
2603 NW 13th St. #228, Gainesville, FL 32609
Tel: 352-336-5700
Email: jonathan@oianorth.com
Web: www.oianorth.com
OIA North America is a USDA accredited organic certifying agent offering USDA National Organic Program certification, OIA US FARMGAP Good Agricultural Practices and Food Safety Certification, and GMP Good Manufacturing Practices Certification.

Booth: 507
Organic Answers Group Inc
Nancy Boyle
4235 Brandon Drive, Delray Beach, FL 33445
Tel: 561-352-1697
Email: nancyb@organicanswers.com
Web: www.organicanswers.com
Organic Fertilizers representative

Booth: 409
Perdue AgriRecycle, LLC
Heather Comegys
28338 Enviro Way, Seaford, DE 19973
Tel: 302-628-2360
Email: heather.comegys@perdue.com
Web: www.perdueagrirecycle.com
Perdue AgriRecycle manufactures organic fertilizer called MicroSTART60 which is made from dehydrated poultry manure. Please stop by our booth today for a quote!

Booth: 523
PowerFlex Fence
Connie Krider
324 East Center Ave., Seymour, MO 65746
Tel: 417-741-1230
Email: info@powerflexfence.com
Web: www.powerflexfence.com
World Class Fencing at Affordable Prices! PowerFlex Fence carries the highest quality permanent and portable livestock fencing and livestock watering supplies at prices you can afford.

Booth: 402
Pre-Paid Legal Services, Inc
Felicia Tappan
30902 Taylor Grade Rd, Duette, FL 34219
Tel: 941-920-1801
Email: fjtappan@prepaidlegal.com
Web: www.prepaidlegal.com/hub/fjtappan
We give members access to professional legal counsel not only for traditional legal problems, but for everyday events such as buying a house or a car, creating a will, handling a problem with an insurance company, dealing with identity theft, and much more where legal review should be routine.

Booth: 423
ProPak Software, LLC
Richard Montney
150 Third Street SW, Winter Haven, FL 33880
Tel: 863-297-9293 ext.200
Email: rickm@propaksoftware.com
Web: www.LandMagic.com
LandMagic's SmallFarm software solution is one of the first web based software products designed for the small farm operation. Create and manage job schedules, work orders, inventory, and create a complete history of your caretaking activities and see it on Microsoft Bing Maps.

Booth: 318
Protect U.S.
Stephanie Stocks
P.O. Box 110620, Gainesville, FL 32611
Tel: 352-273-3958
Email: sstocks@ufl.edu
Web: www.protectingusnow.org
Protect U.S., the Community Invasive Species Network, is concerned with protecting the U.S. from exotic, invasive species that could harm our food crops and natural ecosystems.

Booth: 314
Quality Certification Services (QCS)
Denise Aguero
PO Box 12311, Gainesville, FL 32604
Tel: 352-377-0133
Email: denise@qcsinfo.org
QCS offers worldwide certification in all areas of the organic supply chain.

Booth: 516
Red Hills Small Farm Alliance / RHO Market
Malini Ram
3546 Baum Rd., Tallahassee, FL 32309
Tel: 646-526-5631
Email: farmsmall@yahoo.com
Web: www.rhomarket.com
RHO Market is an online farmers market, powered by Local Food Marketplace. This innovative market is run by the Red Hills Small Farm Alliance which works to promote sustainable small farm enterprises feeding the North Florida region.

Booth: 502
Rhizogen
Marc Nichols
4200 Research Forest Dr, Suite 100, The Woodlands, TX 77381
Tel: 678-596-2113
Email: nichols@rhizogen.com
Web: www.rhizogen.com
Rhizogen® is the manufacturer of a complete line of fertilizer products designed to enhance plant growth and yield, as well as increase biodiversity in the soil.

Booth: 618
Simple Living Institute, Inc.
Tia Meer
16206 Hamilton Dr., Orlando, FL 32833
Tel: 321-228-4310
Email: info@simplelivinginstitute.org
Web: www.simplelivinginstitute.org
Simple Living Institute is a nonprofit focusing on education. We host monthly Organic Growers Meeting at Leu Gardens, workshops and garden start-ups, and have published a Local Food Guide for Central Florida.

Booth: 321
Small Business Development Center at the University of North Florida
Marice Hague
12000 Alumni Drive, Jacksonville, FL 32224
Tel: 904-620-1071
Email: mhague@unf.edu
The Small Business Development Centers have assisted hundreds of thousands of potential and existing business owners by providing the management advice, training and information they need to start, grow, and profit.

Booth: 319
Small Farms Academy
Randi Randell
7580 County Road 136, Live Oak, FL 32060
Tel: 386-362-1725 ext.106
Email: rrandell@ufl.edu
Web: smallfarms.ifas.ufl.edu/
The Academy's educational programs are offered as an innovative approach combining state, local and private resources to provide intensive hands-on training to small farmers.

Booth: 508
Society of St. Andrew
Amanda Rich
PO Box 536842, Orlando, FL 32853
Tel: 407-650-1956
Email: FL-Gleaning@EndHunger.org
Web: www.EndHunger.org
SoSA (often known as the Gleaning Network) is a 501(c)3 non-profit hunger relief organization. We work farmers and packers/shippers to salvage food left behind after harvest and rejected truck loads. This food is then distributed to local food pantries, soup kitchens and homeless shelters.

Booth: 219
South Florida Beef-Forage Program
Courtney Davis
458 Hwy 98 N, Okeechobee, FL 34972
Tel: 863-763-6469
Email: cbdavis@ufl.edu
Web: sfbfp.ifas.ufl.edu/
The South Florida Beef-Forage Program is composed of extension faculty representing in addition to research faculty and extension specialists to coordinate extension and research activities for enhanced forage and cattle and other livestock production in Central and South Florida.

Booth: 606
Southern Region SARE Program
Sponsor
Candace Pollock
1109 Experiment St, Stuckey Bldg Rm 203, Griffin, GA 30223
Tel: 770-412-4786
Email: cpollock@uga.edu
Web: www.southernsare.org
We have information to help farmers and ranchers move profitably toward production systems compatible with the goal of sustainable agriculture, including good land stewardship, enhancing quality of life, and strengthening rural communities.

Booth: 608
Sustainable Agriculture Research and Education
Kelly Monaghan
PO Box 110310, Gainesville, FL 32611-0310
Tel: 352-273-3508
Email: kmon913@ufl.edu
SARE strives to make all agriculture within the state of Florida more sustainable economically, environmentally and socially. We connect researchers, extension agents, producers, and community organizations to research and implement the best practices available.

Booth: 620
SweetPro Feeds
Jerry Shoop
PO Box 204, Balm, FL 33503
Tel: 813-310-7757
Email: jlshoop@netzero.com
SweetPro provides premium Livestock feed supplements and is a leader in this field for 20 years due to scientific research and a proprietary blend of ProBiotein.

Booth: 411
True Blue Plants
Christielynn Skinner
425 E. Sprice St, Tarpon Springs, FL 34689
Tel: 877-237-5268
Email: cskinner@trueblueplants.com
Founded in 1998, True Blue Plants is the southeast leading wholesale and retail blueberry nursery providing high-quality, southern high-bush blueberry plants to a diversified client base including large and small commercial growers, nurseries, retail outlets, and home gardeners.

Booth: 521
UF/IFAS Extension Soil Testing Laboratory
Lamar Moon
631 Wallace Building
Gainesville, FL 32611
Tel: 352-392-1950 ext.226
Email: dlmoon@ufl.edu
Web: soilslab.ifas.ufl.edu/
To serve the citizens of Florida, by providing appropriately selected soil, plant and water testing, interpretation and recommendations as an educational service through the Cooperative Extension Service to guide management decisions affecting lime and fertilizer use efficiency.

Booth: 309 / 311
UF/IFAS Presents Florida MarketMaker
Sponsor
Linda Landrum
7580 County Road 136, Live Oak, FL 32060
Tel: 386-362-1725 ext.105
Email: LLandrum@ufl.edu
Web: fl.marketmaker.uiuc.edu/
UF/IFAS is a federal-state-county partnership with a strong commitment to Florida Agriculture by supporting the Florida MarketMaker program.

Booth: 404
UF/IFAS, IPM Florida
Norman Leppla
P.O. Box 110620, Gainesville, FL 32611
Tel: 352-273-3951
Email: ncleppla@ufl.edu
Web: ipm.ifas.ufl.edu
IPM Florida provides statewide, interdisciplinary and inter-unit coordination and assistance in integrated pest management to protect agriculture, communities and the environment. The IPM Florida website contains small farm information (ipm.ifas.ufl.edu)

Booth: 406
UF/IFAS, Plant Medicine Program
Kenneth Johnson
Bldg. 970, Rm 3216, PO Box 110620, Gainesville, FL 32611
Tel: 615-881-6113
Email: kljohnson2@ufl.edu
Web: dpm.ifas.ufl.edu
The UF/IFAS, Plant Medicine Program: Trains Plant Doctors in the management of plant health problems of all kinds; Ensures greater production efficiency with a minimum of environmental impacts; Enhances food security and safety.

Booth: 301
UF/IFAS/Mid-Florida Research & Education Center, Apopka
Diane Mealo
2725 South Binion Road, Apopka, FL 32703
Tel: 407-884-2034 ext.129
Email: dwm@ufl.edu
Web: mrec.ifas.ufl.edu
The MREC mission is organized around three program/issue areas: Plant Development, Plant Protection, and Plant Management. In addition we have educational partnerships with the Colleges of Agricultural & Life Sciences, Business, and Pharmacy.

Booth: 401
United Irrigation Supply
Ed Johnson
1529 N. Brevard Ave., Arcadia, FL 34266
Tel: 239-258-2870
Email: Ed.Johnson@unitedirrigation.net
United Irrigation is a full line provider of irrigation equipment: pumps, sprinklers, spray jets, drip tape, inline drip systems and poly hose and tubing. We are farmers ourselves, and understand your needs.

Booth: 303
University of Florida
Tiffany Abbott
1200 N. Park Rd, Plant City, FL 33563
Tel: 813-757-2280
Email: tiffanyabbott@ufl.edu
Web: gcrec.ifas.ufl.edu/pcc/index.shtml
UF and the Institute of Food and Agricultural Sciences provide 3 Bachelor of Science degrees in Agricultural Education; Environmental Horticulture & Geomatics with Master and Doctorate degree in Plant City, FL.

Booth: 613
University of Florida, IFAS, Citrus Research and Education Center
Jamie Yates
700 Experiment Station Road, Lake Alfred, FL 33850
Tel: 863-956-1151
Email: jdyates@crec.ifas.ufl.edu
Web: www.crec.ifas.ufl.edu
Our program provides training and educational materials for small farms, commercial growers and residents about established and exotic pests and diseases of citrus.

Booth: 511
USDA/NASS
Jim Ewing
2290 Lucien Way Suite 300, Maitland, FL 32751
Tel: 407-648-6013
Email: Jim_ewing@nass.usda.gov
USDA's National Agricultural Statistics Service conducts hundreds of surveys each year and prepares reports covering virtually every facet of U.S. agriculture.

Booth: 420
Valencia College
Javier Garces
1800 S. Kirkman Rd., Orlando, FL 32811
Tel: 407-582-1820
Email: jgarces3@valenciacc.edu
Web: www.valenciacollege.edu
Valencia College offers an A.S. Degree in Landscape and Horticulture Technology with a Horticulture Specialization or Landscape Specialization. Three different levels of Technical Certificates are also offered.

Booth: 601
VERTI-GRO, Inc.
Sponsor
Tim Carpenter
15000 US Hwy 441 S, Summerfield, FL 34491
Tel: 352-347-9888
Email: tim@vertigro.com
Web: www.vertigro.com
Verti-Gro® specializes in vertical growing and vertical gardening to utilize space, water and energy in an efficient manner. Our systems provide for high density production for the commercial grower and space saving for the hobbyist or home gardener.

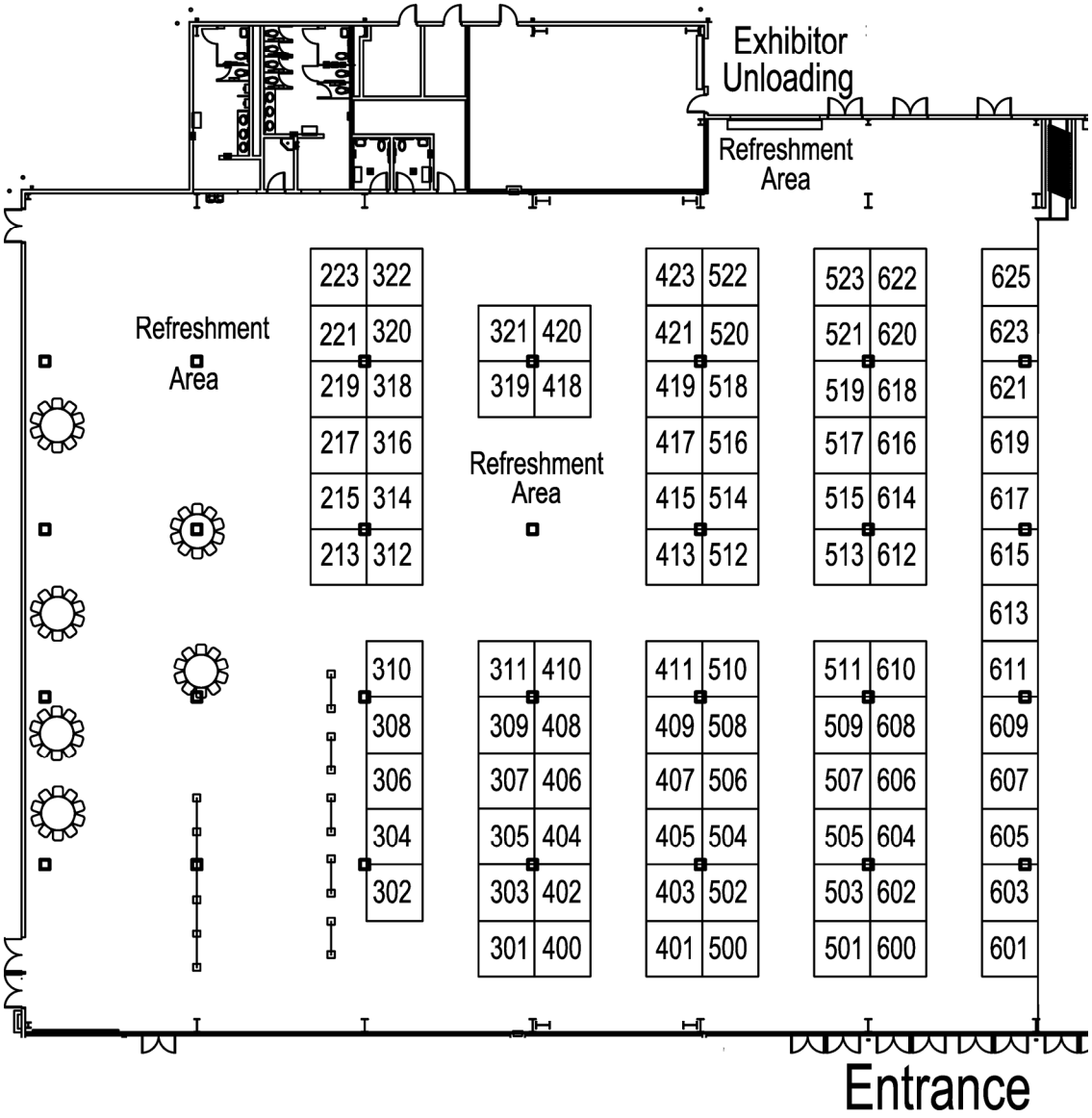
Booth: 515
Wildflower Seed And Plant Growers Association, Inc.
J. R. Newbold
P.O. Box 968, Crescent City, DC 32112
Tel: 386-972-6393
Email: businessmanager@floridawildflowers.com
Web: www.floridawildflowers.com
Our marketing cooperative specializes in producing Florida ecotype wildflower seed and plant material. We also provide technical knowledge to a diverse client group - Landscape Architectural firms, restoration specialists, departments of transportation, municipalities and private home-owners.

Booth: 512
Winfield Solutions
Ashley Vetter
4094 Paul Buchman Hwy, Plant City, FL 33565
Tel: 813-752-1177
Email: avetter@landolakes.com
Web: www.winfieldsolutionsllc.com
With more than 80 locations across the United States, Winfield Solutions offers an industry leading portfolio of herbicides, fungicides, insecticides, adjuvants, micro nutrients and fertilizers, all backed by service professionals to help you win the field.

Exhibitor Listing (Booth Number)

Booth	Organization
213	Chestnut Hill Tree Farm
219	South Florida Beef-Forage Program
221/223	Natural Forces LLC
301	UF/IFAS/Mid-Florida Research & Education Center, Apopka
302/304	IFAS Extension Bookstore
303	University of Florida
305	Natural Resources Conservation Service
306	Florida State Horticultural Society
307	Florida Grazing Land Coalition
309/311	UF/IFAS Presents Florida MarketMaker
310	Brandt, Inc.
312	Florida Certified Organic Growers and Consumers, Inc. (FOG)
314	Quality Certification Services (QCS)
316	Moore Ranch
318	Protect U.S.
319	Small Farms Academy
320	East Branch Ginger
321	Small Business Development Center at the University of North Florida
400	High Mowing Organic Seeds
401	United Irrigation Supply
402	Pre-Paid Legal Services, Inc
403	Florida Automated Weather Network
404	UF/IFAS, IPM Florida
405	Albert's Organics
406	UF/IFAS, Plant Medicine Program
407	Doublethumb Growing Solutions
408	Animal Welfare Approved
409	Perdue AgriRecycle, LLC
410	Florida FGT, LLC
411	True Blue Plants
413	Johnny's Selected Seeds
415	Magna Bon II, LLC
417	David Lerner Associates, Inc.
418	It's Our Nature®
419	Apollo Sunguard
420	Valencia College
421	Advanced Drainage Systems, Inc.
423	ProPak Software, LLC
500	Island Grove Ag Products
501	Florida Department of Education/Food and Nutrition
502	Rhizogen
503	FDACS - Office of Agricultural Water Policy
504	New North Florida Cooperative Association, Inc.
505	Florida Meat Goat Association
506	Florida A&M University Cooperative Extension - Marketing
507	Organic Answers Group Inc
508	Society of St. Andrew
509	O-C Grown
510	Hillside Orchard Farms
511	USDA/NASS
512	Winfield Solutions
513	Global Organic Specialty Source, Inc.
514	Living Towers Farm
515	Wildflower Seed And Plant Growers Association, Inc.
516	Red Hills Small Farm Alliance / RHO Market
517/519	Hopkins Tropical Fruit Nursery
518	Harvest of Hope Foundation
520	Florida Association of Community Farmers' Markets (FACFM)
521	UF/IFAS Extension Soil Testing Laboratory
522	Farm-to-Consumer Legal Defense Fund
523	PowerFlex Fence
600/602	Florida Department of Agriculture and Consumer Services
601	VERTI-GRO, Inc.
603	Florida A&M University/CESTA
604	Florida Farm Bureau Federation
605	ARAMARK
606	Southern Region SARE Program
607	OIA North America
608	Sustainable Agriculture Research and Education
609	Agri-Starts, Inc
610	Farm Credit
611	MerchantSource®
612	Douglas Speed & Associates
613	University of Florida, IFAS, Citrus Research and Education Center
614	Animal and Plant Health Inspection Service
615/617	Agri Services International
616	Conservation Trust for Florida
618	Simple Living Institute, Inc.
619	Mothers Organics Humus Farm
620	SweetPro Feeds
622	Haygrove Inc
623	KY Burley Moldings, Inc.
625	Green World Path, Inc.

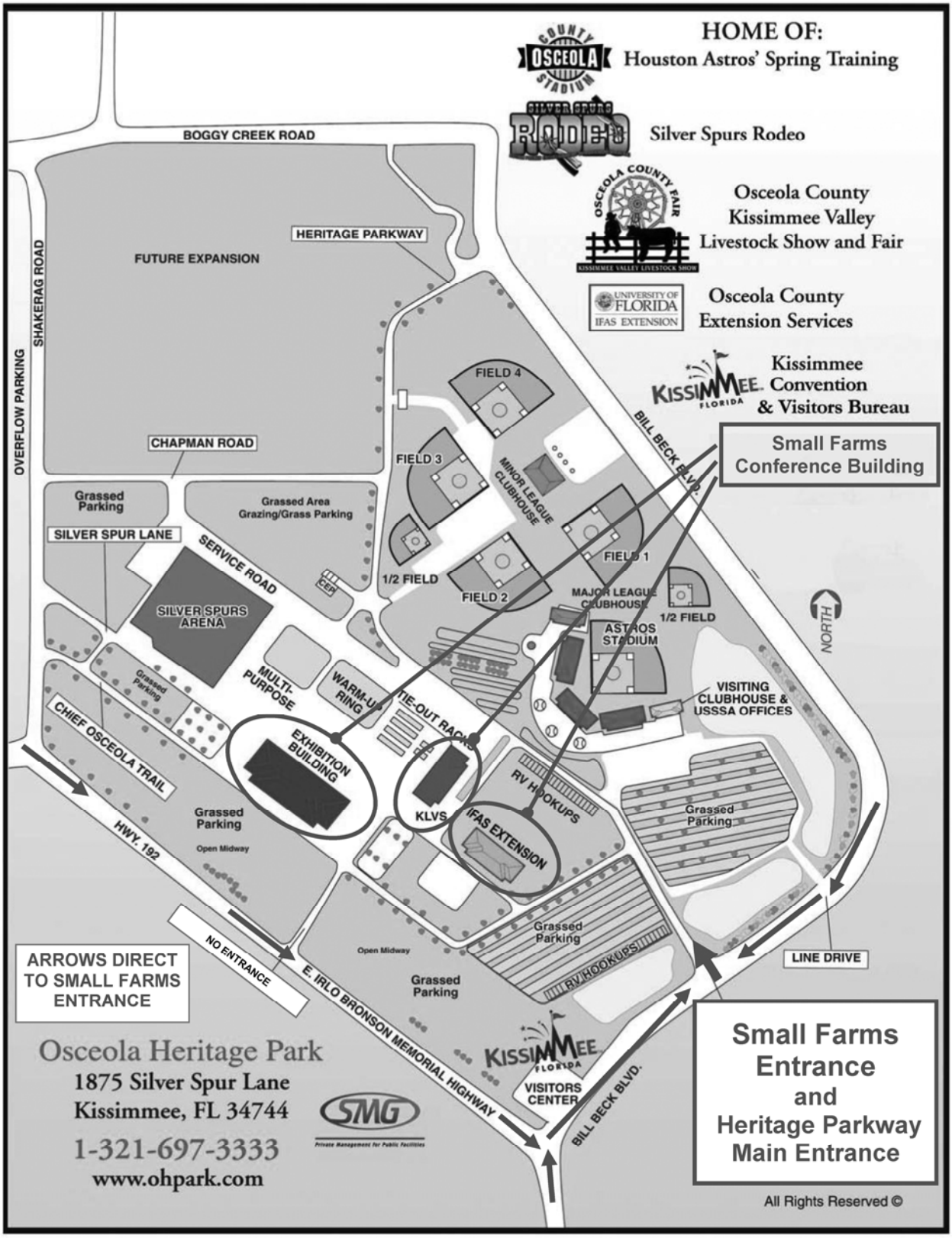
Exhibit Room Floor Plan



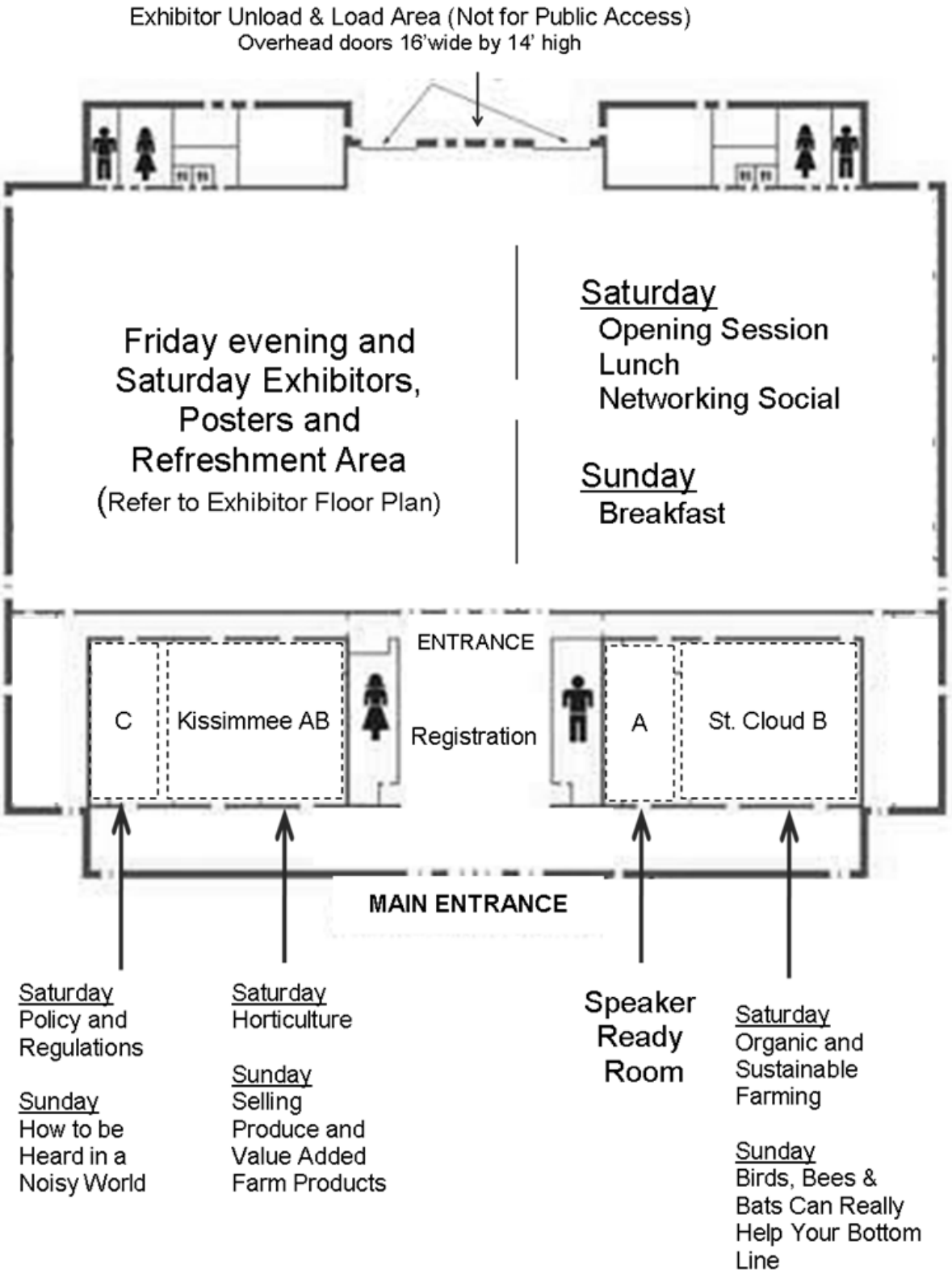
= poster

= seating

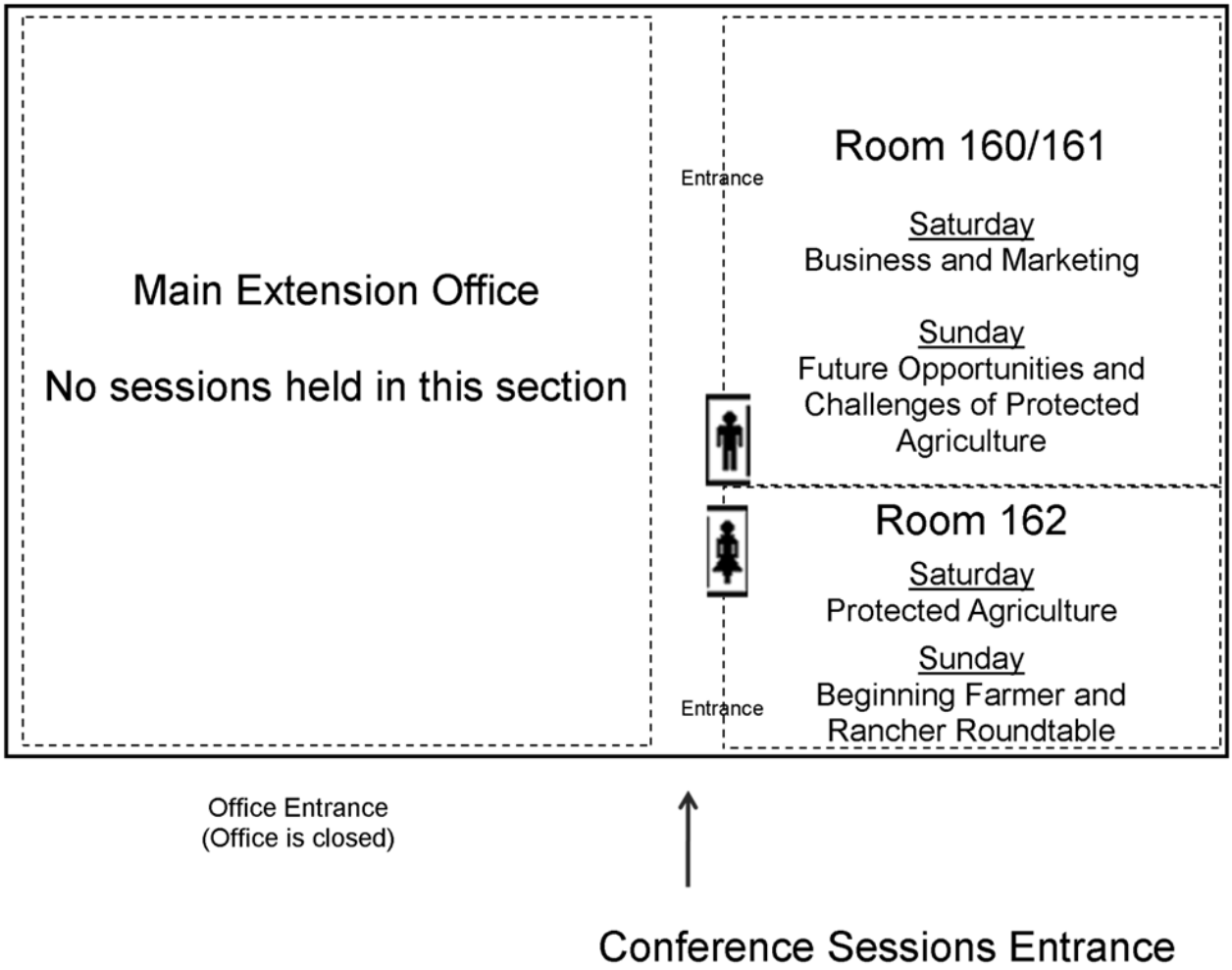
Overall Osceola Heritage Park (OHP) Layout



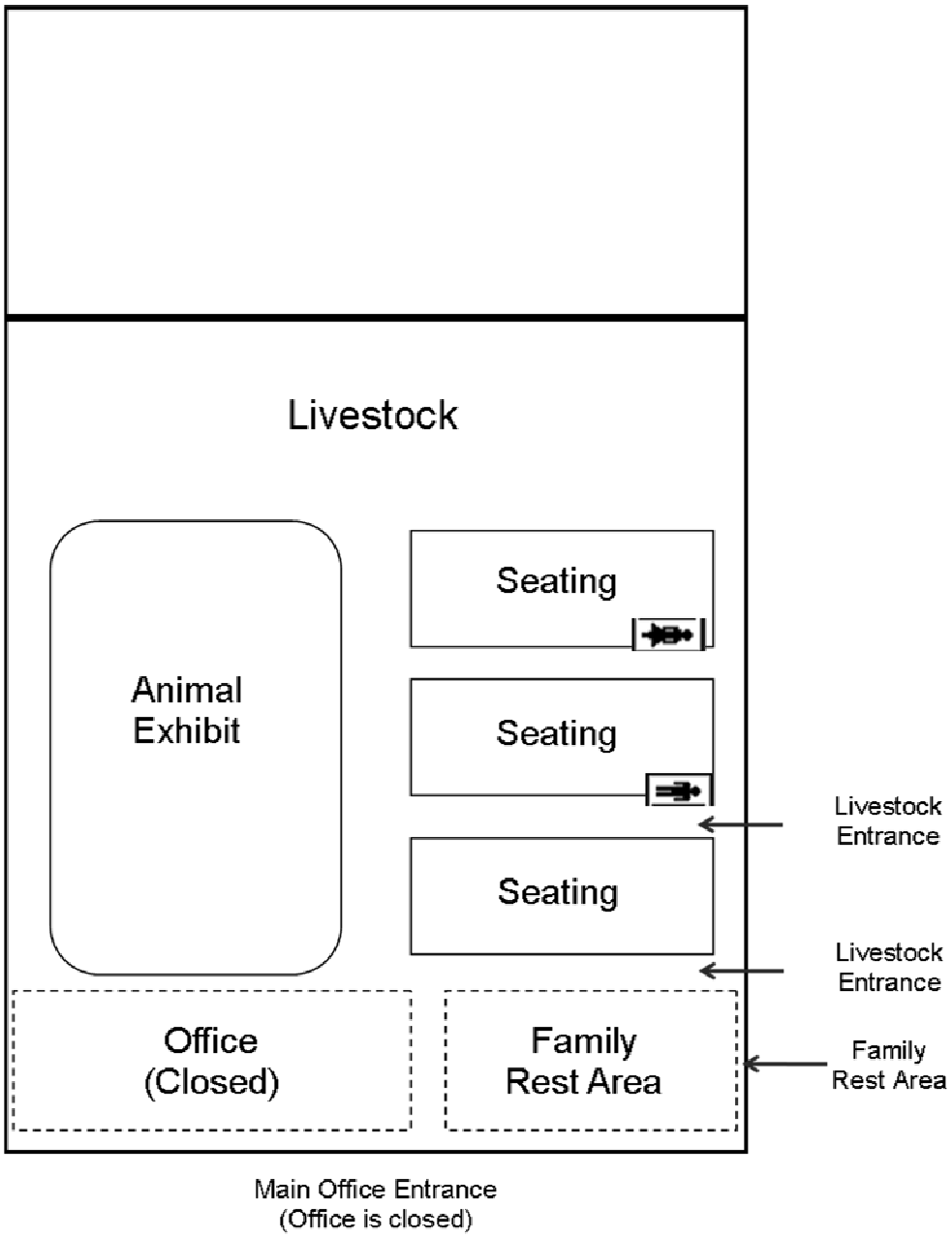
Exhibition Building Layout



Extension Services Building Layout



KVLS Pavilion Layout



Additional Information

Family Rest Area

(Located in the KVLS Pavilion)

Conference organizers are sensitive to the need of participants who may need to attend with their young children. While the conference is unable to provide babysitting services or activities for older children, the Family Rest Area will be available for nursing mothers and parents with young children that need a short break from the conference. The room will be open during conference hours on Saturday and Sunday. Refer to the KVLS Pavilion map on the previous page for the room location, or ask any of the conference staff.

Parents will be responsible for the supervision of their children at all times and will not be allowed to leave their children in the room unsupervised.

Medical Assistance:

In case of an emergency, DIAL 911 on a cell phone, and state the emergency.
There is also a phone located in the Manager on Duty office in the Exhibition Hall. That office sits directly in front of Hall B. On that phone you must dial 9-911, the first 9 is to get an outside line.

Our location is:
Osceola Heritage Park
1901 Chief Osceola Trail, Kissimmee, Fl 34744
Be sure to indicate which building: Exhibition, KVLS Pavilion, or IFAS Extension Services Building

Area Hospitals

Osceola Regional Medical Center
700 W. Oak Street, Kissimmee, FL 34741
Telephone: 407-846-2266
Web Site: www.osceolaregional.com

St. Cloud Regional Medical Center
2906 17th Street, St. Cloud, FL 34769
Telephone: 407-892-2135
Web Site: www.stcloudregional.com

Florida Hospital Kissimmee
2450 N Orange Blossom Trail
Kissimmee, FL 34744
Telephone: 407-846-4343
Web Site: www.fhkissimmee.com

Area Pharmacies

Walgreens
1111 W Vine St
Kissimmee, FL 34741-4168
Telephone: 407-847-5252

Walgreens
2274 Boggy Creek Rd
Kissimmee, FL 34744
Telephone: 407-344-7134
Web Site: www.walgreens.com

Publix Super Market
2340 Fortune Rd
Kissimmee, FL 34744-3993
Telephone: 407-348-7686
Web Site: www.publix.com

Business Services

FedEx Office Print & Ship Center
3295 Greenwald Way N, Suite B
Kissimmee, FL 34741, US
(Across from the LOOP shopping plaza on John Young Pkwy.)
Telephone: 407-933-6760
Web Site: www.fedex.com/us/office
Open until 9 p.m. weekdays and 6:00 p.m. weekends.

FedEx Office Print & Ship Center
4350 W Vine St
Kissimmee, FL 34746
Telephone: 407-396-2923
Web Site: www.fedex.com/us/office
Open until 9 p.m. weekdays and 6:00 p.m. weekends.

Transportation

Yellow Cab
722 E Donegan Ave, Kissimmee, FL 34744
Telephone: 407-846-2222
Category: Taxicab Service | **Hours:** 24 hours

County Taxi
4489 W Vine St, Kissimmee, FL 34746; 3.52mi
Telephone: 407-396-0003
Category: Taxicab Service | **Hours:** 24 hours

Maingate Taxi
15 S Hoagland Blvd, Kissimmee, FL 34741; 2.46mi
Telephone: 407-390-0000
Web Site: www.maingatetaxi.com
Category: Airport Shuttle & Taxicab Service
Hours: 24 hours

Notes

Notes

We would like to extend a special thank you to our sponsors for actively supporting the Florida Small Farms and Alternative Enterprises Conference

Sustaining Partners

UF UNIVERSITY of FLORIDA IFAS

Fresh from Florida®

Gold Sponsor

FLORIDA A&M UNIVERSITY
1890 LAND GRANT INSTITUTION
COLLEGE OF ENGINEERING SCIENCES, TECHNOLOGY AND AGRICULTURE
TALLAHASSEE, FLORIDA

Silver Sponsors

VertiGro MADE IN THE USA

SOUTHERN SARE
Sustainable Agriculture Research & Education

ARAMARK HIGHER EDUCATION

WHOLE FOODS MARKET

Bronze Sponsor

Bowen Brothers, Inc.

TRIANGLE CC