



**North Carolina Department and Agriculture & Consumer Services**

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**2010 Specialty Crop Block Grant Program**

**12-25-B-1086**

**Final Report**

**1-27-2014**

**Revised**

**3-24-2014**

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**Project Title:** N.C. Plant Tracking System Phase I and II

**PROJECT SUMMARY**

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The purpose of this project is to develop a web based tracking system to assist North Carolina's registered nurseries and garden centers in listing plant acquisitions, to initially register and/or renew annual licenses, and for utilization by NCDA&CS field and technical staff to enter and query nursery inspection information. Based on previous funding received from the 2009 NCDA&CS Specialty Crop Block Grant Program, Phase I of the project focused on developing plant acquisition tracking system components. Additional funding is being requested to refine existing Phase I system applications and for the development and implementation of new Phase II applications. Phase II will focus on the registration and inspection processes for nurseries and garden centers. The applications developed will permit nurseries and garden centers to initially register and/or renew required annual licenses on-line via the secure NCPlants Tracking System website. Program components will be developed to permit field and technical staff to record, document, query, and retrieve inspection data in a highly effective and cost-efficient manner. When fully implemented the plant tracking system will enhance our pest prevention, licensing, and inspection activities and increase the overall competitiveness of our state's nursery industry.

North Carolina currently ranks fifth in the U.S. for greenhouse and nursery cash receipts with the 2011 value estimated at \$707 million annually. Despite recent economic and market concerns, the nursery and floral industries still constitute a significant sector in North Carolina agriculture. As this industry adapts to new economic and market realities, customer preference frequently drives change in the marketplace. Such preferences include the demand for premium plant brands, value-added services and a strong knowledge base. Satisfying the demands of a growing industry often leads to larger, more diverse growing operations, numerous contract growers, and an increasing list of nursery plant resources. This diversity frequently leads to increased risk related to quarantine plant pest potential. As such, the need to track the introduction and movement of plant material continues to be increasingly important. Addressing plant pest issues at an early stage, prior to full establishment and spread has proven to be an important strategy for North Carolina.

A 2009 NCDA&CS Specialty crop Block Grant focused on developing an electronic plant acquisition tracking system (NCPlants). Phase II concentrated

on the refinement and incorporation of the NCPlants system with the development of an on-line registration and inspection tracking system for nurseries and garden centers. When completed, the end product will be a comprehensive, on-line application that will directly benefit over 1,500 nurseries and 2,500 garden centers by providing a secure procedure for obtaining and renewing their nursery certification/licenses, listing plant sources and to assist the NCDA&CS-Plant Industry Division with verifying plant sources and assessing the potential for movement of plant pest.

## **PROJECT APPROACH**

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During 2011, NCDA&CS Plant Industry Division continued to fine-tune the web-based NCPlant application and to roll out the application to nursery industry. The measureable outcome completed was more than 90% of North Carolina registered dealers were actively registered and participating in NCPlants. The system was expanded to include registered and certified nurseries in 2012. Significant progress was made with more 45% of North Carolina's registered and certified nurseries registering in NC Plants by September 30, 2013.

In addition to further refining NCPlants and the initial rollout to the industry, a primary objective of this project was to integrate the NCPlants database with an on-line inspection and certification application for NC nurseries and registered dealers. Significant progress has been made in this area, but there were changes in the development strategy that delayed the implementation of the project.

Specifically, in June 2011, it was decided by the NCDA&CS administration that any new inspection/certification systems be in accordance with a department-wide portal that was being planned/developed. As such, delay was necessary to ensure that Phase II was compatible with department infrastructure. In October, 2011, it was decided by the NCDA&CS administration that the Department's licensing and permitting applications should be coordinated with the state's efforts to implement a statewide system for inspection and certification. As a result, rather than hire a programmer to develop a single application, it was decided to partner with other state agencies to procure bids and contract with one commercial off-the-shelf company to develop an integrated statewide inspection and certification system that would be coordinated across all departments. From October 2011 through January 2013, the interagency RFP was written, bids obtained, vendor demonstrations held,

and a state contract was awarded to CSDC Systems through the NC Office of the State Controller. Although this interagency coordination effort resulted in delays for this project, the end result will be an integrated system that will better serve the public.

While the interagency RFP was being developed, Plant Industry Division staff worked with NCDA&CS IT staff to define the PHASE II business requirements so that we would be ready to present a fully developed statement of work with system specifications and business requirements to the statewide vendor. In January 2013, the state awarded the statewide contract to CSDC Systems Inc. On February 7, 2013 the company conducted a department-wide demonstration of the system based on the Business Analysis developed by Plant Industry This demonstration was very impressive and included many of the specific requirements needed to achieve Phase II of the project. A Consulting Services Agreement between the vendor and NCDA&CS was executed on March 22, 2013 and work with the consultant began on March 25, 2013.

The efforts since March have concentrated on development of the back-office application that will serve as the basis for development of the user interface for the mobile inspection application and the public portal application for use by certified nurseries and dealers. Although development of a completely functional system has not yet been achieved, development of the back-office application lays the groundwork for the remaining the functionality of the system. Work completed to date represents an estimated 67% of the total project effort.

NCDA&CS has received significant contributions from several sources. The State of North Carolina Office of Information Technology Services is now managing the development of an integrated inspection/certification/permitting system for all departments. NCDA&CS Plant Industry Division has had outstanding support from Departmental IT staff in drafting business requirements and supporting our efforts with the development and testing of the integrated NCPlants application. The consulting contractor, CSDC Systems, has spent many hours in development and testing to ensure that the final application meets the business needs of the Plant Industry Division and the nursery industry.

## **GOALS AND OUTCOMES ACHIEVED**

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- *Track the success of Phase I of the pilot project such that 80-90% of the 2,300 garden centers registering through the new web-based plant material tracking system are in full compliance by December 31, 2011.*

This measurable outcome has been completed with more than 90% of North Carolina's registered dealers now actively registering and participating in NC Plants. Larger chain stores have designated a single representative to record the entries for their entire chain. As such, the total number of system users measures around 180 to represent more than 90% of nursery dealers.

- *Expand the use of the web-based plant material tracking system to include registered and certified nurseries such that there is a minimum of 75-80% participation by December 31, 2012. Currently, there are no nurseries providing this information in an electronic format and assessments will take place to determine the ease and frequency with which this information is provided.*

Significant progress has been made with more than 45% of North Carolina's registered and certified nurseries now actively registering and participating in NC Plants. Once the licensing and inspection application is fully functional, registering with NCPlants will be required prior to receiving a nursery license; thus we expect to achieve closer to 100%. To date, work with the nursery industry has focused on educating the nurseries as to the value of NC Plants and ensuring them that information included is confidential. Information for our nurserymen was delivered directly and through the N.C. Nursery and Landscape Association.

- *Develop an emergency plant pest regulatory test case scenario and assess the ability for NCDA&CS' staff to trace the movement of nursery stock into and throughout the state efficiently with minimal time investments.*

This measureable outcome was completed in June 2013. On June 4, 2013, four NCDA&CS-Plant Industry staff participated in a USDA-ICS Tabletop Exercise to discuss possible pest outbreak scenarios and how coordination among various agencies (NCDA&CS – Plant Industry Division, NCDA&CS-Forestry, and USDA-APHIS-PPQ) can efficiently and effectively respond.

- *Design and implement a secure web-based system for NCDA&CS' staff to record inspection and certification information for nurseries and garden centers in the state such that 90% or more of staff are fully compliant by December 31, 2012.*

Configuration and extensive user testing of the back-office application is complete. The back-office component lays the groundwork for the remaining functionality of the system. GoLive testing of the application has been conducted and nursery dealer license renewal forms were generated using the new licensing system as part of that exercise. The renewal forms were subsequently mailed to nursery dealers. The fully functional application will allow nurseries and nursery dealers to complete renewal forms on-line, as well as make on-line payment for their annual licenses. Once testing and configuration of the back-office application is complete, configuration of the Mobile Inspection Interface and the Public Portal will be completed. It is anticipated that the application will be on-line and completely functional by April 1, 2014.

See ADDITIONAL INFORMATION Section for Example Screenshots from the application with NCPlants integrated as a key component.

Goal 1 is achieved with 90% compliance.

Goal 2 is achieved a compliance level of 45%.

Goal 3 was achieved in June, 2013.

Goal 4 is 67% achieved and will be fully achieved by April, 2014.

The end product will be a comprehensive, on-line application that will directly benefit over 1,500 nurseries and 2,500 nursery dealers that are currently registered by the NCDA&CS Plant Industry Division. The application will provide a secure platform for listing plant sources and also allow nurseries to make application for and renew their nursery certificates on-line, make payments and review their inspection status. The application will provide NCDA&CS-Plant Industry Division with a comprehensive application that facilitates nursery inspection and certification, as well as verifying plant sources and assessing the potential for movement of plant pest.

## **BENEFICIARIES**

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The beneficiaries of this project are the citizens of North Carolina and the North Carolina nursery industry. This web based application will allow nurseries and nursery dealers to be more efficient with their time and resources. The application will protect the nursery industry by tracking possible plant pest issues

and to allow the Plant Industry Division to serve the industry more efficiently and effectively in inspection and permitting activities.

North Carolina has 2,500 nursery dealers and 1,500 nurseries. The nursery industry is the beneficiary of a more efficient plant tracking and certification system. Nurseries must find ways to effectively control costs to stay in business. The work in this project will help protect them from major plant pest problems that may attack at any time. The new application will also save money by allowing the industry to renew their nursery certifications on-line and make payments and review their inspection status.

## **LESSONS LEARNED**

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This project was a very ambitious undertaking. It is difficult to anticipate all of the roadblocks that will arise over the course of such a project. The pace of technological change and the need to integrate the application across a statewide platform significantly complicated the process. However, the application will ultimately be more robust and will have increased functionality with an extended application lifecycle as a result of integrating the application with a broader state IT initiative. Delays in the project and subsequent turnover in project staff increased the difficulty in achieving project goals in a timely manner.

It was unknown at the beginning that the proposed application would ultimately be integrated into a statewide platform. This delayed and complicated application development, but the ultimate solution will be greatly improved.

The goals of this project will be achieved but the results have been delayed. Future Participants should anticipate delays as much as possible and work with Grant Staff to minimize surprises in managing grant funds.

Grant staff was very helpful and understanding in allowing Plant Industry to extend the grant and retain funds for the intended purpose. Plant Industry staff turnover and delays in identifying the ultimate consulting contractor, as well as the need for improved communication with grant staff, contributed to our utilizing less funds than desired. Improved communication and more timely implementation of the project would have alleviated many problems.

## **CONTACT PERSON**

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## **ADDITIONAL INFORMATION**

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The following pages provide example screenshots from the application, with  
| NCPlants integrated as a key component.

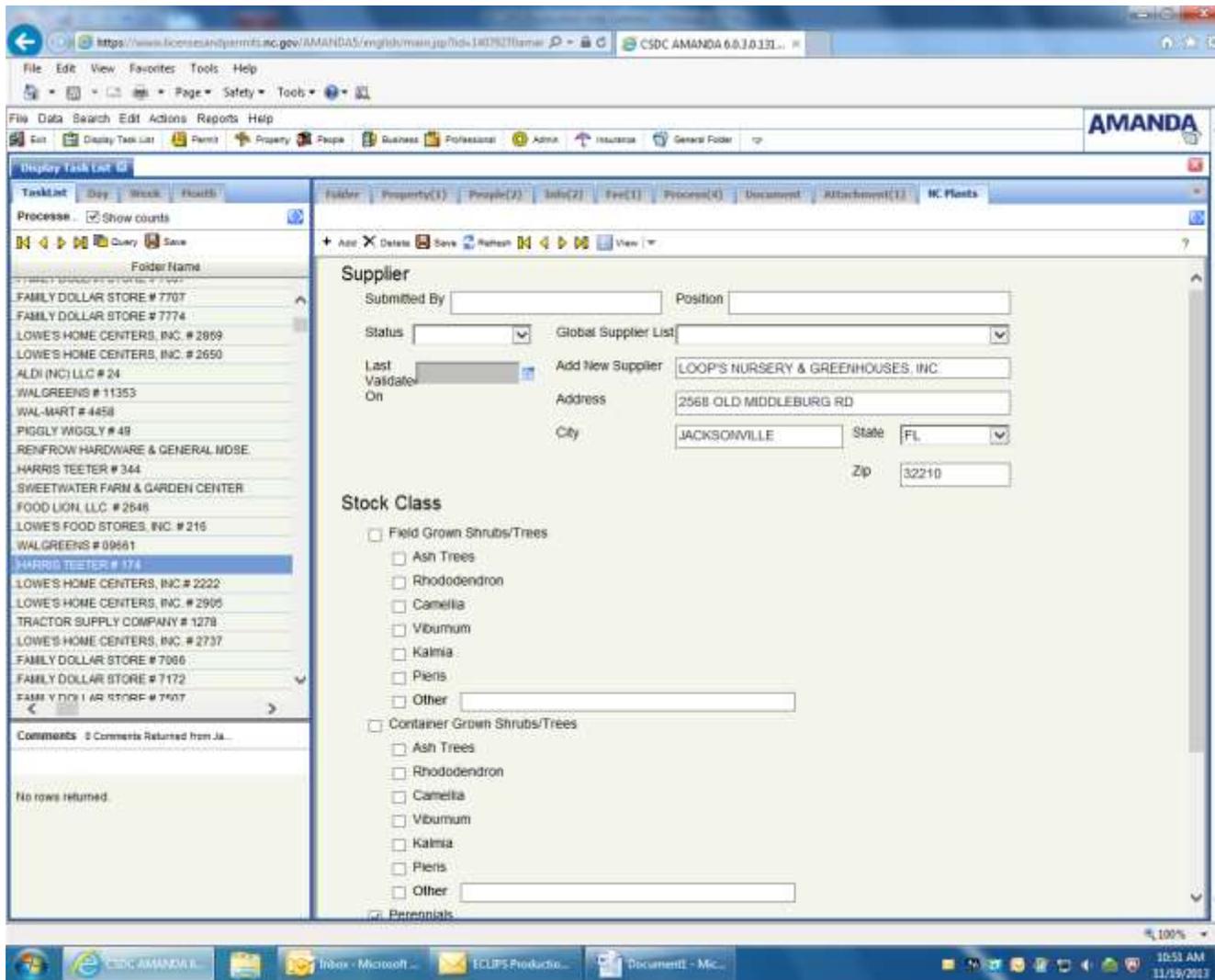


Fig 1. Example NCPlants Nursery Supplier Input Screen

The screenshot displays the AMANDA web application interface. At the top, the browser address bar shows the URL: <https://www.ncmissandpermits.nc.gov/AMANDA5/eng/esh/main.jsp?tbl=14375270.xml>. The application title is "AMANDA". Below the navigation menu, there is a "Display Task List" section. The main content area shows a table titled "NC Plants" with the following columns: Add New Supplier, Address, City, State, Zip, Field Grown Shrubs/Trees, and Ash Tree. The table contains 15 rows of supplier data.

Add New Supplier	Address	City	State	Zip	Field Grown Shrubs/Trees	Ash Tree
LOOP'S NURSERY & GREENHOUSE	2068 OLD MIDDLEBURY RD	JACKSONVILLE	FL	32210		
Van Hoekelen Greenhouses	P.O. Box 88	Mcados	PA	18237		
Bay City Flower Co Inc	2265 Cabrillo Highway South	Half Moon Bay	CA	94019		
Coastal Nursery	117 Rancho Road	Watsonville	CA	950769608		
Westland Floral Company	1540 Cravens Lane	Carpinteria	CA	93013		
FOWLER'S NURSERY	6118 HWY. 70 WEST	CLAYTON	NC	27520		
ROCKWELL FARMS, INC	332 ROCKWELL FARMS RD.	ROCKWELL	NC	28138		
ALDRSHOT GREENHOUSES	1135 GALLAGHER RD	BURLINGTON	ON	L7T2M7		
BDK MARKETNG, INC	3822 CROSS COUNTRY DR.	HUMBLE	TX	77346		
Bayview Flowers	3764 Jordan Road	Jordan Station	On	ON LOR1J0		
CJ Sales	7031 Grand National Drive #110	Orlando	FL	32819		
Hawaiian Tropicals Direct	8437 Marins Boulevard	Orlando	FL	32836		
Lakeshore Produce	P.O. Box 198	Jordan Station	On	ON LOR190		
Naturally Simple Solutions	P.O. Box 1417	Sorrento	FL	32776		
THE GREEN MACHINE, INC.	16363 E DAVENPORT RD	WINTER GARDEN	FL	34787		

Fig 2. Example NCPlants Nursery Dealer Supplier List

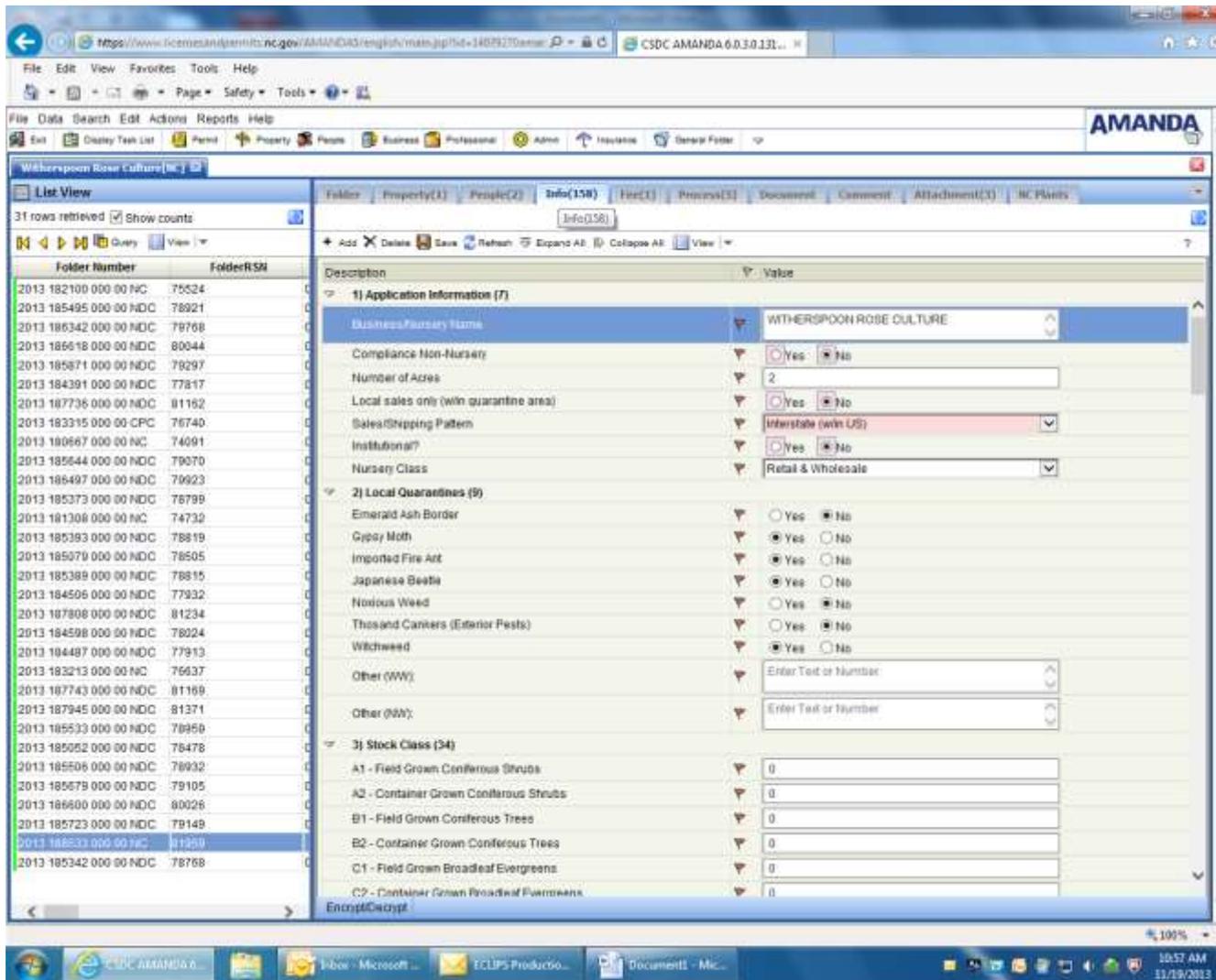


Fig 3. Example NC Nursery License Application Input Screen

<https://www.ncagriculture.com/permits.nc.gov/AMANDAS/english/main.jsp?tbl:14079170amar>

**INVOICE AND APPLICATION FOR NURSERY DEALER LICENSE RENEWAL**  
 North Carolina Department of Agriculture & Consumer Services  
 Plant Industry Division, Plant Protection Section  
 1060 Mail Service Center, Raleigh, NC 27699- 1060  
 Phone: (919) 707- 3730 Fax: (919) 733- 1041

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**2013- 2014** License/Certificate **N025- 6412**  
 Expiration Date 12/31/14 Nursery Dealer (025)

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Information on this renewal application form includes information from previous year's license and/or information from the most recent inspection. Review, note any changes, and sign to attest all information is true. Your current license was issued on 12/10/2012 and expires on 12/31/2013.

The most recent nursery inspection was completed on by .

Information on file	Indicate any changes here
Nursery Name PITTSBORO FEED	
Owner/Manager/Authoriz	
Mailing Address: 1103 EAST STREET P	
Ph1: 9195422454 Ph 2:	

Fig 4. Example Invoice and Application for Nursery Dealer License Renewal

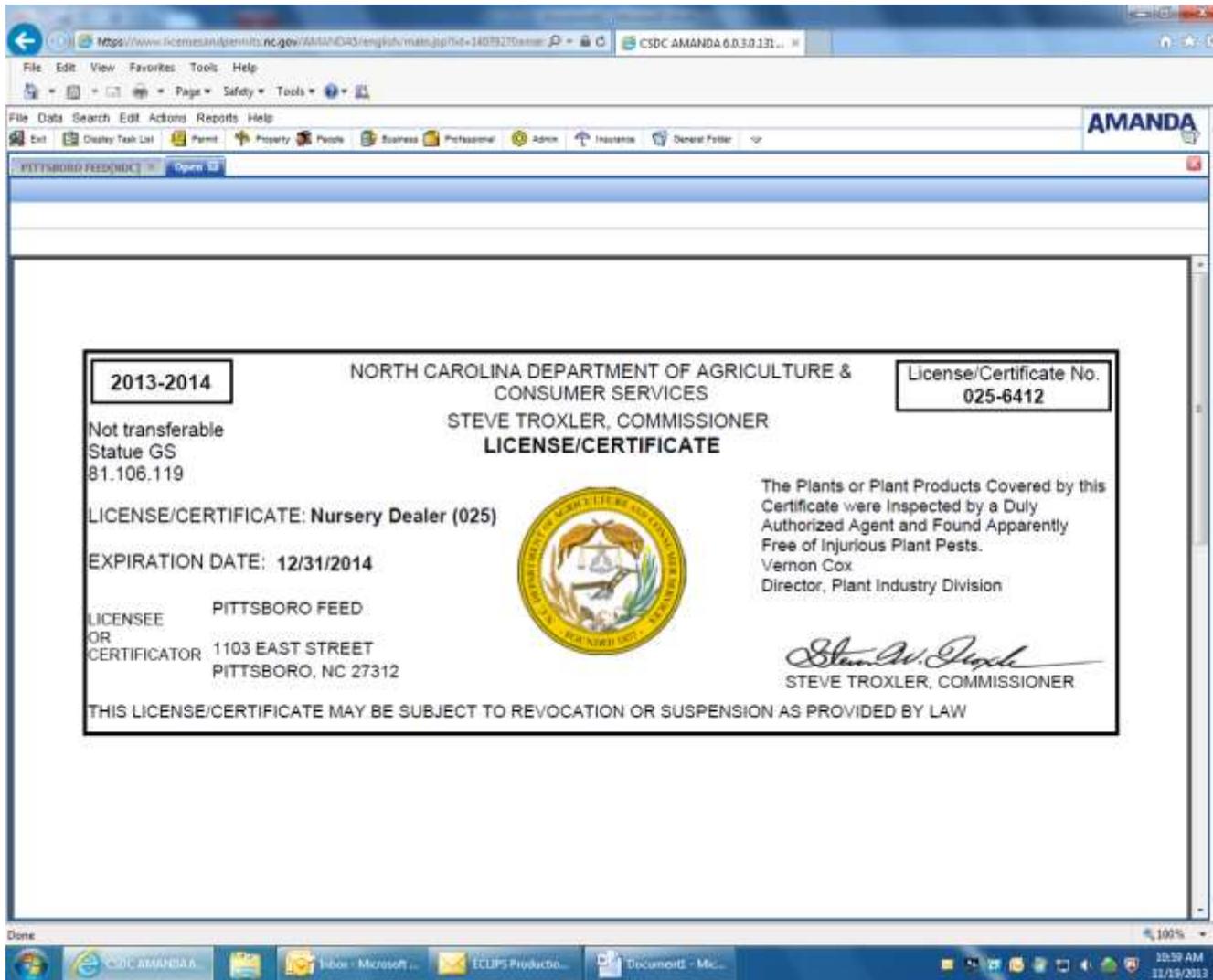


Fig 5. Example Nursery Dealer License/Certificate Issued

**Project Title:** New Educational Initiatives for the N.C. Nursery Industry

## **Project Summary**

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**Specific Issue Addressed:** The recent economic recession had a devastating impact on nursery production, North Carolina's largest crop with \$780 million in farm income. The recession exposed a great need for education on managing nursery businesses more effectively and efficiently. In addition, nursery production is a very technical, knowledge intense area of agriculture due to the need to manage the production of 1000's of different plants, and also the need to understand new best management practices, marketing, trends in demand, management of natural resources, and environmental, labor, and safety regulations. There is also a need for opportunities to earn continuing education units (CEU) for irrigation, pesticide, and landscape professional certifications.

**Project Importance and timeliness:** Nursery and greenhouse growers experienced a transition from a period of unsustainable growth (2000 – 2006) to a time of severe business contraction ( 2007 – 2012). In order to survive and be profitable in the future, growers needed opportunities to learn a more sustainable business model and better management skills.

This project was timely because it allowed the NCNLA to provide a diverse educational event that served the needs of the green industry and provided information that will improve the management and operation of their businesses. It also made it possible to reach growers in eastern and western NC that traditionally have not had these opportunities .

**Project Objectives:** This project focused on three important objectives to provide educational training for growers and green industry related businesses to increase their management skills and improve the sustainability of their operations.

1. To provide new educational initiatives that included three day regional conferences with management related seminars and tours.
2. To reach a diverse range of growers in different regions of the state by offering the seminars and tours in Raleigh (August 2011), Hickory (August 2012), and Wilmington(2013). Also, this project targeted beginning farmers of specialty crops by including them in all project activities.
3. The third objective to produce educational webinars for growers was dropped from the project in our amended agreement. This was necessary due to budget

cuts and reorganization at NCSU that prevented them from being able to produce the webinars for NCNLA as planned.

This project was not funded by any other grant program.

## **Project Approach**

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This project included three day educational conferences (Summer Green Road Show) with seminars and tours in Raleigh (August of 2011), Asheville (August 2012), and Wilmington (August 2013). The original project work plan also included producing and presenting educational webinars. The webinars were to be produced by NC State University but due to budget reductions at NCSU, the Dept. of Agricultural Communications was eliminated and the webinars could not be produced. A budget revision and time extension was requested and approved to use the funds budgeted for webinars for a third year of the educational conference.

Each year's conference included seminars focused on a variety of topics. NCNLA worked closely with extension specialists from NC State University in developing topics and speakers. Business management topics included liability and insurance, contracts, financial management, taxes, and human resource management. Marketing topics included customer relations, merchandising, new plant demand, developing a marketing plan, pricing, and advertising. Also insect, disease, and weed control, irrigation management, pruning, and other best management production topics were presented.

Educational tours were planned with NCSU extension specialists to allow participants to see field demonstrations of best management production and landscaping practices. The tours were conducted the day after the two days of seminars. Each tour was conducted by NCSU and NCNLA staff and included industry experts for the topics covered.

NCNLA and NCSU specialists invited the speakers and made all the conference arrangements. NCNLA staff worked out all logistics and contracts with the convention centers where the conferences were held. NCNLA was also responsible for designing, printing, and the distribution of program/publicity brochures. Registration and fees were managed by NCNLA as well as payment of all expenses. Evaluation forms were completed by participants during each conference and summarized by NCNLA. Evaluation data was used each year in planning the conferences to provide the topics and speakers that were most requested and useful to participants.

Another phase of this educational project was the Young Professional Leadership Program. This program targeted growers and employees with less than 10 years experience to provide them training at the Summer Green Road Show. An application was developed and sent out to potential participants. Participants were selected by NCNLA and each one received full registration including seminars, Energy Saving Landscape Certification, and tours.

The extension specialists and county agents from NC State University were important partners in planning and conducting the seminars and tours each year of the Summer Green Road Show.

### **Goals and Outcomes Achieved**

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The **goal** of this project was to train nursery/greenhouse producers to increase their management skills and improve the sustainability of their operations. The project was successful in achieving this goal and exceeded our target numbers for the measurable outcomes.

We completed the activities in our amended project proposal and achieved the project performance goals and outcomes. The completed activities included an educational conference that included two days of seminars and one day of tours held in three regions of the state over three years (Raleigh 2011, Hickory 2012, Wilmington 2013). In addition, extending the project for an additional year and moving the location each year proved beneficial. We were able reach many people that normally wouldn't have been able to attend do the time and expense required for travel.

The first **measurable outcome** was the number of people that participated in the educational conferences and tours each year. Conference and tour registration records were used to collect this data.

Our original target was to have 200 people participate in this training in both Raleigh and Asheville for a total of 400 over the two year project. After the project was amended we extended our goal to include 200 participants in Wilmington in the third year. Moving the location around the state of N.C. allowed us to reach a different audience each year. Since this was a new project, benchmark data for attendance was not available.

Another **measurable outcome** included written evaluations by participants to determine if they increased their knowledge of the topics. Our target was to increase their knowledge by an average of 50% for each program area. The evaluations also allowed participants to rate the speakers and suggest topics for future Summer Green Road Shows.

Our original plan included pre and post conference self-assessment evaluations to determine if attendees increased their knowledge. Evaluation forms were to be given to participants at registration and at the end of the conference. However the preconference evaluations were not practical and difficult to implement. We distributed evaluation forms during each seminar track and had participants complete them at the end. The forms were designed to measure how much they increased their knowledge of the topics.

A third **measurable outcome** was included in the original project proposal to determine the number of growers who participated in on-line webinars. As explained in Project Approach, this part of the project was amended and funds used for a third year of the Summer Green Road Show instead of webinars.

Summary of the measurable outcome data for each year of the Summer Green Road

Show educational conferences:

Raleigh 2011:

Attendance: 246 people participated in the educational conference and 72 in the tours. Total 318

Evaluations to determine if attendees increased their knowledge: The average evaluation rating was 3.75 where 5 indicated they increased their knowledge

100% and 1 indicated a 0% increase in knowledge. This exceeded our goal of increasing their knowledge by 50%.

Hickory 2012:

Attendance: 239 people participated in the educational conference and 74 in the tours. Total 313

Evaluations to determine if attendees increase their knowledge: The average evaluation rating was 4.1 where 5 indicated they increased their knowledge 100% and 1 indicated a 0% increase in knowledge. This exceeded our goal of increasing their knowledge by 50%.

Wilmington 2013:

Attendance: 171 people participated in the educational conference and 15 in the tours. Total 186

Evaluations to determine if attendees increased their knowledge: The average evaluation rating was 4.05 where 5 indicated they increased their knowledge 100% and 1 indicated a 0% increase in knowledge. This exceeded our goal of increasing their knowledge by 50%.

In summary, this project made good progress in improving the management knowledge and skills of producers of nursery and greenhouse specialty crops. The outcome results showed we exceeded our goal of reaching 200 participants in 2011 and 2012 and were slightly less in 2013. Overall our total of 817 exceeded our goal of 600 participants. By conducting this event in a different region of the state each year, we reached many new people that wouldn't have had access to this management information.

We also reached 27 new or beginning specialty crop producers through our Young Professional Leadership Program that assisted them in participating in the educational seminars and tours.

In addition, program evaluations by participants indicated the educational conferences were effective in increasing their management knowledge. The three year average program evaluation rating was 3.9 on a scale where 5 indicated they increased their

knowledge 100% and 1 indicated a 0% increase in knowledge. This exceeded our goal of increasing their knowledge by 50%.

Participants were also able to earn continuing education credits for pesticide and irrigation licenses, and arborist certifications.

## **Beneficiaries**

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The beneficiaries of this project included ornamental plant nursery and greenhouse crop producers across North Carolina. In addition, beneficiaries included retail nurseries and nursery/landscapers that also grow and use these specialty crops. Nursery and greenhouse crop production represents a farm income of \$709 million in NC and is the largest crop grown in the state.

A total of 887 people attended the educational seminars and tours in Raleigh, Hickory, and Wilmington. The information that these beneficiaries received will allow them to make better management decisions that will impact their sales, profits, and long term sustainability of their businesses.

The potential economic impact of this project will be determined by future farm income and employment. In the two years before this project began, sales for many ornamental plant growers declined 30% - 40% during the economic recession. Most nurseries and related green industry businesses also laid off 30% - 50% of their employees. Information gained through this project will help them manage their businesses more efficiently and profitably in future years. This will provide a positive economic impact on communities through increased farm income and employment. The potential to increase nursery and greenhouse farm income by \$100 million back to pre recession levels is possible over the next 3-5 years. The information and management skills developed from this project will play an important role in this growth.

## **Lessons Learned**

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The positive results of this project as described in the Goals and Outcomes section provided confirmation of the need for management related information for nursery and greenhouse crop producers. Educational conferences that are designed to provide this information can be successful with the right topics, effective speakers, and location.

Involvement of extension service specialists and agents, representatives of the target audience, regional and state commodity associations, and community colleges in planning these events was critical to their success. The events we conducted through this project would not have been possible without participation from all of these stakeholders. They helped identify the topics, speakers, locations, and publicity that made these events a success. Other states considering this type of educational conference should focus on involving as many people as possible from these different groups early in the planning process.

Our original plan included pre and post conference self-assessment evaluations to determine if attendees increased their knowledge. Evaluation forms were to be given to participants at registration and at the end of the conference. However the preconference evaluations were not practical due to the attendees registering at different times, the short time available between seminars, attendees coming in after the seminar started, and logistics of distributing surveys before the speaker started. We distributed evaluation forms at the end of each seminar track and this provided the information we needed to determine how much they increased their knowledge of the topics. I would recommend using evaluations only at the end of each seminar as the most effective way to achieve this goal.

The population of the targeted audience within a one to two hour drive must be considered in selecting a location. We found that few participants would drive more than two hours to attend.

Having the event during a time of year that is traditionally slow for participants is important to avoid conflicts with their business work schedule.

Our original proposal included producing educational webinars. However, our plan to use communication specialists from NC State University had to be cancelled. Budget reductions at NCSU forced them to reorganize their staff and were not available to participate. Since we had relied on NCSU as the only cost effective means to accomplish this task we requested an amendment to our project. This project was amended in 2012 to use funds from the webinar production on a 2013 Summer Green Road Show educational event.

The budget amendment and extended timeline allowed us to complete a third year of the educational conference component of this project. As a result, the third year of the conference reached nursery businesses in a new region of the state.

## **CONTACT PERSON**

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## **Project Title:** Fresh and Healthy North Carolina Apples

*Previously approved final report*

### **Project Summary**

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Apple production plays a significant economic role in North Carolina. A significant portion of the 4+ million bushels of apples grown in the state each year are sold through farm markets where high summer temperatures cause fruit to ripen quickly, limiting their shelf life and consumer appeal and increasing their susceptibility to decay. Unsold bushels of soft fruit are normally juiced, representing a loss in fruit value of 80 percent. Technology discovered at NC State and commercialized as SmartFresh can reduce the loss in firmness of apple fruit after harvest. However, because of the size and cost of commercially available units for SmartFresh treatment, this technology was available to only a few of the larger producers in the state who sell through wholesale markets. In a 2009 pilot study we found that SmartFresh maintained the firmness of fruit held in farm markets for several weeks. The objectives of this project were to demonstrate growers how SmartFresh can preserve the eating quality and health benefits of North Carolina apples sold through farm markets and to design, develop, demonstrate, and educate North Carolina apple growers on a cost-effective method for SmartFresh treatment suitable for small scale producers.

### **Project Approach**

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The first objective of the project was to design, build, test, and demonstrate a simple cost- effective unit for small scale (2 bins = 40 bushels; 12 bins = 240 bushels) treatment of apples with SmartFresh suitable for use by the many smaller apple producers in the state who sell their fruit through direct farm markets.

- June 7 - Designed, built and tested two small-scale prototype units for SmartFresh treatment. The smaller of these units was a “Pallet Tent” with a capacity of 40 bushels while a larger “Adjustable Apple Tent” can be used to treat up to 240 bushels of apples in 80 bushel increments.
- June 14 – “Maximizing Your SmartFresh Investment” – A workshop that provided in- depth discussion of the technical considerations when using 1-MCP technology in farm markets and demonstrated the operation of the “Pallet Tent” and the “Adjustable Apple Tent”. Forty apple growers participated and received an educational bulletin which described variety-specific protocols for SmartFresh treatment and which also included a description of how to build the “Pallet Tent” and where to order the “Adjustable Apple Tent”. This workshop was held free of charge to participants.

- July 21 - A discussion of the benefits of SmartFresh for direct marketed apples – Ways to integrate SmartFresh technology into direct market farm operations to improve fruit quality and consumer satisfaction was presented to 80 apple growers at the Henderson County Preharvest Apple Tour.
- Training workshops were held in Wilkes County (40 growers in attendance) and Henderson County (120 growers in attendance) to describe the construction and operation of small-scale units for SmartFresh treatments.
- Jan 12 - Grower panel at the Southeast Apple Growers Meeting “Making SmartFresh Work in Our Operation – Does it Pay?” Four growers who have experience using SmartFresh in their farm market operations were asked to share their experiences at the Southeast Apple Growers Meeting (180 apple growers in attendance).

The second objective of this project was to evaluate the potential for SmartFresh to preserve the sensory quality, and human health benefits of North Carolina apples. This objective was met by:

- Demonstrating the positive effects of SmartFresh treatment on the sensory quality of apple fruit harvested at an advanced, “tree-ripened” stage of fruit maturity after short term cold storage. “Tree-ripened” fruit typically exhibit improved sensory qualities (volatile flavor compounds) at harvest, but many of these quality characteristics rapidly decline to unacceptable levels in storage. SmartFresh completely suppressed formation of the ripening hormone ethylene in ‘Gala’ apple fruit that were harvested at a very advanced stage of fruit maturity during 56 days in cold storage. Late harvested fruit that were treated with SmartFresh still had acceptable firmness (13.6 pounds force) after 56 days in cold storage whereas the firmness of untreated fruit declined to an unacceptable level (10.8 pounds force).
- The David H. Murdock Research Institute (DHMRI) were contracted to undertake an instrumental analysis of the major volatile aroma compounds responsible for the sensory quality of ‘Gala’ apples. The DHMRI found that levels of aroma volatiles were higher in late harvested fruit after short term storage compared to fruit harvested earlier for long- term storage. They also found that SmartFresh had variable effects on levels of the major aroma volatile compounds after 56 days cold storage; having no effect on levels of the major esters, but increasing the level of two major alcohols (butanol and trans-2-hexanol). Butanol is responsible for the overall apple flavor, aroma and sweetness whereas hexanol is responsible for green, flowery, and earthy notes. The positive effect of SmartFresh on the level of these two dominant alcohols in late harvested ‘Gala’ apple fruit after short term storage has not been previously reported.

## Goals and Outcomes Achieved

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The goals of this project were to develop technology for North Carolina apple growers that would increase the quality and consumer acceptance of apples sold through direct farm markets. The long term goal was to increase the competitiveness and profitability of North Carolina apple growers and to increase the health and well-being of North Carolina citizens.

#### Short-Term Outcomes:

- We designed, built, tested and demonstrated to commercial apple grower's two simple, cost-effective units capable of treating small batches (40-240 bushels) of apple fruit with SmartFresh.
- Educational training and printed materials were provided describing how apple growers can incorporate SmartFresh technology into their retail markets to improve fruit quality and consumer satisfaction. The educational information included variety-specific recommendations of how growers can maximize their investment in this new technology. The educational material that we developed is currently being edited as a web-based publication for growers. The educational bulletin that we developed is now being distributed by AgroFresh Inc. to advise small apple growers how to use their product nationally.
- We conducted research that described the positive effects of SmartFresh technology on the quality and sensory properties of late harvested apple fruit. We demonstrated that late-harvested fruit that were allowed to develop to a "tree-ripened" level of maturity had greater consumer appeal, as determined by a higher level of firmness and some important aroma compounds after short term cold-storage.

#### Long-Term Outcomes:

Long-term outcomes of the project include an increase in the number of North Carolina apple growers using SmartFresh technology to improve the quality of fruit sold through direct farm markets and to increase the consumption of North Carolina apples by using this new technology to increase consumer demand. More than five growers built their own facility for treating apple fruit with SmartFresh and started using this technology since 2009. Growers who are using SmartFresh report varied benefits including improved firmness, acidity and consumer acceptance of fresh market fruit after short-term storage, increased yields in juicing operations of treated apples after long-term cold storage, and improved product quality and consumer acceptance of processed products including slices and sauces. It will be difficult to quantify the effect of Smartfresh on consumption trends for fresh apples sold through direct farm markets over the next few years since there is no formal mechanism to collect this type of data on an annual basis. Data describing the effects of SmartFresh on sensory quality and volatile aroma compounds were not available to share with growers during the life of this project, but will be presented at local and regional grower meetings during 2012.

## Beneficiaries

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The completion of this project accomplishments were directly beneficial to apple growers, extension agents, and agribusiness technical personnel who participated in the various educational activities of the project. Attendance numbers for each of the events are listed below:

Activity	Date	Attendan
Workshop	June 14	40
Preharvest Farm	July 21	80
Educational Session	Jan 11	180
Educational Session	Feb 1	120
Educational Session	Mar 5	50

## Lessons Learned

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Growers can quickly become overwhelmed when they are presented with research-based information in the form of a Powerpoint presentation or an educational bulletin. Inviting a small group of growers who have been using SmartFresh technology for some time to share their experiences in a panel discussion at a regional grower meeting was an effective way to complement the message that we were trying to convey. The growers on this panel were able to explain how they introduced and use this technology in their farm markets, and to describe some additional benefits that we had not previously considered such as the additional yield from juice apples after long-term storage and the greater consumer acceptance of treated apples used to make apple slices for baked products.

## Contact Person

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## Additional Information

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Educational Bulletin “Maximizing Your SmartFresh™ Technology Investment”

# **Maximizing Your SmartFresh™ Investment**



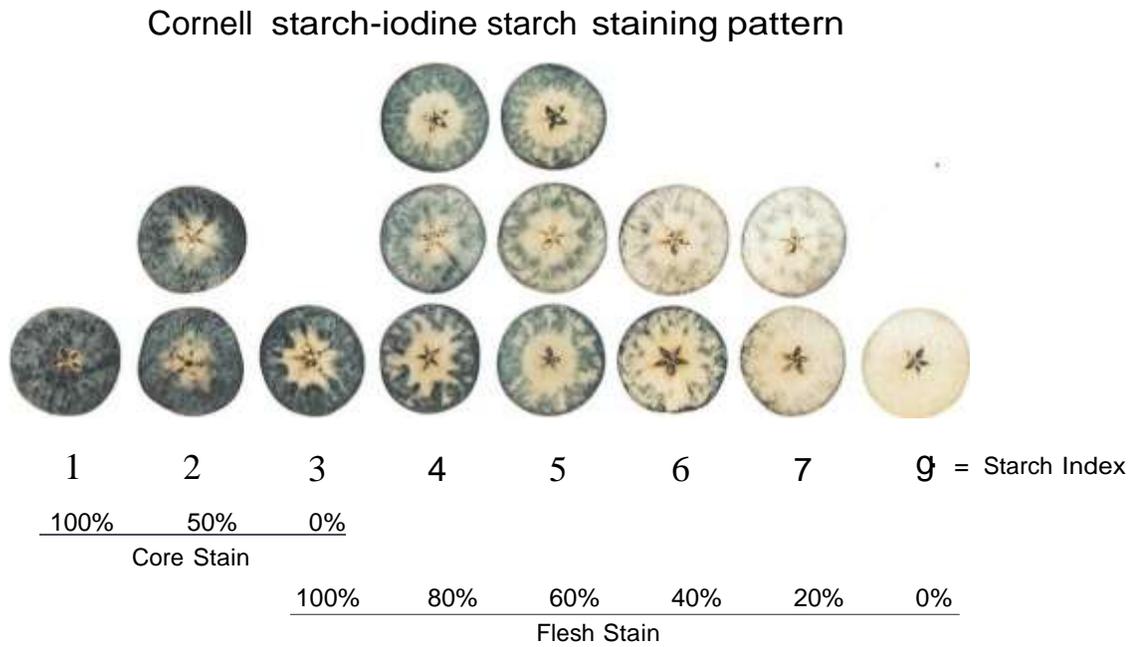
M.L. Parker, S. McArtney, T. Hoyt and J.D. Obermiller  
Department of Horticultural Science  
North Carolina State University  
Raleigh, NC

SmartFresh™ is a relatively new tool for postharvest management of apples. In 2002, SmartFresh™ was approved for commercial use on apples by the Environmental Protection Agency under a reduced risk program because of the very low toxicity of the product and the fact that treated fruit have no detectable residue. It is thought to bind irreversibly to the ethylene receptors in plant tissues making the crops insensitive to ethylene and subsequently retarding many of the ethylene mediated responses such as fruit softening in apples. SmartFresh™ can maintain the apples firmness and acidity and decrease scald and greasiness even when stored under less than ideal storage temperatures. However, maximum storage life results from the combination of SmartFresh™ treatment and recommended storage practices. When using SmartFresh™ according to the manufacturer's recommendation, the period between harvest and treatment is varietal dependent and varies from three to ten days. In addition, the manufacturer (AgroFresh) publishes an annual summary of use recommendations listing with a recommended maturity range for most cultivars based upon the starch index and flesh firmness of the fruit at harvest. Being able to determine the flesh firmness and starch index of the fruit is necessary to use SmartFresh™ with the optimal effectiveness. Apple flesh firmness (<http://postharvest.tfrec.wsu.edu/pgDisplay.php?article=N113A>) is determined with a penetrometer (Effegi or Wagner are common brands and can be purchased for \$200-300) which is a hand held gauge with a 7/16" probe that is pushed into a peeled patch on opposite sides of an apple. This device can be purchased from several online sources dealing with orchard equipment. The starch level or starch index of the fruit is also a very useful tool to determine the maturity of the apple and following the conversion of starch to sugar as the apple matures ([http://www.agbioresearch.msu.edu/nwmihort/starch\\_iodine\\_note.pdf](http://www.agbioresearch.msu.edu/nwmihort/starch_iodine_note.pdf)). Apples are cut in half across the middle of the fruit and one half is placed face down in a shallow pan of a potassium iodide solution and evaluated according to the degree of discoloration (Fig. 1).

Treating beyond either the time after harvest or outside of the recommended maturity parameters decreases fruit response, shortens the effective marketing period, and negates the company assurance of increasing the postharvest life of the fruit. According to research and experiences with NC grown apples, treating the apples as soon after harvest as possible, preferably within 1-3 days, is suggested for optimal effectiveness.

**Figure 1.** Starch Iodine staining pattern used to determine apple maturity. Chart taken from:

<http://ecommons.librarv.cornell.edu/bitstream/1813/3299/2/Predicfing%20Harvest%20Date%20Window%20for%20Apples.pdf>

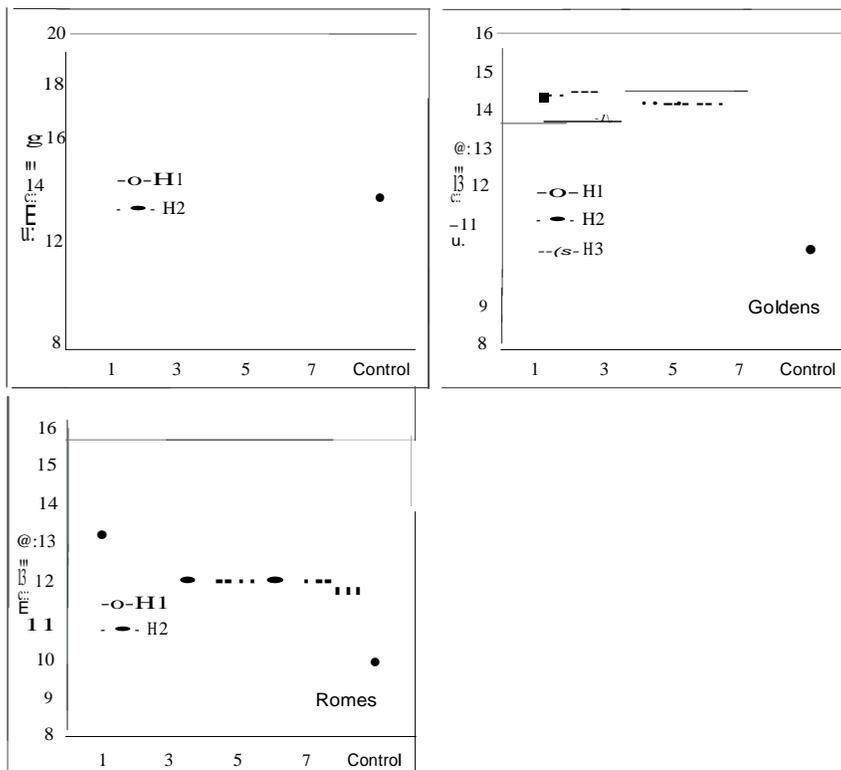


One of the challenges of using SmartFresh™ on apples is that the fruit needs to be sealed in an airtight enclosure during treatment for 24 hrs - exposure to a one part per million concentration of 1-MCP. After treatment, the fruit can then be held in a regular cold storage room. Controlled atmosphere (CA) rooms are designed to be airtight and have the ability to hold a one ppm concentration of 1-MCP in the atmosphere for 24 hours. However, in many cases a grower may not have the capacity to harvest and fill a CA room within the recommended interval following harvest. Growers selling through retail outlets grow multiple varieties and will need to treat smaller quantities of fruit at varied intervals and do not have access to CA facilities or an air tight facility for treating apples. The quantity of SmartFresh™ required is based on the volume of the treatment area and maximum cost effectiveness is accomplished by completely filling the treatment enclosure.

At NCSU we have been evaluating the commercial use of SmartFresh™ for more than eight years on NC grown apples (Blankenship, Parker, McArtney, Obermiller and Hoyt). The studies have shown that if used properly, SmartFresh™ can maintain the flesh firmness of treated apples over those not receiving the SmartFresh™ treatment by 3-6+ lbs after 40 days of storage at 32oF and 7 days at room temperature. Figure 2 below illustrates the effect of SmartFresh™ on three cultivars, 'Gala', 'Golden Delicious' and 'Rome' and the impact of harvest date and post harvest treatment interval treating the fruit at 1,

3, 5 or 7 days after harvest. The fruit not treated the first day were held at 32°F until treatment. SmartFresh™ was effective at maintaining the firmness of all three cultivars. Earlier harvest dates resulted in greater fruit firmness after 40 days of storage at 32° F and 7 days at room temperature. The first harvest was conducted when the fruit had a starch index of 3-4 based on the Cornell starch Index based on an 1-8 scale (See Figure 1). It is also important to note that shortening the harvest to treatment interval of 'Golden Delicious' and 'Rome' greatly increased the flesh firmness response. The resulting firmness benefit increased by up to 40% for fruit treated 1 day after harvest compared to fruit treated 7 days after harvest. In NC, we are recommending that growers treat their fruit as soon after harvest as possible and preferably within 3 days of harvest.

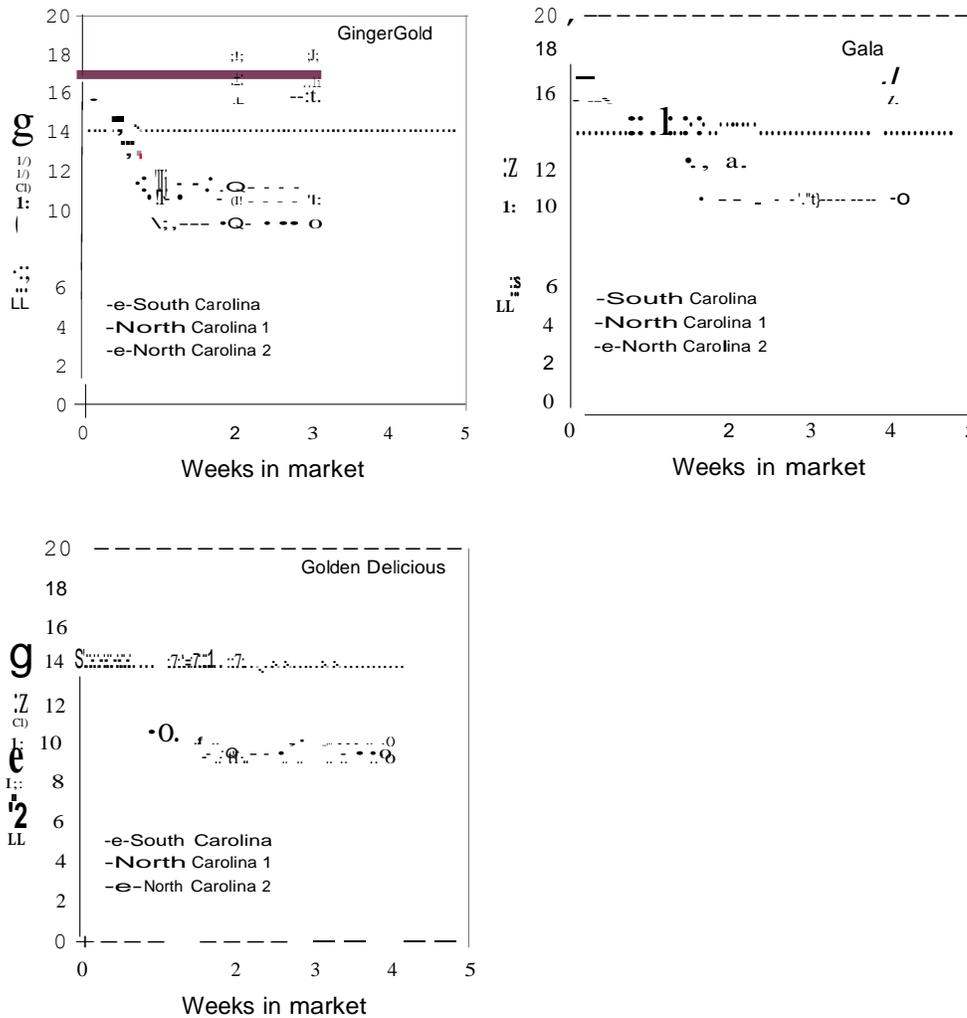
**Figure 2 .** Impact of delaying SmartFresh™ treatment of 'Gala', 'Golden Delicious' and 'Rome' apples on the flesh firmness. The units of the x-axis is the number of days from harvest to SmartFresh™ treatment. Fruit were held at 32°F between harvest and treatment. The first harvest is designated by H1 and following harvests numbered accordingly.



SmartFresh™ is being used commercially in NC on a limited basis. The largest growers using the material have large shells lowered from the ceiling in their cold storage rooms and treat several hundred bins per application. We have also developed applications for effectively using refrigerated tractor trailers for treating approximately 66 bins per application. Caution, do not use trailers or facilities with exposed wood on the inside. SmartFresh™ is absorbed by wood, and with the exception of the wood in the bins, other wood surfaces should be minimized or sealed with some type of wood sealer (i.e. plywood walls, wood floors, etc.). However, many growers in NC do not have the desire or ability to harvest and treat a large quantity of fruit within 1-3 days of harvest. The goal in NC was to develop protocols and techniques for using SmartFresh™ to treat smaller quantities of fruit, primarily for growers who sell in retail markets. We have conducted on-farm trials with growers with retail operations and placed treated and untreated fruit in their markets of the cultivars 'Ginger Gold', 'Gala' and 'Golden Delicious'. These fruit were held under ambient temperatures in each market. Fruit samples were collected weekly from each retail display area and flesh firmness, soluble solids and starch index were measured on these samples.

The flesh firmness information from this study is included in Figure 3. The response of the apples was similar at all three retail stands. Untreated fruit of all three cultivars softened very quickly. After one week, most of the apples had less than 14 lbs. of firmness- generally considered to be the threshold for high quality fruit. However, SmartFresh™ treated fruit maintained flesh firmness values similar to the fruit at harvest even after 3-4 weeks at ambient temperature.

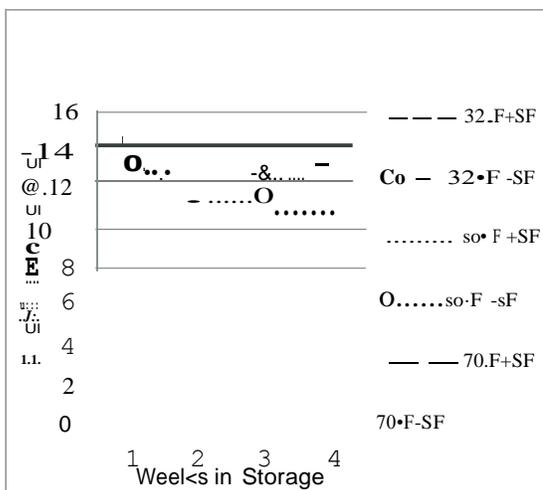
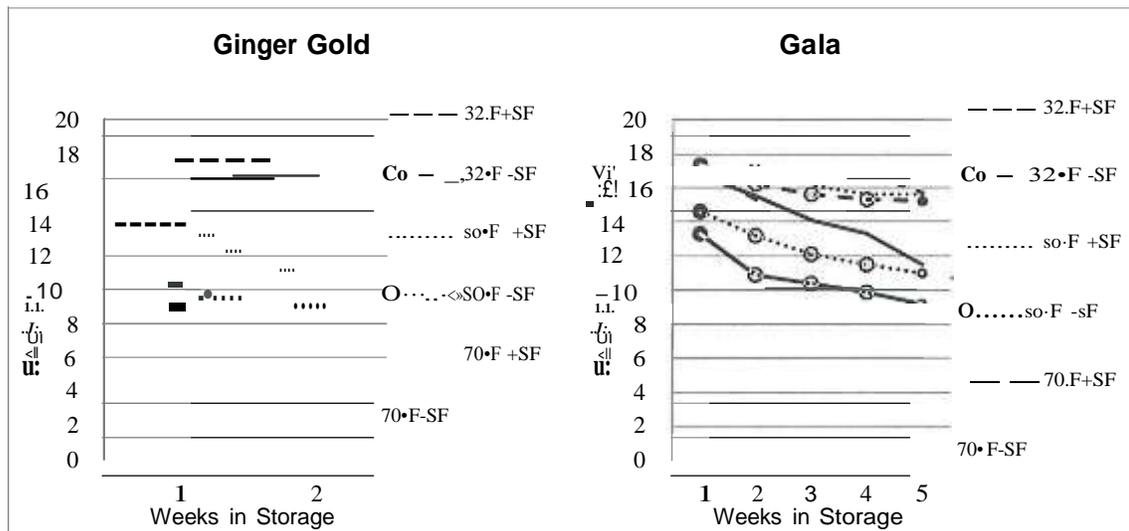
**Figure 3.** Impact of SmartFresh™ treatment on 'Ginger Gold', 'Gala' or 'Golden Delicious' apple flesh firmness for fruit held at ambient temperatures in commercial retail stand display areas. Solid lines are SmartFresh™ treated fruit.



Optimal fruit quality is achieved with most cultivars when the fruit is stored at 32°F. Apples not treated with SmartFresh™ and stored at 40°F will respire and degrade twice as fast as apples held at 32°F. Fruit held at 60°F degrades six times faster than apples at 32°F. However, many smaller operations maintain storage temperatures above 32°F due to current cooler use patterns and/or limited refrigeration capacity. To deal with these challenges we have evaluated the impact of SmartFresh™ on the quality of fruit held at different storage temperatures. Samples of 'Ginger Gold', 'Gala' and 'Golden Delicious' apples were harvested and either treated with SmartFresh™ within 1-2 days of harvest or left untreated. The fruit were then stored at 32, 50 or 70°F and sampled at weekly intervals to determine the impact on flesh firmness (Fig. 4). All of the

apples without SmartFresh™ (lines with symbols) had the lowest flesh firmness regardless of temperature for all three cultivars, with the exception of untreated 'Gala' fruit stored at 32°F. Also notice that the flesh firmness of SmartFresh™ treated 'Ginger Gold' stored at 70°F was significantly greater than untreated fruit stored at 32°F. There was no difference in flesh firmness of SmartFresh™ treated 'Gala' and 'Golden Delicious' apples held at 32 or 50°F after 4 weeks.

**Figure 4.** Impact of SmartFresh™ (SF) treatment on 'Ginger Gold', 'Gala' or 'Golden Delicious' apple flesh firmness for fruit held in at 32, 50, and 70° F. Lines with symbols represent treatments that did not receive SmartFresh™.



As stated earlier, treating apples with SmartFresh™ needs to be performed in an airtight enclosure. Based upon our data and experiences, our recommendations in NC are to treat fruit within 3 days of harvest to ensure the

maximum benefit from SmartFresh™ treatment. However, obtaining the correct measured amount of SmartFresh™ and an appropriate facility to treat smaller quantities of fruit (2-12 bins) has been a challenge. In our research trials, we have been using SmartFresh™ SmartTab™ and a chamber that holds two stacked bins of apples at a time.

AgroFresh now sells SmartFresh™ in a form that can be used for smaller scale use. SmartFresh™ SmartTab™ come in a blister pack of 10 tablets and each tablet is designed to treat approximately 123 cubic feet (fe). A packet of 10 tablets comes with an activator kit consisting of a small plastic container with a screw on lid, with a small hole in the center, with a small quantity of activator solution and 2 activator tablets. When ready for treatment the lid, which has a hole in the center, is removed from the activator kit, a seal is removed and the appropriate number of SmartTab™ and activator tabs are placed in the solution. After the lid is replaced, the assembled activator kit is promptly placed inside the treatment chamber and sealed immediately.

The activator kits are designed for a single use regardless of the number of SmartTab™ used. Additional activator kits can be ordered at no additional cost when included with the SmartTab™ order. The actual volume of fruit treated, and resulting per unit treatment cost, depends upon the size and configuration of the chamber, but 1 bin of apples takes up approximately 50 ft<sup>3</sup> of area. The cost of the SmartTab™ is approximately \$320 for a pack of 10. Purchasing the SmartFresh™ material is also a little different than most of your other pest management material. You must set up an account and purchase the material directly from the company, AgroFresh. (Note: credit card payment is preferred.) Their contact information is:

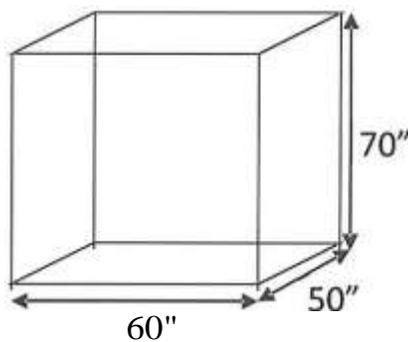
AgroFresh, Inc.  
Phone: 1-866-206-1001  
FAX: 1-866-964-8138  
P.O. Box 8500-54357  
Philadelphia, PA 19178-4357

The sales representative that can address additional questions is Mr. Bruce Beardmore. He can be contacted by e-mail at: [bbeardmore@agrofresh.com](mailto:bbeardmore@agrofresh.com) or by phone at: (616) 450-1104.

The initial chamber that we used was designed to treat 2 bins of fruit per treatment. It consists of a frame made from 1/2" PVC pipe (54" wide, 60" long and 65" high) and a 4 mil polyethylene pallet cover (64"X56"X108") (Fig. 5). Two bins of apples are stacked and placed centered on a piece of 6'X6' vinyl

linoleum (Fig. 6). The frame is placed over the two bins of apples and plastic pallet cover was then placed over the frame and sealed to the linoleum with duct tape. One side is left open until the SmartTab™ and activator kit are prepared and placed inside the chamber. For this treatment one SmartTab™ was used in one activator kit for each application. The remaining side of the cover is then sealed to the linoleum with duct tape. After 24 hours, the cover is removed from the bins and the apples are handled with the rest of the fruit. If there is enough head room over the top of the bins the plastic cover and frame can be removed as a single unit without having to fit the plastic over the frame for each treatment. Cooling the apples as quickly after harvest is ideal and the SmartFresh™ application can be made in a cooler, however in all four grower trials the treatments were made at room temperature with effective results.

**Figure 5.** Diagram for the PVC frame used for creating a treatment chamber for treating 2 bins of apples.



*Specifications*

PVC pipe  
6 -Ten foot by 1 inch PVC (Schedule 40) pipe

Cut PVC

- 4-70 inch
- 4 – 60 inch
- 4 – 50 inch

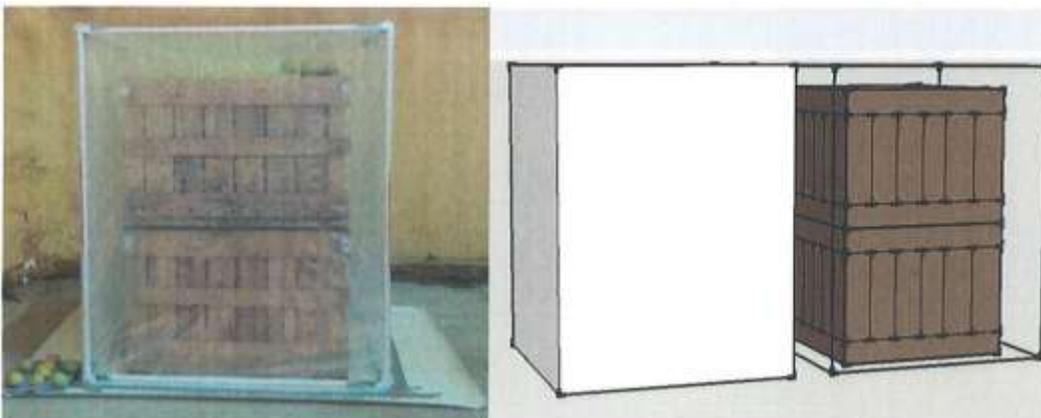
8 -1 inch three way PVC fittings

*Cost*

6 -Ten foot by 1 inch PVC (Schedule 40) pipe @ 2.35	14.10
8 -1 inch three way PVC fittings @ 2.40	19.20

*Total Cost* \$33.30

**Figure 6.** Photo and diagram of the 2 bin treatment chamber using a pallet cover.



Some growers have used plastic sheeting and duct tape to create their own air tight facilities in various sizes and configurations. Although company names will be mentioned in the remainder of this paper, this should not be considered as an endorsement, but rather sources that carry the materials described. The 4 mil pallet covers can be purchased in a roll of 25 at a cost of approximately \$200 for the covers and shipping (Clear Shrink Pallet Covers, Flexible Packaging, Houston, TX, toll free (800) 353-9125 (Part number FP14/01/6456108H).

In 2010, a grower trial was initiated with 3 retail apple growers. The growers were supplied with a 2 bin treatment frame, pallet covers and SmartTabs™ (supplied by AgroFresh) for 1 O-2 bin applications. The growers were expected to harvest the fruit at the stage of maturity normal for their operations. Each bin was sampled before and after treatment. The samples were then held at room temperature (70°F) for 30 days before measuring flesh firmness. Results are presented in Table 1 below for some of the cultivars evaluated. Notice that the SmartFresh™ treatment resulted in significantly greater flesh firmness for all cultivars except 'HoneyCrisp' and 'Cameo'. You will also note that many of the SmartFresh™ applications were made on fruit that were more mature than the recommendations by AgroFresh (those in red) with successful results after 30 days at room temperature. In retail operations, growers want to harvest fruit at a later stage of maturity with higher fruit quality (and yield), and then treat with SmartFresh™ and sell within the next 3-4 months. This increase in fruit quality both at harvest and from storage is expected from their clientele. For fruit to be held for a longer period of time it would be advisable to harvest within the maturity guidelines described by AgroFresh in their Apple Use Recommendations booklet.

During our trials over the past several years, we recognized the need for an intermediate sized chamber between the 2 bin pallet cover and a 66 bin refrigerated tractor trailer. We were able to work with "The Blimp Works" (Mr. Tracy Barnes, <http://theblimpworks.com/>, ph. 704-876-2378) in Statesville, NC to design an adjustable height chamber with a 4 bin square footprint (Adjustable Apple Tent) (Fig. 7). The chamber is designed to treat 4, 8 or 12 bins at a time depending upon a stacking height of one to three bins. This chamber can be suspended from a frame as shown in the image below or suspended from overhead ceiling rafters. The chamber itself is constructed of 6 mil polyurethane and is light weight (less than 40 lbs). We added square PVC frames at the top and bottom to maintain a square shape. The shell is lowered over the bins of fruit and a skirt at the bottom is spread out and water bags or tubes are placed on top to seal the shell to the floor. There is also a two bin capacity chamber designed with a skirt at the bottom to facilitate sealing with a water tube that is also available, referred to as a "Small Apple Tent".

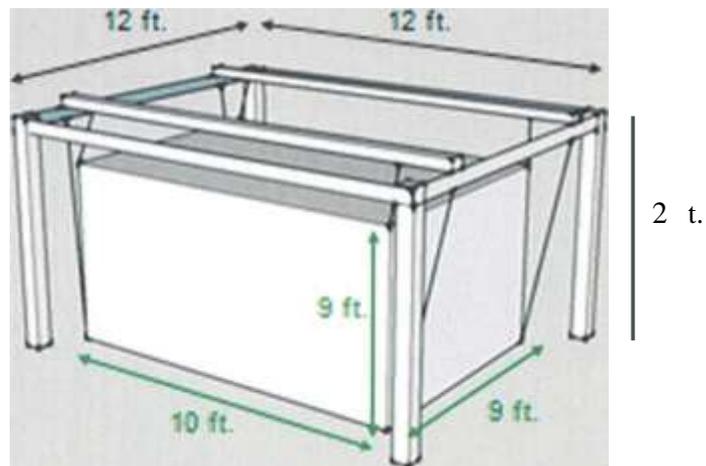
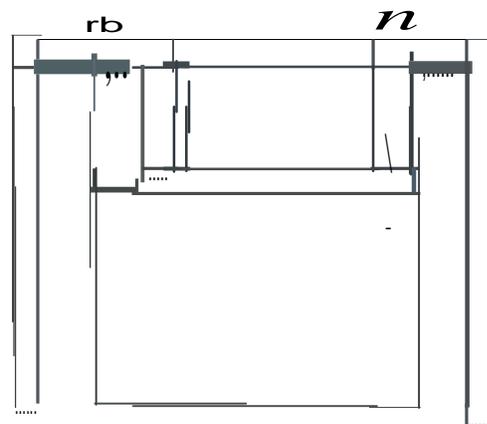
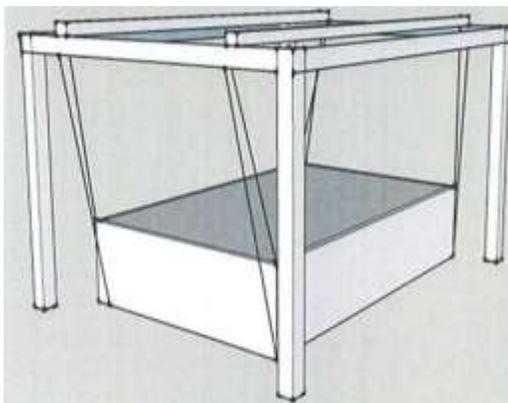
Table 1. Harvest maturity and effectiveness of SmartFresh™ application on the flesh firmness for multiple apple cultivars from the 2010 North Carolina grower trials.

Cultivar	Harvest maturity		Firmness after 30 d @ 70 °F		
	Firmness (lbf)	Starch (1-8)	Untreated (lbf)	Treated (lbf)	Difference (lbf)
Ginger Gold (Lamb)			9.9 a	17.5 b	+ 7.6
Ginger Gold (Owenby)			8.3	14.4	+ 6.1
Gala (Lamb)	17.1	5.0	9.1 a	15.2 b'	+ 6.1
Gala (Owenby)	14.3	7.5	8.4 a	12.3 b	+ 3.9
Honeycrisp (Owenby)	16.0	6.9	15.3	15.2	-0.1
Jonagold (Lamb)	14.8	7.8	9.3 a	14.2 b	+ 4.9
Jonagold (Owenby)	16.2	5.6	9.0 a	15.8 b	+ 6.8
Red Del. (Owenby)	15.8	6.8	7.4 a	13.4 b	+ 6.0
Mutsu (Lamb)	15.4	5.7	9.7 a	15.2 b	+ 5.5
Golden Del. (Coston)	13.9	6.9	10.2 a	14.0 b	+ 3.8
Golden Del. (Owenby)	15.6	5.6	11.5 a	16.1 b	+ 4.6
Stayman (Coston)	14.9	3.0	7.9 a	14.4 b	+ 6.5
Fuji (Coston)	13.9	7.1	13.5 a	14.6 b	+ 1.1
Cameo (Coston)	15.3	5.9	14.3	14.7	+ 0.4
Rome (Owenby)	21.0	4.3	12.1 a	15.3 b	+ 3.2
Rome (Coston)	17.5	6.2	10.3 a	13.1 b	+ 2.8
Empire (Lamb)	16.4	4.9	8.6 a	11.9 b	+ 3.3
Empire (Coston)	15.4	4.4	8.0 a	12.1 b	+ 4.1
Pink Lady (Lamb)	19.2	6.0	16.8 a	19.5 b	+ 2.9

\*\*Values in red represent fruit more advanced in maturity than current AgroFresh recommendations.

\*\*Values in blue represent unacceptable levels of fruit firmness for optimal fruit quality (< 14 lbf).

**Figure 7 .** The Adjustable Apple Tent being used to treat 12 bins with diagrams illustrating the treatment of 4 and 8 bins and overall dimensions of the enclosure.



Carbon dioxide leak testing was conducted both at the beginning and end of the season to verify the air tight suitability of the Adjustable Apple Tent and the Small Apple Tent. This test, in combination with the flesh firmness response of treated fruit, indicates that the chamber is a very effective treatment facility. These treatment chambers may be available commercially from The Blimp Works for approximately \$900 for the "Adjustable Apple Tent" and \$500 for the "Small Apple Tent". Due to recent military contractual obligations supply in 2011 may be limited, so call early for availability.

One of the grower cooperators in 2010 was able to purchase a unique shipping container that is referred to as a tall cube and could treat approximately 24 bins stacked 3 high. Many traditional shipping containers do not allow bins to be stacked in a manner to minimize free head space. The cost of a "once used" (produced in China and shipped full of freight to the US) was approximately \$4,000. But again, keep in mind that any treatment facility must be airtight and should be designed or have dimensions where bins can be arranged so that there is very little excess room for efficient use and cost of the SmartFresh™ treatment. In the Adjustable Apple Tent we used 2 SmartTab™ for 4 bins, 4 for 8 bins and 5 SmartTab™ for 12 bins.

In conclusion, our research has indicated that SmartFresh™ is a very effective postharvest management tool. It can be used to maintain the flesh firmness of the apples for a much longer period of time compared to untreated fruit. Fruit treated with SmartFresh™ can also be held at higher than optimal temperatures and still maintain acceptable flesh firmness for a longer period of time. In addition to maintaining flesh firmness, SmartFresh™ also slows the loss of fruit acidity and reduces scald development, even under less than ideal storage conditions. We feel that the use of SmartFresh™ is a tool that retail operations should consider adopting in order to maintain high quality fruit in storage, during retail display, sales and in the hands and home of the consumer.

**Project Title:** Fraser Fir Christmas Tree Market Expansion

**Project Summary:**

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This project was and is intended to increase demand and restore wholesale prices for North Carolina (NC) Fraser fir Christmas trees through expanded marketing and promotion. Regional oversupply, increased national competition, and the economic recession created a situation where extra promotional efforts were needed to compete for Christmas tree buyers' attention. The North Carolina Christmas Tree Association (NCCTA) is the primary vehicle for cooperative promotion among growers. The recent and ongoing economic and market situation have required promotional efforts to be expanded upon.

The NCCTA has expanded existing promotional strategies driven by its long-range market plan to develop new ways to reach buyers that are visually and emotionally appealing. Marketing efforts of the NCCTA have centered on promoting the association website, [www.NCchristmastrees.com](http://www.NCchristmastrees.com), branding North Carolina Fraser Fir as "The Perfect Christmas Tree," and increasing awareness of North Carolina Fraser fir. The NCCTA website provides a gateway to product listings, wholesale grower listings, and a choose & cut directory. It provides one-stop access for buyers and consumers looking for the perfect Christmas tree. Once wholesale and retail customers find NCchristmastrees.com, they can access grower information and link to farm websites.

These efforts were expanded in 2010-2011 with funding from the 2009 USDA / NCDA&CS Specialty Crop Block Grant. Those grant funds were used to augment association efforts to brand and promote NC Fraser fir and to assess the impact of NCCTA promotional efforts. Funding from the 2010 Grant cycle have allowed NCCTA to continue expansion on existing core promotional efforts, as well as allowed us to embark on new ways to draw on the visual appeal of North Carolina Fraser fir and the farms where it is grown. The North Carolina Christmas Tree Association (NCCTA) used grant funds to enhance and expand the association's marketing activities by creating more visibility of North Carolina Christmas trees in existing markets, creating opportunities for North Carolina growers in new markets, increased use of point of sale and consumer education materials, and promotion of North Carolina Christmas trees and growers at trade and consumer shows.

NCCTA sought to help the North Carolina Christmas tree industry create stable and sustainable markets in the face of increasing supply of Christmas trees nationwide, an uncertain economy, and a long-term erosion of the real tree market to artificial tree sales.

The project used a pre and post activity survey to assess present and future marketing needs and measure program effectiveness.

The project expanded on NCCTA efforts to use advertising to drive all potential buyers (wholesale, retail, choose & cut) to the NCCTA website [www.NCchristmastrees.com](http://www.NCchristmastrees.com) where buyers and consumers can find tree availability, tree care, positive attributes of real trees, fire safety tips, and locate tree farms and retail lot locations.

The project expanded branding efforts of North Carolina Fraser Fir “The Perfect Christmas Tree” by creating and distributing point of sale materials to growers and their customers.

NCCTA was able to increase and improve their presence at local, regional and national “Green Industry”, consumer, and other trade show events.

### **Project Approach:**

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An annual grower survey was created and distributed to evaluate association marketing efforts. The survey was an opportunity to collect information on grower planting practices as well as their marketing perceptions. Along with its function as an evaluation tool, this survey provided some very interesting information about both the NC Christmas tree industry and marketing activities.

Of the respondents, 75% were primarily wholesale growers. 21% percent of the respondents were choose & cut growers and 23% were retailers, keeping in mind that many growers are involved in multiple sectors of the industry. In addition, 4% of respondents included allied business owners.

### **Acreage & Annual Tree Planting Results**

The growers who responded to the survey collectively operated between 10,000 and just over 15,000 acres of Christmas trees depending on the acreage assignment applied from each farm size category (low, medium, or high end of range). Data from this survey indicated a reduction or cessation of annual planting among a majority of respondents beginning in 2005. This trend has helped the leadership of the NCCTA to predict the duration of the recent oversupply of Christmas trees as well as helping guide long range promotional planning and efforts..

### **Grower Perceptions about Promotional Efforts**

This survey provided useful insights into the value growers place on different NCCTA promotional activities and services. The marketing activity data were weighted and sorted to provide a visual ranking of their value to respondents. Survey questions provided information on the perceived value of promotional activities, their use by members, and their effectiveness in attracting wholesale and choose & cut customers. Respondents were also asked what marketing activities they engaged in themselves.

Growers were asked to rank the perceived value they placed on NCCTA marketing activities and products over the past three years. The most notable change in grower perceptions is the top ranking of the NCCTA website. Growers indicate that is clearly the single most valued activity conducted by the NCCTA. This reflects a fundamental shift in the way Christmas tree growers are interacting with their customers.

The Buy-Sell (wholesale) directory is highly valued as 100% of wholesale respondents indicated that they have been listed in the directory each year. Out of the 100% of respondents that were listed in the directory, 74% purchased an ad in the directory. When the survey was conducted in 2010, the purchase of ads in the Buy-Sell directory was ranked near the bottom of these activities despite the popularity of listing in the directory. This is a clear indication of the need for increased promotion.

Among NCCTA promotional point-of-sale materials, survey results depict a clear indication of increased usage of these materials. Over the grant period, the number of growers who used these promotional materials increased by 32%. In addition to use the materials personally, 82% of participants distributed these materials to customers and buyers. Point-of-sale materials continue to be highly valued, although the ranking of individual items has shifted. North Carolina Fraser Fir banners and tree care pads were perceived as the most valuable followed by “Real Trees Make Scents” brochures and North Carolina Fraser Fir posters. While there is very little difference among the weighted averages of many of these promotional activities, it is interesting to note that the perceived value of mass media activities have slipped behind point-of-sale items and social media activities.

Another interesting increase is the value placed on social media through Facebook, blogs and Twitter. Respondents went from being mostly “not familiar” with such avenues in 2010, to 42% of respondents ranking it as “somewhat effective” effective in 2011, and 47% of respondents ranking it as “somewhat effective” effective in 2012.

Respondents were asked to rank NCCTA activities in their value to finding either wholesale or choose & cut customers. Responses were similar for both 2010 and 2012. Not surprisingly, both groups of growers identified their own marketing efforts as the most important factor in gaining customers. Both groups also ranked the NCCTA website and their perspective directories (Buy/Sell wholesale directory and the “Memories” choose & cut guide) as the next most important tools for gaining customers. NCCTA activities were perceived as providing greater opportunities to find customers than either county or

national associations. A noticeable increase was seen in the value placed on referrals from NCCTA advertising in magazine and online publications that direct buyers and consumers to the NCCTA website.

The NCCTA grower survey also examined what marketing activities growers take on themselves. In 2010, among all marketing activities, “calling other growers to sell trees” was the most widely used activity. However, by 2012, calling other growers had fallen to fourth place with less than half the frequency of use of building a website. The use of internet marketing and social media increased.

Grower reliance on calling their peers to market their trees could reflect a healthy network among growers and the practicality of working with friends and neighbors. However, the rounds of phone calls that recently have targeted major growers and other re-wholesalers contribute to rumors and levels of pessimism that undermine grower’s price position. Reliance on phone calls to neighbors as a primary selling tool has surely played into buyers’ manipulation of tree prices. Other marketing activities such as meetings or tradeshows at least provide access to broader information about current markets and tree pricing. Thankfully, the survey data does show a decreased reliance on “phone calls” and increased use of a range of marketing strategies that represent a more proactive marketing plan.

Information from these surveys not only provides insight into planting trends and the effectiveness of different marketing activities but will also guide the promotional efforts of the NCCTA. The relative importance of different activities should not necessarily eliminate a lower-ranked activity but may change the level of investment that the association commits to it. To a great degree, this survey reinforces the commitment already made to keeping the website fresh, engaging, and easy to use and producing quality Buy-Sell and Choose & Cut directories.

#### New Market Regions for NC Fraser Fir

Growers were asked to what new regions they sold their trees. In 2011, almost half of the respondents expanded their local market considerably within North Carolina, Virginia, Tennessee, South Carolina, Georgia and Florida. However, in 2012 market expansion was prominent in areas such as the Gulf States, Central Midwest, Northeast, Northwest, Caribbean Islands, Central America and Canada.

#### **Activities, Goals and Outcomes Achieved:**

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**Professional images and video:** In the original approved grant plan we anticipated creating seven short seasonal video clips produced for inclusion in the NCCTA website. In addition, four longer pieces that cover Fraser fir production, Fraser fir attributes, retail lot selection, and merchandising tips for buyers that can be included in DVD's for both wholesale buyers and media personnel.

To better benefit our needs for media and buyer tools, we produced the video clips based on the following: 10 video clips ranging from two minutes to four and a half minutes: Retail merchandising, choose & cut, Fraser fir lifecycle, Fraser fir attributes, tree care, tree selection tips, different ways to purchase a NC Fraser fir (wholesale, retail lot, choose & cut, mail order, store...), and three seasonal production clips including spring, summer & fall.

These videos and images are accessible for viewing from the NCCTA website. Members can access these links and link the content from their own websites to educate buyers and consumers.

A 22" flat screen television with DVD player was purchased to show images and videos at trade and consumer oriented shows.

Here is a link to seven videos that are currently displayed on the NCCTA website:

<http://www.ncchristmastrees.com/about-real-trees.php>

The NCCTA Executive Committee has requested a few minor modifications to the following three videos at our own expense. We are currently working on those changes. Edited videos will be posted to the website soon. Here are links to the original versions:

<http://youtu.be/G6aP2MIMwnc>

<http://youtu.be/rVK069roy8o>

[http://youtu.be/\\_w7KqITcMuA](http://youtu.be/_w7KqITcMuA)

These professional images and videos will increase the appeal of all NCCTA promotional formats. Advertising and promotion at the NCCTA are designed to drive both wholesale and retail customers to the association website for further information.

**Media kits & survey:** One thousand full color, two pocket folders with business card and DVD insert were printed. Folders will be used to distribute up-to-date articles and information to media outlets, government agencies, community and government leaders, and other interested parties.. Folders will be also be used to distribute retailer DVD's and other relevant information about proper retail care. Folders will be created on an as-

needed basis in appropriate quantities in order to keep contents current and on topic for each audience.

**Development of new media formats:** NCCTA developed a blog in June 2011 as another outlet to educate consumers about real Christmas trees. Over twenty-five posts have been created since its creation.

**Create more visibility for North Carolina Christmas trees in existing markets, and allowing the association to create opportunities for North Carolina growers in new markets:**

The Trade Show and Consumer Education Committee along with Jennifer Greene (NCCTA) planned and organized the following trade show agenda for 2010-2011. One change in the type of shows attended reflected an increased importance placed on consumer shows that provide an opportunity to boost real tree sales in general and have a return for both wholesale and retail market segments. Strong interest at consumer shows has been a bright spot during a period when ornamental nursery trade shows have been particularly lack-luster due to the economy. However, the oversupply of Christmas trees has created a demand for more intense personal marketing strategies for growers. Shows that NCCTA has attended in the past have now become **very well attended** with NC growers/exhibitors making the presence of NCCTA at these shows unnecessary.

Both consumer and trade shows provide valuable “face-time” with consumers and potential customers of NC Christmas trees. NCCTA participated in numerous shows and events throughout the grant cycle:

- NCNLA Green N’ Growin’, Greensboro, NC – January 2011, January 2012 January 2013  
Attendees - 3,500-5,000

Who - Industry professionals/potential wholesale buyers

- Got To Be NC Fest, Raleigh, NC – May 2011, May 2012, May 2013  
Attendees - approx. 85,000

Who - Great opportunity to connect with consumers and educate about the environmental benefits of REAL Christmas trees

- National CTA Convention, Sacramento, CA – August 2012  
Attendees - approx. 250

Who – Industry peers in need of pre-cut trees on their lots and seedlings

- National CTA Convention, Arlington, VA – August 2013  
Attendees - approx. 200

Who – Industry peers in need of pre-cut trees on their lots and seedlings

- Mountain State Fair, Fletcher, NC – September 2011, September 2012, September 2013  
Attendees - in excess of 180,000

Who – Great opportunity to connect with consumers and educate about the environmental benefits of REAL Christmas trees

- Christmas In The Valley, Hickory, NC – December 2011  
Attendees – Approx. 3,500

Who – Great opportunity to connect with consumers and educate about the environmental benefits of REAL Christmas trees

- Southern Christmas Show – November 2011, November 2012  
Attendees - in excess of 100,000

Who – Great opportunity to connect with consumers and educate about the environmental benefits of REAL Christmas trees

- Christmas in July Festival, West Jefferson, NC – July 2011  
Attendees - Approx. 20,000

Who - The annual Christmas in July Festival in downtown West Jefferson was started by Christmas tree growers in Ashe County to highlight the industry and draw outside buyers to see the bountiful Fraser fir in the area.

- North Carolina State Fair, Raleigh, NC – October 2011, October 2012  
The average attendance for the fair is 823,782.

Presence at these trade shows were enhanced with the following items purchased:

- New posters, banners, and signage for pop up display
- Laminated photos were added to the display to depict the different aspects of production, harvest, choose & cut, greenery production
- Larger display areas were purchased to enhance exposure
- 22” LCD Flat screen TV with DVD player to show educational videos and photos

Expanded advertising efforts included:

- A full page ad in Our State Magazine – October 2011, November 2011, October 2012, November 2012, 2013?
- Online run-of-site promotion with Our State magazine – November 2012
- (2) half page ads in seven targeted months of Plant & Supply Locator – 2011 & 2012 - January, April, May, June, July, August, September 2013??
- WSOCTV.com text ads, banner, ads, & rich media ads, November & December 2010, November & December 2011, November 2012
- Garden Center Magazine classified ad for twelve months – 2011
- Full page ad and half page advertorial in the Fayetteville Observer featured in a special “Buy NC” full color insert – July 2011, July 2012
- Half page ad in Southern Living magazine – Nov. & Dec. 2011, Nov. & Dec. 2012
- Half page ad in the Appalachian State University (ASU) football program for 6 home games – September thru November 2011
- On-site tent display at two ASU home games – October 29 & November 12, 2011
- Web banner on [www.GoASU.com](http://www.GoASU.com) – October & November 2011
- Quarter page ad in five targeted issues of American Nurseryman Magazine – June, July August, September, December 2011 & June, July August, September, December 2012 & June, July August, September, December 2013
- Half page ad in target issues of Produce News Magazine – June, July, August 2011 & June, July 2012 & July 2013
- American Nurseryman - Digital “blow in ad” positioned by print ad in the digital edition of American Nurseryman to compliment running display ad in American Nurseryman – August 2013
- American Nurseryman - SPROUT E-newsletter digital ad. SPROUT is published biweekly on the first and third Thursday of each month. 3,600 E-newsletters are sent out twice a month.
- Digital Sponsorship Position on American Nurseryman Magazine Digital Edition - The digital edition reaches out to receive an additional 3,300 page views in the horticulture industry. Extra bonus - digital copies will also be sent to 97,000 +members of Lawn Site along with a digital copy of Turf Magazine.
- The Packer - The leading source of news and information on fresh fruit and vegetable marketing. Circulation includes retailers, produce wholesalers, growers/shippers/packers, foodservice distributors/operators, transportation services and others allied to the field. Print & digital edition subscribers: 13,022 – half page ad, August 2013
- Thepacker.com digital Ad – 15,000 impressions – July 2013
- Packer Daily E-Newsletter – July 29 thru August 5, 2013
- In June of 2011, 100,000 Choose & Cut rack cards printed and distributed by professional distribution services to over 450 locations along I-85, I-40, & The High Country. Rack cards were also distributed at trade and consumer shows and to Chambers and Visitor Centers throughout North Carolina.
- In July 2013, another 85,000 Choose & Cut rack cards were printed and distributed by professional distribution services to over 450 locations along I-85, I-40, & The High Country. Rack cards were also distributed at trade and consumer shows and to Chambers and Visitor Centers throughout North Carolina.

All promotional materials and advertisements drive consumers and buyers to the NCCTA website [www.NCchristmastrees.com](http://www.NCchristmastrees.com) and target wholesale, retail and choose & cut markets.

**Increase the website usage by 25% over the life of the project:**

In 2010, website sessions totaled 206,829 and in 2011 the total number of sessions was 166,982. However, in 2012 website sessions totaled 265,938. After evaluating the numbers, it can be concluded that the spike in sessions in 2010 can most likely be attributed to multiple visits by NC growers and technical web designers and NCCTA staff who repeatedly visited the site to update and edit during a redesign process. When reviewing the website usage increase from 2010 to 2012, it clearly depicts a 29% increase in total sessions.

The total number of pageview's on the site in 2010 was 856,750. In 2011, the total number of pageview's increased to 1,020,211. So even though the total number of sessions decreased from 2010 to 2011, the interest in what was being viewed in 2011 increased by 19%. We believe that this can be attributed to the specific search elements that were added to the website in October 2010 allowing customers to target their searches based on their specific wants and needs. This targeted search results in those farms that meet the needs entered as well as a Google mapping feature to easily contact and/or locate the farm or grower.

Website statistics show an increase in average pageview's per session 2010 to 2012, as well as increase in the average session length, illustrating that site visitors are spending more time on the site and are visiting more pages. This increase may be even more important than the twenty-nine percent increase in number of sessions. Clearly improvements to the website have made it more accessible and useful.

In July 2013, NCCTA placed focus on spending additional awarded grant funds to target wholesale Christmas tree buyers through online advertising promotions with Thepacker.com digital Ad, Packer Daily E-Newsletter, American Nurseryman - SPROUT E-newsletter, and a digital Sponsorship Position on American Nurseryman Magazine Digital Edition. When website stats were compared to May-June, the months of July-August 2013 showed a 27% increase in unique visitors (new visitors) to the site. There was a 37% increase in pageviews per visit and the visit duration (length of visit) increased by almost one minute.

Web stats for 2013 in its entirety, cannot be accurately compared to the previous year's statistics until January 2014.

**Increased usage of NCCTA point-of-sale materials:**

In 2010, two hundred retailer kits were produced and made available to all NCCTA grower members. These materials enhance the brand identity of North Carolina Fraser fir as the "Perfect Christmas Tree", and educate consumers about positive attributes of farm grown Christmas trees, proper tree care and fire safety. Approximately 140 kits had been distributed as of December 31, 2010. A follow-up email allowing any NCCTA grower member to pick up additional kits was sent out on January 5, 2011. Each kit included:

- (1) 12"x18" corrugated plastic "NC Fraser Fir, The Perfect Christmas Tree" signs
- (2) 11"x14" laminated Fraser Fir attribute posters
- (2) 11"x14" laminated Fraser Fir Care Posters
- (25) Real Trees Makes Scents brochures
- (15) Fraser Fir care pads with 50 tear sheets each = 750 Fraser Fir Care Sheets
- (2) 36"x55" Fraser Fir outdoor banners

In 2011, additional point-of-sale materials such as were purchased and made available to all NCCTA grower members and their customers. Approximately fifty kits were mailed in and out of state to retail lots selling North Carolina Fraser fir. A total of two hundred Fraser fir outdoor banners, five thousand "real Tree Makes Scents" brochures, two-hundred thousand tear sheets about tree care (distributed in pads of 50) were distributed in 2011 to growers and their customers selling North Carolina Fraser fir. NCCTA staff used email, mailings and website to promote availability, distribution from the NCCTA office, and materials were made available at association meetings. The increased value of point-of-sale materials to NCCTA members was supported by their elevated ranking in the 2012 over the 2010 grower survey.

**Beneficiaries:**

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Direct beneficiaries include the 1,000+ Christmas tree growers in North Carolina and contiguous counties in Virginia and Tennessee. All of these growers are not claimed as members of the North Carolina Christmas Tree Association, but the vast majority of tree production in these areas is from Association members. Furthermore, any promotion that stabilizes or increases demand for North Carolina Christmas trees will benefit all of these growers over time, regardless of association affiliation.

## **Lessons Learned:**

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Investments made by the NCCTA over the last two and a half years have expanded our promotional impact and website usage has continued to increase. Not only does the association provide a higher quality presence on-line, but the total promotional effort drives potential buyers and consumers to the website. Our goal of increased website use was far exceeded. Grower survey results changed from 2010 to 2012 to reflect this increased focus on using the website to promote North Carolina Fraser Fir. Other investments were just as important, however. Improvements to our trade show exhibit increased its professional appearance and visibility helping to attract contacts at a time when trade show attendance was down. The enhanced ability of the NCCTA to provide point-of-sale materials to members was critical at this juncture in the Christmas tree market when so many growers were struggling to maintain market share. Use of NCCTA point-of-sale materials was an added benefit that members could provide their customers. Additional promotional activities funded through the NCDA & CS Specialty Crops Block Grant have made it possible for the NCCTA to fulfill its mission to the North Carolina tree industry during two of the most difficult years the industry has ever faced. With these investments in our strategic marketing plan, the NCCTA is well positioned to continue promoting North Carolina Christmas trees.

## **CONTACT PERSON**

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**Project Title:** Creating a Commercial Horticulture Information Portal

## **PROJECT SUMMARY**

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The recent economic decline has been a watershed event in the Green Industry. Prior to that time the Green Industry had a revenue of \$8.4 billion and employed over 150,000 workers in North Carolina (2005:Green Industry Council). Declines in housing construction have forced many green industry businesses to close or reduce employee workforce. Remaining employees have reduced travel to professional development opportunities and assumed more responsibilities, which frequently preclude them from participating in formal educational opportunities. There is a current need for reaching these folks with continued training now even as their travel opportunities decrease. Signs of new housing starts, job creation, and slight economic recovery have shown promise for the green industry since many businesses are linked to construction and development. New nursery and landscape business owners, as well as new employees will need horticultural training in a readily available format. Moreover, newly hired extension agents or current agents now tasked with covering commercial horticulture may not have appropriate backgrounds to assist growers. This web portal is a timely and relevant response to the needs of this audience.

To meet these challenges, we proposed to design and develop an interactive information portal targeted directly to commercial nursery, floriculture, and landscape horticulture professionals. It would serve as a clearinghouse of information about production from NC State University and other institutions; contain video and audio podcasts of industry leaders on the topics of quality and business success; and enable interaction between faculty, growers, and extension agents about production challenges.

The proposed portal will be interactive and regularly updated with field interviews of growers, agents and green industry leaders. Annotated videos of various practices that have proven effective at nurseries, greenhouses, or in landscapes will be posted to disseminate “field intelligence” of the green industry. Podcast interviews will highlight leaders of the green industry and give them a chance to share their values with the rest of the green industry. Users will be able to download and listen to narrated power point presentations, which will capture and exploit the efforts of extension specialists and county agents. Presentations delivered in one county can be watched later by constituents in surrounding counties. Prospective graduate students will be able to learn about the green industry in North Carolina, read about previous work in their prospective fields, and remain relevant on current topics. New journal publications on green industry topics from around the world will also be posted so that the site will serve as a clearinghouse for agents, growers and educators.

## **PROJECT APPROACH**

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We obtained a web design company with abilities to construct a content management system. The proposal was sent out for bid through NC State University and Webonobo was selected to build the portal. The web design company chose the content management platform Plone to create the site. With Plone, once the scaffold is created

and the site mapped for navigation, content managers simply upload content, annotate it, and post it. This requires no hyper-text mark-up language (HTML) skills or any other web design skills. Additionally, it reduces the need for hiring other firms to make changes to text, add new content, or change pictures in the future. All of these tasks can now be completed by anyone with one hour of training provided in the on-line management materials contained within the site. This platform allows us to increase the longevity of the site by reducing future maintenance and design costs.

Field voice recordings were made with high quality audio equipment, pictures using an existing program digital camera, and annotated videos were created using the software program Camtasia Studio that publishes video, still pictures, text, and audio together into one video format to be used as a teaching tool.

Extension documents were created or updated by reviewing current literature, visiting growers who are technologically savvy, and collaborating with other extension professionals at professional meetings to obtain current information about various production challenges. The NC State University communications department designed the layout and published the final documents.

## **GOALS AND OUTCOMES ACHIEVED**

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All three co-authors worked closely with the web designers and created a unique web presence for their commodity to convey extension information, video content, relevant news and current events. All three information portals became fully functional on July 31, 2012, which was about a month past the expected date of introduction. This delay can be attributed to both the need to obtain a professionally qualified design firm and to the bid process necessary at NC State University to obtain a company to complete work of this scope. Additionally, the sites have been updated and edited numerous times since introduction, and refinements are designed to be ongoing.

The websites

<http://nurserycropscience.info>  
<http://landscape.nurserycropscience.info>  
<http://floriculture.nurserycropscience.info>

were created as a resource for Cooperative Extension agents, growers, graduate students, and other professionals to learn, locate information, and stay current with issues affecting their industry in North Carolina.

They are also meant as a first point of contact for new agents or growers to become familiar with a particular nursery or floriculture production topic or landscape issue. The site layout allows visitors to read articles based on their depth of interest, watch a video or listen to a podcast, or look at photographs to gain a broad understanding of the topic. The sites are separated into major issues challenging the nursery, floriculture, and landscape industry, for example, on the nursery crop science site the issues are substrates, water, integrated pest management, (business) management, propagation, and cultural practices. Each of these categories has sub-categories that further separate the issues

into smaller challenges in order to provide broad content in that area. For example, “Water” has subcategories of source water quantity; source water quality; irrigation system design and management; and filtration and treatment. Each section has a number of articles, videos, and extension content to help agents and growers become familiar with the topic and learn current techniques at their own pace.

Since introduction, nurserycropscience.info has had 1119 unique visitors that stay approximately three minutes and view about three pages of content. According to google analytics, about 88 per cent of visitors are new to the site, which means we are reaching new users all the time. However, the 68% bounce rate indicates that some folks are going to the site, but do not go past the first page and return to their previous search engine results. Using these numbers we could say that there are at least 350 people  $[1119*(100\%-68\%)]$  engaging the site out of necessity. It is still early in the introduction phase of the finished project and these numbers are encouraging us to reach our goal of 2000 unique visitors and 200 visits a month.

The content populating this site has been contributed by the co-authors and a number of research and extension specialists. Anthony LeBude, in collaboration with a research specialist and faculty from three universities, recently published the NC Cooperative Extension document “Preparing Nursery Crops for Winter in the Southeast United States” that combined resources of four states to meet an issue challenging an entire region. The document recently won the “Extension Communications Blue Ribbon Award” from the Southern Region of the American Society for Horticulture Science. In total, the co-authors of the grant produced or updated nine extension publications, which was four more than the expected outcome.

In collaboration with Dr. Charles Safely, an agriculture economist at NC State, LeBude updated production budgets for field production of three common plants in North Carolina. The excel spreadsheets offer examples of costs associated with producing these plants on a 20 acre scale, and also provide linked spreadsheets for growers to input their own costs to determine their pricing and revenue projections. Additionally, there are sheets to calculate insecticide, fungicide, and herbicide costs applied to each crop organized by pesticide. This allows growers to input their costs for the pesticide and track per tree how much is being spent on pest management. These downloadable, free documents meet the expected outcome and are posted on the tab “Management > Costs, Budgets, Pricing, Finance.”

Anthony LeBude produced three videos at 35 total minutes, Brian Whipker seven at 53 total minutes, and Barbara Fair one at 7 minutes for a total of 93 minutes of video posted across the three sites. The proposed outcome for video was 30 minutes of professionally produced video and five podcasts. We have met the expected outcomes for this endeavor, however, there were some externalities associated with this approach discussed in the Lessons Learned section below.

Many advances in social media have been made since the proposal was submitted in 2010 that make reaching target audiences easier without encumbering paid advertisements. A portion of the proposal was to mail out surveys and fliers and secure advertisements in various media outlets to promote the new websites. We are still in the process of a thorough introduction but we do not foresee needing to expend the

advertising budget in order to reach our target audience using all those methods. For example, the North Carolina Nursery and Landscape Association (NCNLA) published an article in the January/February 2013 edition of their trade publication “Nursery Notes” for free. They also e-mailed their member list-serve. This should reach about 2500 green industry members of the organization, which comprises the bulk of our target audience in North Carolina. Anthony LeBude made several presentations at the NCNLA Green and Growin’ Show in January 2013, the Caldwell County Nurserymen’s Association in Lenoir, NC, in February 2013, and at Meyland Technical Community College in February 2013 about the new website for the green industry. An e-mail advertising the new resources was sent to the state master list serve for County Extension agents with horticulture responsibilities. This list contains all the target audience for Extension agents. A Cooperative Extension agent in the western part of North Carolina has a list serve of green industry businesses that might not be members of NCNLA and an e-mail is being sent via that service as well. He has also posted the websites on his NC Cooperative Extension facebook page.

## **BENEFICIARIES**

A survey to determine the usefulness and ease of navigation for potential users was sent in December 2012 to all commercial horticulture extension agents in North Carolina. It can found on-line at <<http://go.ncsu.edu/nursery.crop.science.survey>> and has been completed by 25 respondents. The questions and most relevant responses are in Table 1.

Table 1. Questions and condensed answers to a survey of users of [nurserycropscience.info](http://nurserycropscience.info). (n=25)

<b>Survey Questions</b>	<b>Condensed answers</b>
1. Please provide your thoughts about the ease of navigation within the site, presentation of information, layout, and content.	Navigation seems pretty straight forward; layout of information is good; text could be larger; once I figured out to use the top tabs for navigation, it was easy.
2. What other factors or challenges to nursery production need to be included in this website?	Record keeping and marketing; Pest identification keys; vertebrate pest control; energy, environmental challenges, plant breeding and selection;
3. Besides primary, secondary and tertiary documents, photos and videos, is there another form of information delivery we are missing?	What is there seems very limited, especially in the area of pest and disease identification and management. Perhaps because this information is located within other depts. (entomology, pathology) however, there must be a way to integrate across departments.
4. Thinking back to your most recent two or three challenges about nursery production that you had to solve, would this website have provided information about one of the issues?	Yes (issue is present and material sufficient)-13; No (issue is present, but material insufficient)-2; Issues are not on this website currently-3; Other-1, I actually shared some of your publications with other agents recently;

<p>5. As a Cooperative Extension agent what top 3 items do you feel are most valuable to you on the site?</p>	<p>Production information, videos and publication search; Substrate-watering-nutrition- IPM; videos, the publications, and the list of the Ornamentals Working Group faculty.</p>
<p>6. Your input is very valuable because you are the target audience of this website. Please provide any suggestions for content, organization, or design of the new website that we can use to guide our efforts.</p>	<p>Keep adding up to date content, not information from 40 years ago; Larger font on the resource listings, and summary info on each page to provide context; Pruning videos seems to be a deficiency; Having a comprehensive disease and insect key would be great</p>

Overall respondents agree with the layout and usability of the website and spoke favorably of the content on the site. Many could have used the information on the site to solve a recent problem with a client. There were some issues that need to be addressed such as plant breeding and evaluation. We provided a link to that information under the references tab in order to provide a greater treatment of the subject and separate out plant material from plant production. These two important components of the green industry really deserve separate sites devoted to each subject. Moreover, there was a information missing for plant pathology and entomology. These aspects of plant production are sometimes inseparable from the activities of nutrition, water and substrate and one can affect the other in terms of deficiencies and toxicities, plant growth, drought or over watering and incidence of disease or pest outbreaks. Currently there is a question key to determine which pests might be causing the symptoms present on plants, and there is identification information for specific sets of pests, e.g., scales, beetles, *Phytophthora*, etc., but there is no top level key encompassing everything at once. We have added more content under the IPM tab to meet these challenges and this process is ongoing, especially for insect identification. This is a large field of study and new treatments are published regularly with a nursery only focus that reduces the number of pests an extension agent must be able to practically field-identify. This section is going to be a continuous process as is the website itself. The participants want frequent updates and this websites allows that to happen.

## LESSONS LEARNED

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Our initial outlay for web design was three times less than the actual cost of the service so we obtained a budget revision. Over time, however, this initial high investment will be recouped by less costs associated with service and maintenance. Additionally, the new system will allow us to increase relevancy and timeliness of posting information by inhibiting delays associated with hiring web maintenance firms after the grant period has ended.

As a result, the funds earmarked for professional video production were moved into web design services to defray the cost. Subsequently, the co-authors have produced additional videos and podcasts to exceed the initial proposed video outputs. Creating the video content has been challenging since it requires some special design skills, new technology,

and software applications; however, it has proved an invaluable resource since it is a great way to convey complex information in an illustrated format that allows respondents to experience another learning style besides reading. Additionally, much of the content conveyed to agents for training requires graphs, illustrations, tables, and figures containing complex data requiring careful interpretation. Producing videos ourselves with the intent of teaching to others has increased our understanding of the subject matter and allowed us to take the perspective of the person learning.

## **CONTACT PERSON**

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**Project Title:** Local Produce Safety Initiative

**PROJECT SUMMARY**

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The Local Produce Safety Initiative (LPSI) was a project to enhance the competitiveness of North Carolina specialty crop producers that serve the growing market for locally-grown fresh fruits and vegetables. Small farms serving the local food market are committed to protecting their customers' health. Protecting customers from pathogen contamination is a business imperative for these producers, as a contamination incident is easy to trace in direct market relationships and destroys a producer's reputation among its small customer base. Pending federal food safety legislation will also increase regulatory compliance mandates for these producers. However, most published guidances and audit regimes for on-farm produce safety are designed for the needs of large-scale produce operations that market through regional and national wholesale channels, and are often in conflict with the on-the-ground realities of small, diversified, low-input and socially disadvantaged produce farms.

The LPSI addresses this problem by (1) identifying the best management practices that these farms currently use to reduce the risk of pathogen contamination, (2) working with researchers to validate the effectiveness of those best management practices, and (3) disseminating information about those practices to the state's small produce operations. Further, the LPSI cooperated closely with and complement the work of the North Carolina Fresh Produce Safety Task Force.

LPSI was funded by the North Carolina Specialty Crops Block Grant Program and a Community Reinvestment Grant from the Rural Advancement Foundation International (RAFI). Through this combined funding, CFSA 1) conducted research on existing food safety practices and barriers for adoption of USDA Good Agricultural Practices (GAPs); 2) provided direct technical assistance and cost share assistance – funded by the Community Reinvestment Grant from RAFI – to small farmers to aid them in completing GAP certification; and 3) developed a guidance manual on proven, cost-effective, scale-appropriate GAPs for small farms, in cooperation with the NC Fresh Produce Safety Task Force.

For the first time, small, diversified farms were given a clear roadmap for how to achieve GAP certification in a cost-effective manner that meets the needs of buyers and that is appropriate for the economic situations, cultural conditions, and farming practices of those farms. Availability of these guidance materials and trainings enables small farms to enter new wholesale and institutional markets, and to preserve existing markets that may impose GAP certification requirements in the future.

**PROJECT APPROACH**

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CFSA worked with NCSU food science researchers to 1) conduct research and outreach with North Carolina's small farm community and Cooperative Extension personnel to identify the best management practices to reduce the risk of pathogen contamination; 2) validate the effectiveness of those best management practices; 3) develop

recommendations and training materials for farmers on those validated practices and identify issues for further research to promote food safety on small farms; and 4) disseminate findings and tools to the state's small produce operations and Cooperative Extension personnel.

## **GOALS AND OUTCOMES ACHIEVED**

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The two major goals of LPSI were to develop a research-based, guidance manual and provide trainings on that manual to both farmers and extension agents.

**Goal 1:** Develop and publish guidance manual on proven, cost-effective, scale-appropriate "whole farm" GAPs for small farms, in cooperation with NCFPSTF. The guidance should be made available via on the internet free of charge, and should be downloaded by 600 growers during the term of the proposal.

**Outcomes Achieved:** CFSA successfully achieved Goal 1 by 1) developing GAP audit tools and guidance manual for small farms, based on research and direct experience of farmers and 2) modifying existing GAP audit tools and guidances to reflect validated small farm pathogen control practices. LPSI offered a GAPs resource page to disseminate tools and guidances to growers. Of the two year duration of the project, the website was visited by over 6,200 unique viewers.

Attached is the draft CFSA GAPs Audit Manual. We will make final edits on flow and graphic layout over the next month and then post to the CFSA website. We expect the manual will be posted to the website in April 2013. As noted below in "Lessons Learned," development of GAPs Audit manual was delayed because of 1) delays in farms' audit schedules and 2) time intensiveness of translating the material into laymen's terms. We will monitor the number of views of the GAPs Manual on the CFSA website and report data in progress reports to NCDA for LPSI II.

To ensure that the guidance documents were research-proven, CFSA completed the following research activities:

### Food Safety Practices for Small Farms

- Conducted literature review, met w/NCFPSTF members, identified primary areas of concern for on-farm food safety practices on small farms, and identified successful small farmers with demonstrated expertise in pathogen-control best management practices.
- Conducted 2-4 visits with 12 participating project farms to identify the best management practices that these farms currently use to reduce the risk of pathogen contamination, and catalog challenges from the experience of project farms in complying with GAP audit requirements and in managing pathogen contamination.
- Worked with NCFPSTF personnel to identify validation measures for pathogen management practices identified in farm visits, develop plan to quantify costs of those practices, and identify areas for additional research.
- Completed economic impact interviews, including questions on the following topics:
  - Drafting food safety manuals

- Time to complete and difficulty with various GAP components, logs, and records
- Time spent on documentation (i.e. monitor cooler temperature)
- Costs incurred to meet requirements of GAP components (i.e. fencing to keep out wildlife)
- Benefits and profits as a result of GAP certification

Audit Process for Small Farms

- Awarded cost share for GAP audits to 10 farms, with funds from RAFI. Two of the twelve farms declined participating in the USDA GAP audit process.
- Worked one-on-one with farms to discuss food safety manual and offer assistance to become audit ready.
- Conducted pre audit visits and audit walk-throughs for 4 farms to verify all policies and logs were in place.
- Assisted 7 farms create a food safety plan.
- Trained 10 farms on how to apply for NCDA cost share for a GAPs audit; 3 farms secured NCDA cost share.
- Three farms completed USDA GAP audits and others farms are in various stages of the audit request process.

**Goal 2:** Provide training on scale-appropriate on-farm produce production safety practices, based on the new guidance manual developed under Outcome 1, to 200 small farmers growing fresh fruits and vegetables for the local food market and 25 extension agents during the two-year term of the proposal.

**Outcomes Achieved:** CFSA successfully achieved Goal 2 by 1) conducting 5 full-day workshop across the state on whole farm GAPs for small fruit and vegetable producers and extension agents; 2) conducting 2 separate trainings at the CFSA 2012 Sustainable Agriculture Conference; and 3) presenting project findings to various working groups and ag forums/associations.

Training workshops

CFSA collaborated with NCSU to present 6 full-day workshops on whole farm GAPs for small fruit and vegetable producers and extension agents. In total, these workshops reached 172 participants: 145 growers and 27 extension agents.

Date	Location	# of Participants
10-26-12	SAC 2012 pre-conference workshop	<b>19 total</b> -14 growers -5 extension agents
10-27-12	SAC 2012 training session	<b>19 total</b> -15 growers -4 extension agents
11-7-12	Strawberry Expo Workshop	<b>11 total</b> -7 growers -4 extension agents
11-19-12	Pender County	<b>12 total</b> -11 growers

		-1 extension agent
11-30-12	Richmond County	<b>14 total</b> -11 growers -3 extension agents
12-4-12	Buncombe County	<b>30 total</b> -29 growers -1 extension agent
12-12-12	Chatham County	<b>67 total</b> -58 growers -9 extension agents

Project Updates & Presentations

- Participated in monthly meetings of NCFPSTF and its relevant working groups to update NCFPSTF partners on project progress and findings
- Presented project activities at the NC Dept. of Agriculture and Consumer Services Food Safety Forum in 2011.
- Presented project results at the International Association for Food Protection Annual Meeting:  
 Kreske, A., Gunter, C., Ducharme, D., McReynolds, R., and Chapman, B. 2012. Opening Markets: Identifying barriers and developing guidance for GAP certification. International Association for Food Protection Annual Meeting, July 24, 2012, Providence, RI
- Presented project results at the NC Dept. of Agriculture and Consumer Services Food Safety Forum in September 2012.
- Presented project results at the annual meeting of the Carolina Association for Food Protection, Sept. 13, 2012.

**BENEFICIARIES**

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The beneficiaries of this project are the state’s 3,740 vegetable farms, which average 31 acres, and 1,349 fruit farms, which average under 10 acres. One hundred and forty-five growers received direct education and training on scale-appropriate on-farm food safety practices during the two-year term of this proposal, and over 2,500 individuals accessed materials from the web.

**LESSONS LEARNED**

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The audit scheduling stage of this project required farmers to submit a completed food safety manual along with their audit request. Anticipating time conflicts, we advised and continually encouraged farmers to complete their food safety manuals in the off season. Some farmers were successful in heeding this advice, others were not. We have documented these challenges as part of our formal research and will address these barriers (and strategies to overcome this barrier) in both our training materials and workshops.

The economic impact interviews were completed after farms had prepared for a GAP audit. To be able to gather information on the cost of implementation of GAP components, farmers first had to complete the audit. As GAP audits were delayed, as mentioned above, interviews were also delayed.

Delays in the farms' audit schedules also slowed progress on development of the guidance manual. In addition, drafting the manual proved to be more difficult than expected, chiefly due to the need to translate the material into laymen's terms. As several extension agents pointed out to us in the course of our research and trainings, most on-farm food safety guidance for farmers is too academic, and insufficiently practical to actually help small farms move toward GAP certification. So we spent a significant amount of time—more than initially expected—in refining the language and structure of the guidance manual to ensure it will achieve the goal of providing hands-on, real world information on achieving USDA GAP certification. Investing this additional time was essential to producing a quality document.

We had some challenges recruiting sufficient farmer participation in the training workshops in more rural counties (Pender and Richmond), despite outstanding assistance from local extension offices in publicizing these events. If we had concentrated all our trainings in urban/suburban counties we would likely have met or exceeded our goal of reaching 200 farmers through our trainings.

We learned that establishing relationships with NCDA grading and inspection services staff was critical to the success of this project because so much of the application of GAPs rules to any individual farm varies based on individual inspectors' interpretations of those rules. Variation exists at the auditor level, and even the training that inspectors receive admits of grey areas in the interpretation of particular standards and scoring protocols. Continued future efforts by CFSA and our partners, as well as any other entities that would seek to address the challenge of applying GAPs in the context of small-scale, diversified farms, will depend for their success on continued engagement with USDA GAP inspectors, and should possibly encompass incorporating the materials developed in this project into the trainings that those inspectors receive.

## **CONTACT PERSON**

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## **ADDITIONAL INFORMATION**

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<http://gapsmallfarmsnc.wordpress.com/>

**Project Title:** Increasing Sweetpotato Consumption, Competitiveness, & Nutrition Knowledge.  
*Previously approved final report*

## PROJECT SUMMARY

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The objective of this project was to conduct a comprehensive, all-inclusive literature review using numerous databases including the past, present and future roles of the sweetpotato (*Ipomoea batatas* L) in human nutrition and health.

Sweet Potatoes are considered a healthy, “good for you” vegetable however per capita consumption lags other nutritious and popular vegetables. Knowledge about the specific healthfulness of sweet potatoes, their linkage to local growers, and how this nutrition benefits children and adults is lacking and needs increasing.

Specific Issues: Despite the broad perception, supported in part with facts, that sweet potatoes are considered a healthy and nutritious vegetable, consumption lags other highly nutritious and popular vegetables. [Average per capita consumption of the “10 Most Nutritious Vegetables” is 13.9 pounds per year as noted in HealthMed.com, sweet potatoes are at 5.0#/yr/p, 5<sup>th</sup> place; sweet potatoes did not make the “Ten Most Popular Vegetables” as judged by Foodreference.com].

Project Importance: This research proposal will develop and test the most supportable health claims which will be refined into consumer communication programs with proven likelihood to increase child and adult nutrition knowledge and consumption of sweet potatoes. This in turn will benefit both consumers and the states sweet potato growers.

This project has researched, summarized, and scientifically evaluated worldwide literature for the purpose of creating multiple educational messages for implementation by the NC Sweet Potato Commission.

## PROJECT APPROACH

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At the onset of the review, it was expected that most previous research had been laboratory based, primarily consisting of compositional studies and some in vitro bioactivity. However, any previous in vivo research (especially clinical/human trials) was prioritized in this meta-analysis. Collected literature was reviewed, summarized in a tabular format to include the study design, number of subjects, dosage of sweetpotato administered, outcomes assessed and the overall findings, to the extent that these data points were available in the literature citation.

A review of these findings focused upon separating those health benefits that are sufficiently vetted to allow consumer communications from those requiring further analysis and research before consumer discussions would be appropriate. Six messages with health related benefits were professionally honed into educational [marketing] messages and tested with 506 consumers of the mid and south Atlantic region to validate consumer interest in the healthful messages and measure purchase intent.

Additionally, a comprehensive review was conducted to define the sources [NC or otherwise] used by retail and foodservice purchasers of sweet potatoes in the southeastern US such that an educational campaign linking NC sweet potatoes with the local foods initiative can be created.

## **GOALS AND OUTCOMES ACHIEVED**

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This project had two principal goals; the first being to research the available worldwide literature regarding the health benefits of sweet potato consumption and the second being to create a clear linkage between the local foods initiative [Farm to Fork], sweet potatoes from NC growers, and increased sweet potato consumption within NC and the southeastern US.

Goal 1:

The project began 1/31/2011.

Two sources were initially considered for the literature review and upon completion of a proposal review and interviews; Dr. Lila and team were selected due to pricing, proximity, relevant knowledge, access to other researchers and past research efforts that were closely tied to the current need.

Dr. Lila conducts the worldwide literature review. The worldwide literature meta-analysis, conducted at the North Carolina Research Campus by Dr. M. Lila and team, comprises a comprehensive search in all applicable databases (electronic web-based resources fully available to NCSU faculty, and also NAPRALERT database available through University of Illinois Functional Foods for Health Program). In addition, professional contacts were conducted with collaborators in New Zealand and Asia, associated with sweetpotato (a.k.a. kumara) research. These include collaborators at Plant & Food Research Ltd., Crown Research Institute, and Massey University, Palmerston North, NZ, as well as various institutions in Japan and Brazil.

Outcomes have been tabulated in the form of an Excel spreadsheet, organized by year of publication, from 2011 back to older reports. A list of definitions and acronyms is included. Binders (4) containing reprints of the key articles were compiled. Also developed was a references list, organized by last name of author, alphabetically.

A brief synopsis of the highlighted health-protective properties of sweetpotato follows.

The antioxidant properties of sweetpotato are one of the two general mechanistic properties relevant to a broad spectrum of human health conditions. The evidence positions sweetpotato as a strong contender in terms of antioxidant capacity and ability to scavenge free radicals in the human body after consumption. The AO capacity is

demonstrated as the mechanism by which sweetpotato can combat human cancers (see below) as well as CVD, cognitive function, and diabetes-related pathologies. Anti-inflammatory capacity has also been firmly established for sweetpotatoes (see below), and represents a biological mechanism of action relevant to a wide range of human pathological conditions including metabolic syndrome and infection.

The following topics from the full meta-analysis *highlight* the most compelling research findings:

Anti-inflammatory properties and attenuation of oxidative stress:

- Evidence indicates that sweet potato's constituents can protect the body against the damage produced by gamma radiation.
- Results indicate that purple sweetpotato anthocyanins have antioxidative activity in vivo as well as in vitro.
- The anthocyanins in purple sweetpotato possess excellent reducing power.
- Thus, these phenolic components have potential value as chemopreventative materials for human health
- This study provided novel insights into the mechanisms of purple sweetpotato anthocyanins in the protection of the liver.
- Purple sweetpotato color ameliorates cognition deficits and attenuates oxidative damage and inflammation

Amelioration of neurodegenerative diseases:

- Anthocyanin prepared from purple sweetpotato exhibits memory enhancing effects, which may be associated with its antioxidant properties. This supports the evidence that indicate that sweetpotato anthocyanin can improve memory and cognitive abilities.
- In other words, sweetpotatoes contain constituents that may protect brain health, by inhibiting neurodegeneration.

Anti-diabetic properties:

- Almost all antidiabetic activity was found in the cortex of the potato. The active component was presumed to be an acidic glycoprotein.
- These observations support the usefulness of white skinned sweetpotato for the health care of individuals with impaired fasting glucose and mild type 2 diabetes mellitus.
- Sweet potato has glucose lowering potency and can be regarded as an effective compound in the treatment of type 2 diabetes.

Both metabolic and epidemiologic data indicated that substitution of high glycemic index with low glycemic index carbohydrates can reduce the risk of type-2 diabetes. This in turn will improve glycemic control and reduce hypoglycemic episodes among those treated with insulin.

### Cardiovascular diseases

- Batata glycoprotein can inhibit atherogenesis, and the degree of the health benefit effect correlates with the amount of added batata glycoprotein.
- Habitual intake of Ayamurasaki purple sweetpotato as food is purported to prevent lifestyle- associated diseases and reduces the risk of atherosclerosis in humans.

### Anti-cancer/anti-tumor properties

- Results showed the potential anticancer activity of sweetpotato leaf constituents.
- A reduced risk for lung cancer was found to be associated with increased intakes of vitamin A,  $\alpha$ -carotene, and  $\beta$ -carotene.
- Sweet potato leaves associated with the reduced risk for lung cancer.

### Immunomodulatory:

- Consumption of purple sweetpotato leaves modulated various immune functions including increased proliferation responsiveness of peripheral blood mononuclear cells, secretion of cytokines IL-2 and IL-4, and the lytic activity of NK cells.

### Vitamin A-deficiency:

- A simple deficiency of vitamin A is the leading cause of childhood blindness in developing countries.

The marketing message development process is initiated. Following Dr. Lila's activity, Lewis & Neale, the NCSPC agency, used the comprehensive summary provided to fully develop six health related benefits into professionally honed educational [marketing] messages. L&N reviewed the research analysis to identify key health nuggets which were vetted through a review panel composed of health editors, educators, registered dieticians, and consumer affair directors.

The marketing message development output was reviewed with the NCSPCF, refined, and approved for next steps. L&N then refined the vetted health messaging into compelling and supportable educational [marketing] messages.

In order to validate the marketing messages with consumers and define consumer purchase intent L&N used the output from above by employing an on-line survey among 506 sweet potato consumers in the mid and south Atlantic region. Consumer research was conducted in such a manner to aid in determining which messages are the most appealing/interesting to the respondents and heighten their interest in purchasing sweet potatoes based on the messages.

The conclusions of this important research effort were presented along with recommendations, discussion of purchase intent, and proposed next steps. Key findings of this research are as follows:

- Sweet potatoes are widely believed to be healthy, easy to cook, and taste good.

9 in 10 agree that sweet potatoes taste good, sweet potatoes are healthy, sweet potatoes are very nutritious, easy to cook, and can be prepared a variety of ways.

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- Sizable minorities believe some misconceptions about sweet potatoes.
  - 4 in 10 think sweet potatoes are a winter food, one-quarter see them as “fancy” food, and 1 in 5 think they are only for Thanksgiving.
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- Baked and mashed are the most popular preparations.
  - Avid cooks are more likely to prepare sweet potatoes more ways
- “Good source of fiber” and “high in antioxidants” are the most successful nutrition statements among the six tested.
  - “Good source of fiber” performed better across all metrics – believable, relevant, and likely to purchase – than “high in antioxidants.”
    - Ratings for both were not very strong, suggesting that the statements could benefit from additional development
  - The other four nutrition statements all had a negative reaction
- 
- 
- “Healthy!” was the most successful POS message.
  - “Sweet Potatoes: Healthy!” was much more effective at inducing purchase interest than the other two messages.
  - “Sweet Potatoes: For the grill!” performed poorly. This message did better among men, but was still the poorest performing message.

## Recommendations and Next Steps

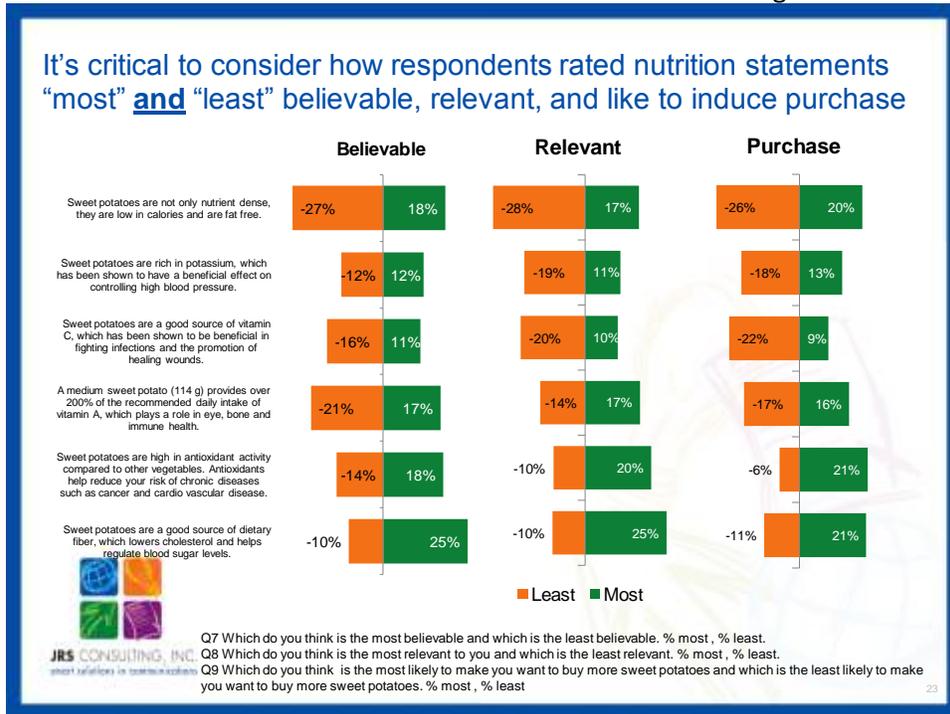
1. Develop communications that position sweet potatoes as more of an “everyday,” year-round food to overcome some current perceptions as “winter food,” “fancy” food and “only for Thanksgiving.”
2. Educate consumers about how to cook and serve sweet potatoes, as these were among the leading barriers to usage.
3. Offer sweet potato recipes/preparation suggestions to all consumers to encourage more frequent usage. Particularly target “avid cooks” with these recipes, since avid cooks’ usage is highest and they are already engaging in a wider variety of cooking methods.
4. Consider offering recipes/suggestions for grilling sweet potatoes since fewer respondents do that now and grilling may focus attention on non-winter eating occasions, combating the current perception that sweet potatoes are a “winter food.”
5. Work to further develop “good source of fiber” and “high in antioxidant” nutrition messaging. These two performed best of those tested, but their ratings indicate room for improvement. Consider supplementing with information combating information such as “not just for Thanksgiving.” In addition, support current beliefs that sweet potatoes are delicious, nutritious and easy to cook.
6. Within your message development, consider leading with the nutritional information that was most positively received (“good source of fiber” and “high in antioxidant”), and introducing the other nutritional claims in future communication. Consider using an expert resource, i.e. physician or nutrition professional, to add credibility to claims perceived less positively by respondents.
7. Consider “avid cooks” to be heavy sweet potato users, since 72% of them currently prepare them at least once per month compared to 42% of others.
8. Proceed with “Sweet Potatoes: healthy!” for POS messaging.



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Purchase intent was quantified by the research as to what statements were more or less likely to induce purchase.



Next steps with this research results have guided NCSPC activities in working the messages into consumer outreach and have formed the basis of added foodservice and consumer outreach efforts.

**Goal 2:**

The project begins in February 2011. The goal of this phase of the project to being to create a clear linkage between the local foods initiative [Farm to Fork], sweet potatoes from NC growers, and increased sweet potato consumption within NC and the southeastern US.

In developing the survey, survey techniques and listing of companies in southeastern US it is learned that limited publically available data exists detailing the specifics of supplier to customer relationships for sweet potato sales to retailers and foodservice chains. This is understandable as it is a confidential and contractual relationship in which the competitive nature of the process causes discussion about who buys from whom to be guarded. Not surprisingly the Marketing Department of the NC Department of Agriculture & Consumer Services could offer no insights; similarly the retailers and foodservice accounts would not reveal their supply arrangements.

A review and compiling of data from earlier "locally grown" test results was not of sufficient statistically depth to be more than generally helpful. The prior tests had been informally conducted by various entities and were conclusive in that consumers expressed a strong preference (85%) for locally grown produce, However, "local", it

North Carolina Targeted Businesses Interview Summary  
 was learned conveyed various meanings ranging from grown nearby to not grown in another country.

The foodservice and retail survey of sweet potato sourcing was adapted to the reality of limited public data.

Thus the technique deployed was interviews with five large NC grower/packer/shippers which collectively ship over 50% of North Carolina's sweet potatoes to all market channels. They were presented with a listing of southeastern retailers and foodservice chain accounts and asked if the noted company to their knowledge used only NC sweet potatoes (with no request for the name of a specific supplier). The answers were compiled into a composite view as presented below. For the retail accounts, if the company did not use 100% NC sweet potatoes, they were asked their opinion of what other regions supplied that company. While the same opinion was sought for foodservice accounts, the data on "supply by other region" was not viewed as consistent for foodservice and has not been included.

The survey results were compiled as follows:

**Retail Survey Results:**

Listing of supermarkets with locations in the southeastern US:

Name	Approx # of locations	Uses 100% NC Sweet Potatoes (Yes/No)	If not 100% NC; what states are sweet potatoes coming from? If known please list
Kroger	3619	Approx 50%	LA
Sav A Lot	1200	Yes	
Food Lion	1169	Approx 75%	MS
Publix	1042	Yes	
Aldi	1000	Approx 50%	
Sam's Club	602	Approx 25%	LA
Costco	425	Approx 60%	CA/LA

North Carolina Targeted Businesses Interview Summary

Stop & Shop	355	Approx 50%	
Whole Foods	310	Approx 75%	
Bi-Lo	207	Approx 50%	LA/MS
Harris Teeter	205	Yes	
Ingles Markets	201	Approx 75%	MS
BJ's	180	Yes	
Topco	131	Yes	
Wal-Mart Super Centers	124	Approx 20%	GA/LA/AL/TX
Lowes Foods	110	Yes	
The Fresh Market	107	Yes	
Kash & Karry	98	Varies	
Piggly Wiggly	96	Yes	
Target Mini Super Market	85	Approx 50%	MS/LA
Wegmans	79	75%-100%	
Bloom's	65	Yes	
IGA (includes Charlie C's)	64	Yes	
DG Markets (Dollar General)	57	None	
K Mart Super Centers	29	Not sure	
Winn Dixie	29	Yes	
Carroll's Foods	27	Not sure	
Scott's Galaxy Foods	16	Yes	

Bo's Supermarket	11	Yes	
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### Foodservice Survey Results:

Listing of southeastern and central US foodservice chains known to use fresh sweet potatoes:

Name	# locations	Uses 100% NC Sweet Potatoes (Yes/No)
Black Eye Pea	44	Yes
Coltons	27	Yes
Cracker Barrel	597	Yes
Fatz	47	Yes
Golden Corral	484	Yes
K & W	35	Yes
Logan's	973	Yes
Longhorn	350	Yes
Morton's	389	Not sure
Outback	964	Approx 75%-100%
Ruth Chris	261	Not sure
Ryan's	200	Approx 75%-100%
Sagebrush	24	Approx 75%-100%
Saltgrass	44	Yes
Santa Fe	20	Yes
Sirloin Stockade	50	Not sure
Smoky Bones	68	Yes
Sonny's BBQ	138	Yes

Texas Roadhouse	481	Yes
Texas Steakhouse	29	Yes
The Capital Grille	23	Yes
Western Sizzlin'	100	Local Purchase

The opportunity for expanding NC sweet potatoes market share is driven by several factors including availability, pricing, quality, and competitive intrusion where NC's shipment patterns about those from another growing region. Stated differently, NC has a dominate position based upon brand share:

- For the Retail supermarkets, totaling 11,733 locations for the accounts noted, North Carolina shippers appears to have about a 64% brand share.
- For the Foodservice chains, totaling 5,348 locations for the accounts noted, North Carolina shippers appear to have about an 81% brand share.

In theory, the NC sweet potato industry could achieve added growth in retail by moving upward from a 64% market share. Each 5% addition in retail market share would add about \$6.5 million in sales. Similarly for foodservice with an 81% market share, each 5% increase would generate approximately \$1.3 million in sales.

By contrast, on a nationwide basis, each 1% of added consumption brings about \$36 million added farm revenue. Since NC does about half the US crop it can be said that achieving a 1% increase in consumption brings \$18 million to NC farmers.

The creation of an educational data base with marketing themes for use by the NCSPC will result from the foregoing activities coupled with the following suggested next steps. Leveraging the information learned in conjunction with several pertinent prior and current research initiatives allows the continuing development of marketing themes for use by the NCSPC. Several key research elements that will assist include:

1. Increasing retail store sales of NC sweet potatoes through simple signage additions in the produce section during off-peak times. (This inexpensive work was done with Lowes Foods and demonstrated impressive sales bumps for signage only displays featuring "locally grown" and 'good on the grill".)
2. Increasing retail store sales of NC sweet potato sales through "good on the grill" demos to hike sales during off peak times. (This demo was developed and deployed with Lowes Foods featuring in store grilling of slices on an electric George Foreman type grill.)
3. Healthful connections linking relevant worldwide research with messages believable to consumers will boost retail and foodservice usage with focused communications.

4. North Carolina has the most and best crop storage facilities in the US. Good control over crop storage results in tastier, better appearing sweet potatoes for both retail and foodservice applications. While this is not top of mind to consumers directly, this is critically important information to retail and foodservice buyers who are (or should be) concerned about the year round quality of their produce. During 2012 a comprehensive survey will be conducted with NC grower/shippers to provide advice on maximizing quality from their facilities.

The conclusions and recommendations focus upon the many strengths of the NC sweet potato industry gained through many years of effort. The North Carolina sweet potato industry, as the largest shipper to the US markets, has the potential to benefit its growers through a combination of “pull” and “push” marketing and brand management techniques. The “pull” approach works by engaging consumers directly and encouraging them to expand usage of sweet potatoes purchased at retail for in home usage or at foodservice when dining. Elements that assist this technique include disseminating relevant and focused health benefit information and alternate recipe and menuing ideas. The “pull” approach has as a downside the potential encouragement of consumption of sweet potatoes, not just of North Carolina origin. However given that NC provides nearly 50% of the US supply and a higher % closer to the southeast, NC will proportionately benefit from any added sweet potato consumption. The “push” approach will be helpful gaining added sales and distribution through educating retailers and foodservice purchasers about what their customers are seeking (healthy, alternate menu ideas, variety), new information on the storage quality advantages offered by NC, and innovative off season marketing (signage, grill demos) that build sales.

Further, the “push” approach has for foodservice the vast upside potential of encouraging many restaurants to add sweet potato dishes made from fresh sweet potatoes to their menus (baked, mashed). While twenty two foodservice chain accounts were noted above, thirty five or more additional steakhouse, barbeque, or seafood concepts not presently offering sweet potatoes were identified within the southeast, northeast and central US. Opportunity abounds for North Carolina sweet potatoes.

Proposed next steps:

- Study the cost benefit of seeking expanded business through direct competition for competitor’s customers.
- Contrast this with the strategy of expanding sales by taking the steps towards expanding consumer awareness, consumer comfort in expanded usage, and thus increased consumption through current customers.
- Employ the push and pull elements noted above.

## BENEFICIARIES

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Multiple beneficiaries evolve from this project; consumers, sweet potato growers, the local economy.

Principally consumers and potential new consumers have and will learn more about the diverse health benefits of including sweet potatoes regularly in the diet. Messages based upon sound science can be crafted to appeal to consumers to upgrade their knowledge about health and nutrition, the foods they choose, and health consequences from better choices.

Better educated consumers, who understand the benefits of increased consumption of good-for-you foods like sweet potatoes will seek them, buy them, prepare and serve them more frequently. This of course benefits the growers who serve the needs of consumers. North Carolina's sweet potato grower base continues to expand as testament to the business opportunity. Currently there are about 450 growers in North Carolina.

As production of sweet potatoes is a capital and labor intensive undertaking it follows that expanding consumption and an increasing grower base has a significant benefit to local North Carolina economy. Farm gate revenue has risen to about \$226 million in North Carolina for sweet potatoes. Grower investments in infrastructure (land, buildings, equipment) and labor needs during planting, harvesting, and packing have added needed jobs in eastern NC.

## LESSONS LEARNED

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The consumer research conducted *among sweet potato users* revealed critical gaps in what consumers really understanding, or worse, don't understand about sweet potatoes. Key areas of misunderstanding and lack of knowledge include:

- Sizable numbers believe misconceptions about sweet potatoes; 4 in 10 think sweet potatoes are only a winter food, one-quarter see them as “fancy” food, and 1 in 5 think they are only for Thanksgiving.
- Truthful nutritional statements were mostly not believed nor viewed as relevant; “Good source of fiber” and “high in antioxidants” were the most successful nutrition statements among the six tested however ratings for both were not strong, four other nutrition statements all had a negative reaction.
- Home preparation of sweet potatoes lacks breadth; baked and mashed are the most popular preparations. Only avid cooks are more likely to prepare sweet potatoes more ways (roast, grill, etc).

Accelerating consumption of NC sweet potatoes among users as well as attracting new users requires that enhanced consumer education be developed and deployed to effectively and convincingly expand consumer knowledge.

As noted above, establishing a clear reading on the specific market penetration of NC sweet potatoes into foodservice and retail was initially hampered by limited publically available data exists detailing the specifics of supplier to customer relationships for sweet potato sales to retailers and foodservice chains. This is understandable as it is a confidential and contractual relationship in which the competitive nature of the process causes discussion about who buys from whom to be guarded. Not surprisingly the Marketing Department of the NC Department of Agriculture & Consumer Services could offer limited insights; similarly the retailers and foodservice accounts would not reveal their supply arrangements. To circumvent this hindrance a survey technique was developed as described above which satisfactorily addressed the need for data.

## **CONTACT PERSON**

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## **ADDITIONAL INFORMATION**

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This has been a successful and eye opening project which has scientifically defined numerous potential health benefits associated with sweet potato usage. Further the project has supported the comprehensive foodservice and distribution distribution network for NC sweet potatoes. Additionally however the project has been helpful in drawing attention to gaps in consumer education that, for long term success as well as for best acceptance of sweet potatoes, need to be addressed.

Specifically, to benefit all NC growers, it is proposed that the NCSPCF develop, deploy, and evaluate the following measurable educational elements:

- Communications that position sweet potatoes as an “everyday,” year-round food to counter perceptions as “winter food,” “fancy” food and “only for Thanksgiving.”
- Educate consumers about how to cook and serve sweet potatoes, as these were among the leading barriers to usage.

- Offer sweet potato recipes/preparation suggestions in innovative ways to all consumers to encourage more frequent usage. Particularly target “avid cooks” where usage and cooking versatility is highest.
- Educate about grilling sweet potatoes since few now do that so as to focus attention on non-winter eating occasions, combating the “winter food” perception.
- Develop “good source of fiber” and “high in antioxidant” nutrition messaging. Supplement with “not just for Thanksgiving” information and introduce the other nutritional claims, using an expert resource, to add credibility to claims perceived less positively by respondents.

**Project Title:** Local Food Harvest Handling Guide

*Previously approved final report*

## **PROJECT SUMMARY**

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In this project, ASAP (Appalachian Sustainable Agriculture Project) collaborated with partners from around the state—North Carolina Cooperative Extension, North Carolina A&T, the North Carolina Farm Bureau, NCDA, farmers, and representatives from key wholesale and retail markets—to conduct preliminary research on the standards and requirements of specific markets in North Carolina for key specialty crops. Results from the research—which examined various handling, quality, and packaging standards -- has provided project partners with a baseline of data related to the challenges buyers encounter in sourcing local fresh fruits and vegetables and the means to address them.

The research was primarily conducted through surveys and interviews with North Carolina industry representatives; the findings will improve producer-buyer communication, improve product quality and reduce harvest loss, and increase market access for North Carolina specialty crop producers.

Across the country there has been an explosion of interest in fresh, local foods. Increasingly consumers want to know where their food comes from, and the businesses where people shop for and eat food are eager to meet this demand. Data released by the USDA Economic Research Service reports that local food sales through direct and intermediate markets grossed over \$4.8 billion in 2008. For direct sales alone the 2007 Census of Agriculture reported \$1.2 billion, a 50% increase from the direct sales total in 2002 of \$812 million. Agricultural Census data for 2007 further shows an increase in the number of farms, particularly small farms (those less than 50 acres), which reverses a decades-long trend. All of these trends reflect the rapidly growing consumer interest in knowing who is growing their food. National market research by firms like the Hartman Group and JWT Advertising have tracked the shift in consumer demand to favor locally grown foods and have identified “local” as one of the food attributes most highly valued by consumers nationwide. The USDA has predicted that the market for locally grown food is going to reach \$7 billion in 2012.

ASAP recently calculated local food spending by residents of Western North Carolina to be \$62 million in 2010. A 2011 consumer survey of Western North Carolina residents further showed strong demand for local products and a willingness to pay more for local food. For the vast majority of consumers surveyed, local food offered a fresher, tastier option to foods produced in more distant regions, as well as a way to support local farmers, local communities, a healthy environment, and the rural character of the region. By extension, these values shape the way residents shop for food and dine out; the survey found that over three-quarters of respondents (77%)

deemed local food a somewhat or very important consideration in choosing a grocery store, and 64% viewed it as somewhat or very important when choosing a restaurant. The research demonstrates that high levels of demand for local food exist, and interest by food retailers and wholesalers in meeting consumer demand is increasing.

Despite the demand for local food and the potential for farms in North Carolina markets, accessing larger scale wholesale and retail outlets is challenging for smaller scale, specialty crop producers. Farmers often lack the knowledge needed to meet the quality and packaging standards of larger market outlets. Attempts to aggregate product through farmer groups and cooperatives run into issues of sizing and other quality standards. Buyers, while they want to source locally, do not have the time to educate farmers about product and packaging specifications.

The results of the research conducted through this project have provided project personnel with a preliminary set of information related to the challenges buyers encounter sourcing locally grown food.

## **PROJECT APPROACH**

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- I. ASAP drafted a survey instrument for North Carolina buyers to identify the obstacles buyers face when sourcing fresh fruit and vegetable products from local farmers and distributors.

The survey questions were primarily informed by previous ASAP research, but were supplemented by additional research into previous studies by agricultural development groups including the USDA and Cooperative Extension. The survey summary is attached.

- II. ASAP staff collaborated with project partners from around the state--NC Cooperative

Extension, NC Farm Bureau, NCDA, NC A&T, Eastern Carolina University agriculture specialists, Eastern Carolina Organics, and New River Organic Growers Coop--to review the project goals, objectives, and timelines. The group provided input on the survey instrument, identified buyers to receive the survey, and developed a dissemination plan.

- III. ASAP revised the survey per the meeting with project partners. Survey dissemination began February 14, 2012. Each project partner distributed the survey to buyers in their region of the state; combined 90 invitations to complete the survey were sent. The survey received 25 responses for a 21% response rate.

- IV. ASAP closed the survey March 9, 2012 and analyzed the results. A report of the results was compiled and disseminated to project partners for review. The summary of findings is attached. Survey highlights include:
- o 96.2% of respondents say their business purchases fresh fruits and vegetables that are grown locally
  - o On average businesses say they purchase 60% of their summer produce from local farms
  - o All businesses said they were moderately or very interested in increasing the amount of local produce they purchase next year
  - o The majority of respondents noted no difficulties in sourcing local produce (68.4%) but those who did have difficulties cited “inconsistent count/sizing” and “non- standard packaging” as the greatest barriers
  - o Other than quality and packing standards, the biggest barriers to sourcing local produce are consistent volume (81.3%), price (50%), and communication with producers (37.5%)
- V. Based on survey results, ASAP and project partners developed a list of targeted buyers to interview in greater depth about the issues around packaging and quality standards when sourcing local produce. Because the majority of survey respondents represented smaller- scale, independently operated food businesses, interviews targeted larger-scale retailers and distributors – businesses likely to experience greater difficulty sourcing from local farms. In this way, the results of the project would have wider applicability.
- VI. An interview instrument was developed for targeted buyers, largely major wholesalers/distributors and retailers. The original survey instrument provided the framework for the interview questions, but the interview allowed for more open ended and in-depth responses from buyers.
- VII. Buyer interviews were conducted beginning May 20th. A total of seven interviews with targeted larger scale North Carolina Buyers were completed.
- VIII. Buyer interviews were analyzed and compiled into a report. The report and its findings were disseminated to project partners for review.
- IX. A final report summarizing the findings from both the buyer survey and buyer interviews was compiled, which formulated strategies to bridge the gap between specialty crop farmers and buyers. The results are available on the ASAP research webpage: “Standards and Expectations of North Carolina Food Buyers”  
<http://asapconnections.org/local-food-research-center/reports/>

For this project, partners were spread across the state of North Carolina. However, team members were able to work together to identify project goals and objectives, maintain an agreed-upon timeline, provide feedback on project instruments and results, and assist in the interview process. Project partners were further tasked with helping to identify survey and interview participants and played a key role in survey dissemination.

## **GOALS AND OUTCOMES ACHIEVED**

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Completed activities include:

- Coordinated an initial meeting of project partners to review goals, deliverables, and timeline
- Conducted an initial buyer survey to determine key specialty crops, main areas of concern, and distinct needs
- Defined the categories of buyers for the formal interview process
- Developed the interview methodology and instrument
- Conducted buyer interviews
- Analyzed data from buyer interviews
- Completed write-up of research results

Project accomplishments met the goals established for the project. As detailed in the project proposal, ASAP and project partners successfully worked together to conduct initial buyer surveys, interview select buyers, and analyze data to come up with a set of recommendations to facilitate buyer/producer communication around common grading and quality standards for specialty crops. The results have been disseminated to project partners and will be posted to the ASAP website.

In this project ASAP surveyed and interviewed a total of 32 North Carolina food buyers from several market categories (e.g. broker for farmers, buying club coordinators, distributors, freight wholesalers, major employers, restaurants, universities, school districts, grocers). The initial survey instrument for buyers was developed by ASAP and project partners and was structured to determine the key specialty crops buyers have the most trouble sourcing locally and to identify the main barriers to their purchase (e.g. size, ripeness, appearance, and packaging). Following upon the results of the survey, ASAP and project partners created an interview instrument to gather more detailed information on precise specifications and needs around these key crops and barriers. All project tasks were managed and tracked using an agreed-upon project timeline and an online data management software package (SalesForce).

Survey and interview results revealed 10 key specialty crops North Carolina buyers routinely have trouble sourcing locally due to incorrect or inconsistent handling and

packaging by local specialty crop producers. These items include: potatoes, lettuce, greens, mushrooms, berries, tomatoes, Brussels sprouts, summer squash, cucumbers, and beans.

To date, this project team is unaware of any similar research being conducted in North Carolina.

This was an exploratory research project that collected the perceptions of buyers on their ability to source local food at the volumes and qualities they desire. The data collected through project activities provides the baseline.

## **BENEFICIARIES**

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The primary beneficiaries of this research project are specialty crop farmers in North Carolina. This project also benefits North Carolina Cooperative Extension agents, farm support organizations, and buyers from various types of market outlets including grocers, restaurants, and wholesaler/distributors.

ASAP staff will apply the knowledge gained from this project in extension activities to help make appropriate connections between farmers and food businesses. A minimum of 1000 North Carolina Farmers will directly benefit from this research. ASAP has an in-house farmer list of nearly 1200; over 550 farmers are members of ASAP's regional branding program, Appalachian Grown. Approximately three quarters of Appalachian Grown farmers produce specialty crops. In addition to farmers, ASAP works with local food buyers (restaurants, institutions, major employers, universities, grocers, distributors, etc) to connect these buyers with suitable producers. ASAP currently has a list of over 350 buyers who purchase local food products who will be impacted by this research.

The results of the research have been posted to ASAP's website, which receives upwards of 7500 hits per month. Visitors to ASAP's website include producers, food buyers, cooperative extension agents, and farm assistance groups (such as Buy Haywood and New River Organic Growers). ASAP's project partners (North Carolina A&T, North Carolina Cooperative Extension, and the North Carolina Department of Agriculture) have also received the results of this research and will share with their constituents. ASAP does not currently have any data on the extent of the impact from partner outreach.

This project was a research-based effort to obtain useful data and information to guide the activities of farm service providers – like ASAP and cooperative extension – who are working to build local food supply chains in North Carolina. Utilizing the information

North Carolina Targeted Businesses Interview Summary learned from this project, producers will be able to make farm business decisions that enable them to satisfy market requirements and gain greater market access. Findings are relevant to service providers in their efforts to create suitable connections between farmers and buyers. In the long term, the combined informed actions of service providers (facilitating suitable connections) and farmers (making changes to their farm business to satisfy market requirements) will further develop local food supply chains and reduce barriers between farmers and buyers.

## LESSONS LEARNED

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ASAP has been promoting local farms and specialty crops for over ten years and in that time has witnessed buyer purchasing practices shift towards sourcing more produce from local family farms. This project has demonstrated the extent to which this shift is occurring for North Carolina buyers. Project activities have documented buyers across the state that place a high priority on sourcing locally grown produce and claim to achieve high levels of local purchasing year round – on average North Carolina business respondents reported that they purchase half of all their yearly produce from local sources.

Across all buyers that participated in this project, definitions of “local” ranged from as large as the Southeast to as small as the area within 30 miles of a business. However, a majority of respondents indicated “local” as a radius within 150 miles from their business, and often crossing state boundaries. By establishing a more confined radius in their definition of “local”, businesses are defining local in ways that are meaningful to the majority of U.S. consumers. For consumers in Western North Carolina, ASAP’s 2011 survey of consumers shows that 19% of respondents defined local as the area within 100 miles of their home and 37% defined it as Western North Carolina. When North Carolina businesses use the same definition of local as their customers it is clear that the businesses value the idea of providing customers with the locally produced specialty crops they desire and are not just changing marketing tactics to capitalize on a trend.

For ASAP, this project strengthened relationships with established buyer contacts and enabled us to connect with new buyers. This project has improved how we work as an organization with buyers and identified intervention points for promoting more local produce purchasing. For example, the results from the online survey and targeted interviews show that North Carolina businesses appreciate and value the services that organizations like ASAP provide in connecting qualified producers to buyers. One of the interviewed buyers specifically stated that in the case of trying to find local product, “ASAP helps a lot.” Another buyer commented that, “I don’t have time to always talk individually to the smaller growers; [working with local food facilitators] could help get more in our door and save time for us.”

The need for targeted efforts to connect farmers and buyers was one of the key findings uncovered by the research. In the interviews of businesses six of the seven participants said that they would like help finding local product. The evidence from our research supports the need for continued outreach to both producers and buyers and the necessity for qualified individuals to assistance in connecting local specialty crop producers with North Carolina businesses.

Our research further confirmed that buyers appreciate the resources, training, and technical assistance service providers offer North Carolina specialty crop producers. In the effort to increase the number of suitable suppliers, buyers would like to see the continued support of farmers. The North Carolina businesses surveyed for this project indicated that farmers often lack the liability and safety certification requirements to become suppliers, or that their post-harvest handling practices are insufficient to prolong the shelf life of products. This preliminary research therefore shows that targeted interventions to provide farmers with the resources and trainings that would allow them to overcome these obstacles would be a key strategy for improving the local food system in North Carolina.

Results from the initial survey to buyers in North Carolina provided project staff with direction for the subsequent buyer interviews and future research endeavors. In the initial survey of businesses, 79% of respondents reported that they were independently owned and operated businesses. The survey further reflected a high percentage of local produce purchasing, little difficulty in sourcing local produce, and an abundance of qualitative data indicating that survey participants were already fully invested in supporting local specialty crop producers:

“Purchasing from local vendors supports our community and our state. Our store mission statement includes directives to purchase locally. Also, there is a strong demand for local items from our customers.”

“[I buy local produce because] It is the only ethical choice. I want a relationship with the people that grow my food and I want to share that with my customers. In my desire to be part of a community it would be hypocritical to not invest in other local interests such as farming.”

While it is encouraging that businesses around the state are dedicated to working with and actively supporting local specialty crop producers, it was obvious that the initial survey was unrepresentative of larger businesses, corporate owned businesses, and those who are not necessarily invested in supporting local specialty crop producers. Initial attempts in the survey could have been more aggressively targeted towards these harder-to-reach businesses that move large quantities of goods and have the most stringent standards for packaging and

quality. The interview process addressed this concern as it focused solely on these more elusive retailers and wholesalers to better balance research results.

One unexpected result of project activities was the prevalence of the initial survey takers who already purchase large quantities of local specialty crops. 95.2% of respondents reported purchasing locally grown produce. These buyers further expressed little to no difficulty in sourcing locally-grown specialty crops.

In addition, in the initial survey of businesses buyers were asked to estimate their percentage of local produce purchases by season (compared to all produce purchases). The high percentage of was surprising. This may speak to the efforts of farmers to extend their seasons to meet the expectations and demands of buyers, and demonstrates the growth in communication between producers and their buyers.

## **CONTACT PERSON**

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## **Local Food Harvest Handling Guide: Final Report**

### **Introduction:**

This report provides the results of the research study *Local Food Harvest Handling Guide*, a project conducted by ASAP (Appalachian Sustainable Agriculture Project) with partners from around the state – North Carolina Cooperative Extension, North Carolina A&T, the North Carolina Farm Bureau, NCDA – and funded by the USDA’s Specialty Crop Block Grant program. The study found high demand for local food by North Carolina food businesses and identified the challenges these businesses encounter in trying to source from local producers due to sizing, packaging, and other quality standard issues.

The purpose of the project was to identify the communication and infrastructure barriers that prevent local specialty crop producers from meeting the standards and expectations of North Carolina food buyers. Project activities included: (1) an initial buyer survey to determine key specialty crops that buyers have the most trouble sourcing locally and identify the main barriers to their purchase (e.g. size, ripeness, appearance, packaging), (2) interviews with targeted buyers to gather more detailed information on precise specification and needs, and (3) a final report summarizing the findings from both the survey and interviews, including a section on suggested strategies to bridge the gap between specialty crop producers and North Carolina buyers.

### **Summary of Findings: Business Surveys and Interviews**

From February 14 to March 9, 2012, ASAP conducted an electronic survey of 90 North Carolina food businesses; 25 responded for a response rate of 21%. The mix of buyers included grocers, school districts, universities, restaurants, major employers, distributors, wholesalers, and buying clubs; the majority of respondents represented small, independently owned food

businesses. The purpose of the survey was to identify the obstacles buyers face when sourcing fresh fruits and vegetables from local specialty crop producers and distributors.

In the survey, 95.2% of buyers reported purchasing fresh fruits and vegetables that are grown locally with 68.4% further reporting no barriers to sourcing local produce.<sup>1</sup> All surveyed buyers said that they were interested in increasing the amount of local produce they will purchase in the coming year. On average the surveyed buyers reported purchasing 60% of their produce from local farms in summer and 44% of their total produce from local sources in winter. When asked what types of barriers exist that prevent them from purchasing more locally grown produce, the buyers indicated difficulties with inconsistent count and sizing of local product, along with non-standard packaging. Respondents further cited inconsistent volume (81.3%), price (50%), and communication with producers (37.5%) as problems that further limited their ability to source locally. These barriers were specifically relevant when trying to source local potatoes, lettuce, greens, and mushrooms. Overall, the survey revealed high interest in local purchasing, high reported rates of current purchasing of local fresh produce—on average these businesses reported that they purchase half of all their yearly produce from local sources—and minimal barriers to local purchasing.

Following the electronic survey of North Carolina food buyers, ASAP and project partners conducted telephone interviews with seven additional North Carolina buyers. Larger retailers and wholesalers/distributors—buyers known to have stricter sourcing requirements and therefore potentially greater obstacles to sourcing from local producers—were targeted for these interviews. The interviews, like the survey, were intended to identify the obstacles larger buyers face when sourcing local specialty crops, with a specific focus on packaging and quality issues.

Like the participants in the electronic survey, the larger scale North Carolina buyers were very interested in local specialty crops, with 100% reporting that they already purchase fresh fruits and vegetables that are grown locally. The larger scale buyers were also very interested in increasing the amount of local produce they will purchase in the coming year. However, the rate at which these larger buyers purchase local specialty crops and the barriers they face when trying to source locally are significantly different from those reported in the electronic survey.

The buyers interviewed reported that only 24-25% of their summer produce purchases, and only up to 8% of their winter produce purchases, come from local sources. These figures are much lower than the 60% and 44% reported by the businesses who participated in the online survey. In addition, the larger buyers faced more barriers when sourcing local specialty crops.

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<sup>1</sup> The majority of businesses studied in this project do not define “local” by North Carolina political

boundaries, but instead used radially based definitions that overflow into states adjacent to North Carolina.

All seven reported difficulties in sourcing local produce items due to quality and packaging standards. The most frequently cited barriers include the quality and packaging standards required by the company, inconsistent quality of local produce, and the short shelf life of local fresh produce. These buyers noted particular difficulty in sourcing local berries, a product mentioned by three of the seven interviewees. In addition to quality and packaging standards, the buyers indicated lack of consistent product volume when in season (57%), difficulty finding local producers (43%), difficulty finding sufficient quality product (43%), and lack of adequate communication with producers (43%) as significant barriers to local produce purchasing. Therefore, while the larger scale North Carolina buyers professed high motivation to purchase local fresh produce, they experience far more obstacles when trying to source these products than their smaller-scale counterparts from the online survey.

The results from the survey and interviews show that demand for locally sourced fresh produce is high and growing among North Carolina businesses. However, the results also clearly demonstrate the disconnect between the expectations of buyers and the capacity of local specialty crop producers to meet those expectations. This research project confirms a need for improved communication between North Carolina buyers and specialty crop producers. Specifically, there is a need for clarifying the industry standards for fresh produce to producers and connecting qualified producers to buyers. In addition, there is a clear need for continued training and technical assistance for farmers to meet North Carolina business industry standards and requirements.

### **Bridging the Gap: Formulating Strategies to Connect Specialty Crop Producers to Buyers**

When asked what types of support would be most helpful in overcoming the barriers to increased local food purchasing by North Carolina businesses, participants of the survey and interviews named training and technical assistance for farmers and help in finding qualified local growers as their top needs.

#### *Training and Technical Assistance*

To access the opportunities in local markets, farmers need skills, resources, and support in multiple areas to succeed. According to the North Carolina businesses surveyed for this project, the areas where producers need the most help include trainings in post-harvest handling practices to prolong the shelf life of products; education on product liability insurance, the different levels of insurance available, and resources for finding the best insurers for their farm

business; and education on the necessity of GAP certification, how to become GAP certified, and the opportunities that this certification can bring when trying to tap into new and larger markets. As the local food market in North Carolina develops and more producers seek to expand their market opportunities, the need for accessible and accurate information on meeting industry standards will become even more vital.

It should be noted that while farmers can benefit from trainings on meeting the market quality standards, buyers too might benefit from information and trainings on the qualities and benefits of specialty crops grown for local markets.

### *Connect Producers and Buyers*

Even when producers can meet industry production standards, there is still the obstacle of connecting qualified producers with buyers. In the interview of targeted businesses, six of the seven participants said that they would like help finding local product. The structure of the current system often leaves procurement specialists disengaged from the local farming community, and they require assistance and resources to connect with qualified local growers. These connections form the basis of a productive and sustainable relationship between grower and buyer. Some type of connection assistance should be considered as a means of facilitating the lasting grower-buyer relationship in order to fulfill demand for locally grown specialty crops.

There are tools that have been developed to connect buyers with growers. ASAP annually produces the *Mixing Bowl*, a grower and buyer directory. Other regions in the state could benefit from this type of directory. It is important that the directory be maintained and compiled by individuals familiar with local conditions. Directories that depend on buyers and growers to maintain their own data will quickly become inaccurate and obsolete.

Other strategies for connecting growers and buyers include events that invite growers and buyers to meet one other in a pressure-free environment. Conferences that attract farmers should also invite local buyers and coordinate time for buyers to sit down with producers to explore opportunities. Farm field trips for buyers are also an effective way to allow farmers to meet potential buyers. Local agencies and organizations that understand the local specialty crops market should be encouraged to facilitate the matching of suitable farmers with appropriate markets.



## Interviews of Targeted North Carolina Businesses

This report summarizes the results of seven interviews of targeted large food buyers who operate in North Carolina. The interviews followed a wider electronic survey of North Carolina food buyers (see appended: ASAP's North Carolina Food Business Survey Summary) and were designed to investigate in greater detail the issues larger buyers experience when trying to source local specialty crops. The original electronic survey of North Carolina buyers gathered input from 25 businesses, 68% of whom reported no barriers to sourcing local product from local producers. This second interview phase purposefully targeted larger retailers and wholesaler/distributors known to have stricter sourcing requirements and therefore probable obstacles to sourcing from local producers. The purpose of the interviews was to identify the obstacles these buyers face when sourcing fresh fruit and vegetables from local producers to help formulate strategies to bridge the gap between farmers and buyers. Staff from Appalachian Sustainable Agriculture Project in partnership with North Carolina Central University conducted the interviews.

Sections of the report included: Survey Highlights; Comparing the results from North Carolina Food Business Survey with Interviews of Targeted North Carolina Businesses; Survey Results; Appended: ASAP's North Carolina Food Business Survey Summary

**Date of Interviews:** Interviews were conducting in the month of May 2012

**Type of Survey:** Phone Interviews

**Response**

Total Completed Survey: 7
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### Survey Highlights

- All seven buyers (100%) purchase fresh fruits and vegetables that are grown locally
- On average buyers purchase 24-25% of their summer produce from local farms
- All seven businesses indicated that they were very interested in increasing the amount of local produce they purchase next year
- Four of the businesses report some policy barriers to sourcing from local producers (57%); three businesses report no policy barriers (43%)
- All seven buyers indicated difficulties in sourcing specific local produce items due to quality and packaging standards. The most frequently cited barriers include the quality and packaging standards of the company, inconsistent quality of local produce, and the short shelf life of local fresh produce. Buyers have particular difficulty sourcing local berries, a product mentioned by three of the seven interviewees.
- Other than quality and packaging standards, the major barriers to sourcing local produce are consistent product volume when in season (57%), communication with producers (43%), product quality (43%), and finding local producers (43%)

## **Comparing the results from North Carolina Food Business Survey with the Interviews of Targeted North Carolina Businesses**

The North Carolina Food Business Survey was an electronic survey of 25 North Carolina food buyers and was conducted from February 14 to March 9, 2012. Like the Interviews of Targeted North Carolina Businesses, the survey asked respondents to identify obstacles to sourcing local fresh fruits and vegetables in their establishments. A variety of grocers, public school districts, universities, restaurants, distributors, and wholesalers made up the pool of survey participants, and 79% of these businesses self-reported as “independently owned.” Overall the electronic survey participants showed high rates of local fresh produce purchasing, high interest in local purchasing, and minimal barriers to local purchasing.

A summation of the similarities and differences between the responses from the electronic survey and the interviews of targeted large scale North Carolina buyers follows:

- The 25 respondents of the electronic survey gave much wider definitions of “local” in the context of local food than did the targeted large scale buyers. The survey respondents’ definitions ranged from “within a thirty mile radius” to “east coast” while the interviewed businesses largely stuck to the state of North Carolina or a 100mile radius, though one business included a 250 mile radius.
- A much larger share of produce purchases in the electronic survey respondents’ businesses came from local sources compared to interviewed businesses. On average the businesses from the electronic survey sourced 47.5% of all produce purchases from local sources in summer and 25% of produce purchases in winter. Large scale buyers participating in the phone interviews on average sourced only 24-25% of their total produce purchases locally in summer and up to 8% locally in winter.
- The reasons North Carolina buyers choose to purchase fresh produce from local producers was similar across all respondents. Some of the most often cited reasons are to support local farms, support the local economy, and to meet the demand of customers.

- All North Carolina buyers who participated in the survey and interviews said that they are interested in increasing the amount of local produce their company will purchase next year.
- The participants of the electronic survey noted far fewer barriers to sourcing local fresh fruits and vegetables compared to the targeted buyers from the interviews. Electronic survey participants did mention some issues with inconsistent counts and sizing of local product, and that this was more of a problem for local potatoes, lettuce, greens, and mushrooms. Larger buyers from the interviews, however, listed far more barriers with a specific focus on the inability of smaller local producers to meet company quality and packaging standards, volume, and shelf life demands. These buyers specifically mentioned berries as a difficult local item to source, as well as tomatoes, greens, Brussels sprouts, and summer squash.
- In addition to product quality issues, buyers from both the survey and interviews have difficulty sourcing local product due to inadequate communication with producers, delivery timing, and in the case of the large scale buyers, because they do not know where to find local producers.
- Buyers from both the electronic survey and interviews believe the same types of support would be most helpful in addressing the barriers to sourcing local food including: providing training and technical assistance for farmers to help them meet company standards and requirements; facilitating communication around the expectations of buyers when they look for a producer and local small producers when they look for a buyer; helping farmers obtain safety, liability, and GAP certifications; tackling distribution and aggregation challenges related to local product; helping farmers increase and extend production; helping buyers connect with suitable local producers.

## Survey Results

\*Reported responses are not direct quotes. A summation of the interviewees' answers are provided and edited to maintain the anonymity of the companies and employees involved.

### 1. How does your company define "local" in the context of local food? (7 responses)

<i>All Responses</i>
North Carolina (and Tennessee for sweet potatoes). I have direct connections to local suppliers. I do buy some non-local to sustain volume
In state- from North Carolina
No set radius. In the area that we service. The farm has to be close to the store it's sold in to be considered local
100 miles
250 miles
100 miles from a specific store
We jumble local and regional together. Covers all of NC and border states too: SC, VA, TN, GA

### 2. Does your company purchase fresh fruits and vegetables that are grown locally? (7 responses)

Yes: 100% (7)

No: 0% (0)

<i>Other Comments</i>
I am a foodie and am personally interested in local
As well as candy, coffee roasted locally, BBQ sauce, salsa, marinate, granola, and dairy
I do purchase from area farmers

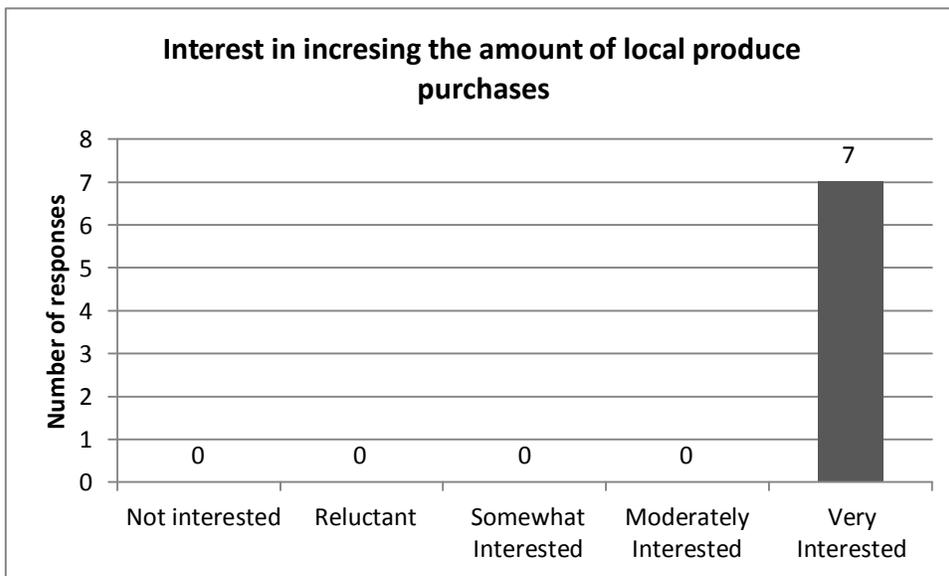
### 3. What percentage of your produce purchases comes from local farms: (7 responses)

	<i>In Spring</i>	<i>In Summer</i>	<i>In Fall</i>	<i>In Winter</i>
Response 1	5-8%	5-8%	5%	<5%
Response 2	5-10%	25%	5-10%	0%
Response 3	40%	40%	40%	10%
Response 4	5%	10%	10%	3-5%
Response 5	30%	50%	40%	10%
Response 6	10%	10%	10%	10%
Response 7	20%	30%	15%	8%
<b>Average</b>	<b>16-18%</b>	<b>24-25%</b>	<b>18-19%</b>	<b>Up to 8%</b>
<i>Other comments</i>				
Items purchased include: tomatoes, corn, peanuts, berries, pumpkins, sweet potatoes, green beans				
Apples, lettuce, lambs, sprouts				

**4. Why does your company choose to purchase locally grown produce? (7 responses)**

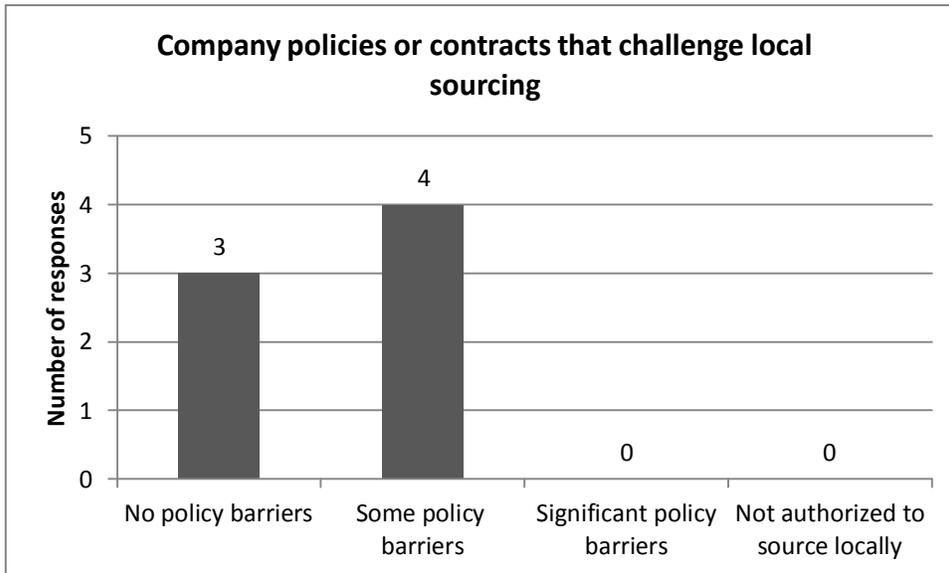
<i>All Responses</i>
We have the call for it; the corporate companies and small companies who want it, and we do it to compete.
To support the local economy, to support local farms, people feel better about local (it's safer), people like to know their farmer/farm where their food is coming from
Works better for everybody: transportation logistics, freshness, the prices are better
Overall the core values of the company are to work with local producers: "create win win relationships with local producers"
Local produce is fresher, trendy, better prices, and good for the local economy
Support local communities, less petroleum than shipping from California
It's the right thing to do, sustainable, it supports local farmers, sometimes the price is better, there is demand for it

**5. How interested is your company in increasing the amount of local produce it purchases in the next year? (7 responses)**



<i>Other Comments</i>
A big focus of mine
We have created a new position devoted to expanding local purchases. The person for this position would be located in Greensboro and would cover the stores from Wisconsin to Florida
Always looking for new growers
Very, very, extremely
Always looking for new farmers to partner with. If they have GAP it's ok for us to be more lenient on the liability insurance (\$4 mill). We can accept \$2 mill and cover the rest

**6. Are there any company policies or contracts that make it difficult for you to source locally grown produce? (7 responses)**



<i>Other Comments</i>
Two exactly: GAP compliant and the grower must be able to sign a hold harmless agreement (extremely important!)
Barriers to purchasing more locally grown produce relate to packaging, volume consistency, and price. The company does have contracts with non-local distributors that must be honored
GAP, insurance levels
Vendor expectations; liability insurance (\$2 mill); paperwork is thick and intimidating; payment electronically; quality expectations are high
GAP and \$4 mill liability

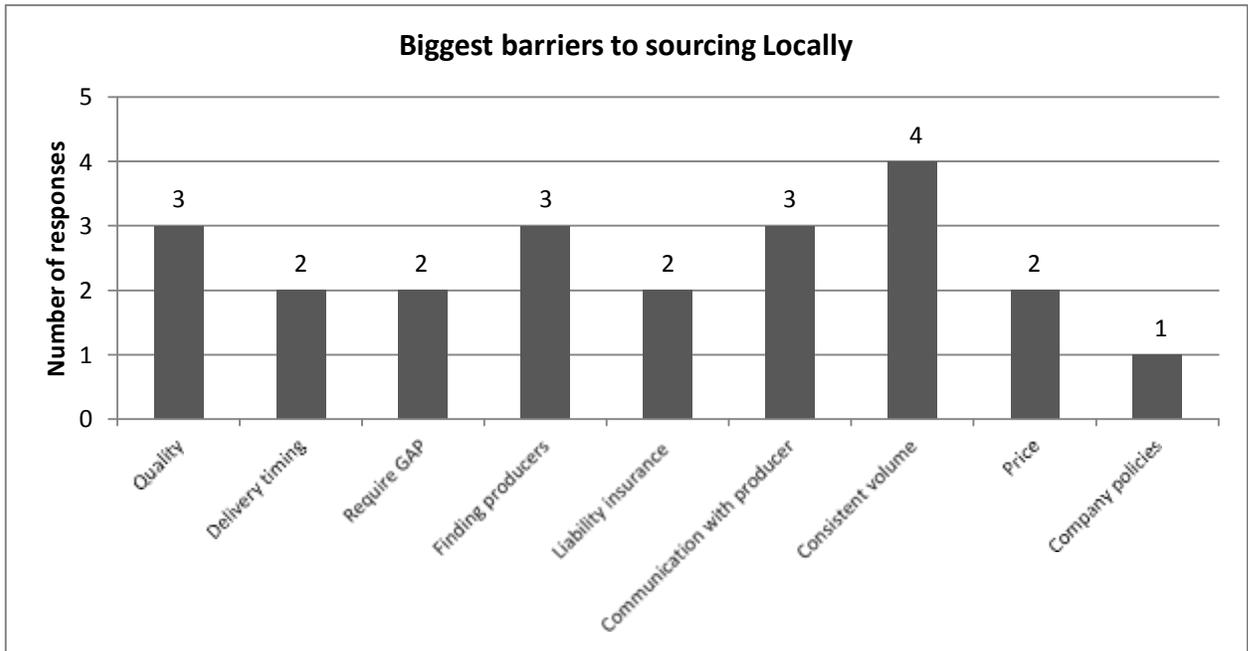
**7. Thinking specifically about quality and packaging standards, which fresh fruits and vegetables do you have difficulty sourcing locally and why? (5 responses)**

<i>All Responses</i>	
<b>Standards</b>	<b>Products</b>
We focus on our brand- if it's going to have our name on it, it has to meet the standard for that product. Our company is a cut shop; they do fresh cuts for us. They are an approved vendor that packs things in <i>our</i> boxes. Specifications and standards are very important. Imperial, Classic, Standard, Reliance (fresh is a reliance box). It also has to meet the standards to go into the box. If it's below standard, it would still be pushed through the system but be sold in a packer box and the price would be lowered	
Damaged; shelf life; varieties, especially Heirloom (tomatoes); price (beans and corn); short season (lettuce); not a lot field grown (peppers); pretty good job (potatoes)	Tomatoes, beans, corn, lettuce, colored bell peppers, potatoes
Knowing industry standards and being able to live up to it; temperature expectations. Quality inconsistent. Availability window is short when available.	Fruits, Brussels sprouts
Not enough berry growers. Could use help in finding more berry growers	All berries
	Bush berries, strawberries, summer squash

**8. Why do you have difficulty sourcing these particular fresh fruits and vegetables? (7 responses)**

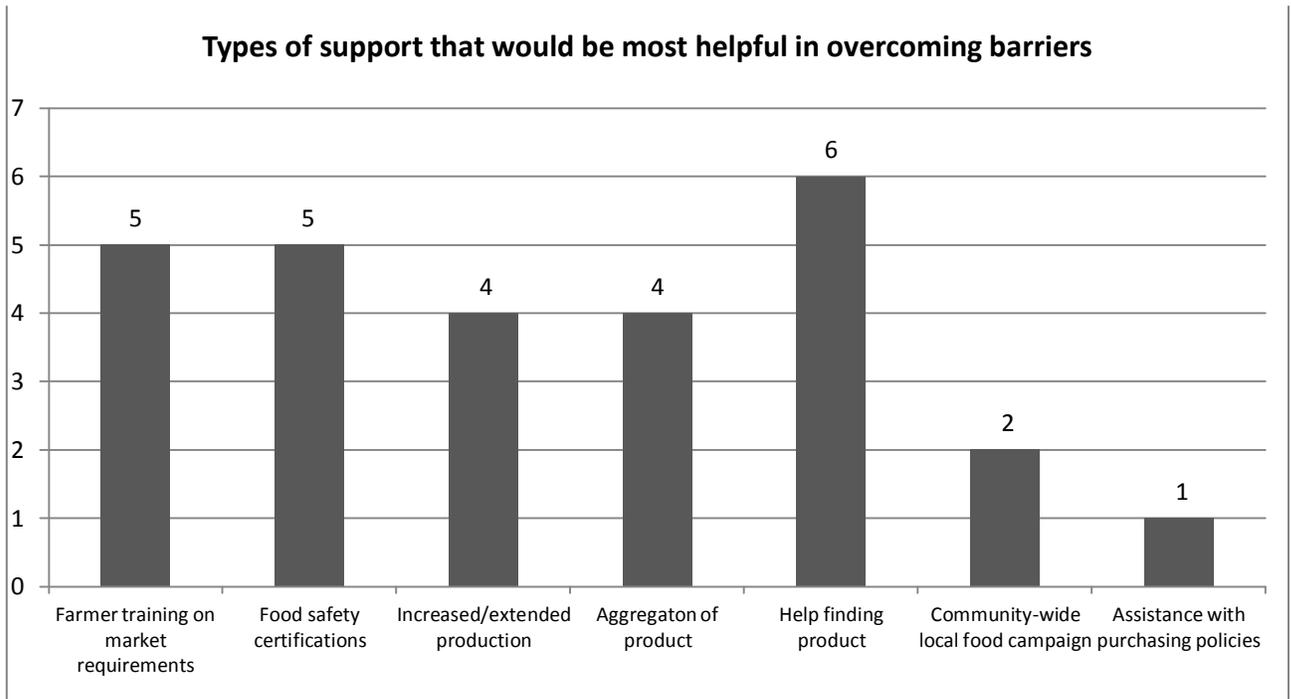
<i>All Responses</i>	
<b>Problems</b>	<b>Products</b>
Quality and meeting company standards	
Too soft/quality is so-so; Price of buying local is high; for the regional stores, the price of an item must be the same in each store and the item must be available in all five stores. Therefore a local producer must have the quantity that can supply all five stores at a price that the company can bear; Specifications/size of produce; packaging	Fruits (too soft and so-so quality); Strawberries (packaging)
Damaged, especially heirlooms; not shippable; packed too ripe	Tomatoes
Wrong temperature; uniformity; packaging consistent with industry standards; (but people do their homework when selling wholesale)	
Seasonal nature of local produce	
Not enough growers of local berries; post-harvest handling so greens don't last long in customers' homes	Berries and leafy greens
Seasonal nature of local produce and availability (berries); heat breakdown (squash); logistics: picking up from farms takes a lot of orchestrating. We have to back haul because a lot of WNC farms don't deliver to Charlotte	Berries and squash

**9. Other than meeting quality and packaging standards, what are your biggest barriers to sourcing locally grown fresh fruits and vegetables? (7 responses)**



<i>All Responses</i>
We focus on our brand- if it's going to have our name on it, it has to meet the standard for that product. Our company is a cut shop; they do fresh cuts for us. They are an approved vendor that packs things in our boxes. Specifications and standards are very important. Imperial, Classic, Standard, Reliance (fresh is a reliance box). It also has to meet the standards to go into the box. If it's below standard, it would still be pushed through the system but be sold in a packer box and the price would be lowered
Quality and quantity
Everyone is growing the same thing; communication with producer; consistent volume when in season (need an accurate idea from growers of how much they will actually bring in); price can be a barrier, but not as big since the company absorbs some margin for local products
Delivery timing; liability insurance from producer; communication with producer; consistent volume when in season; price; less local more regional
Growing season, weather, where to find local product
No warehouse; twice weekly delivery; GAP certification not required but a plus; require same quality from local producers as from a large distributor; where to find local product
Tracking down growers; require GAP certification; liability insurance from the producer; communication with producer; consistent volume when in season (We're expanding logistics for back hauling, but still have a 1 pallet minimum which most growers can't meet)

**10. What types of support would be most helpful in overcoming these barriers? (7 responses)**



<i>Other comments</i>
Got to be NC trace fair – events like these. Also conferences where we learn about how other buyers source
Helping local producers with their packaging
I don't have time to always talk individually to the smaller growers. This could help get more in our door and save time for us. ASAP helps a lot with finding local product
Meeting with growers to make a commitment and emphasize face to face interaction (talking logistics/planning); quality, volume, and pricing so producers understand industry standards; communication as growers get frustrated by lack of follow-up by the buyer and lack of heads up from grower on what's coming up next; Saturation: glut in a product when supply is high doesn't mean it will sell well and the price needs to drop because of saturation. Assistance with developing purchasing policies that include local is something our company already has in place. Sometimes there's a regional weekly merchandizing plan that dictates sales and price to growers, and obstructs growers' desire to sell here
Connections with more local growers
Introductions to growers. Help distributing vendor packets to interested growers and help them understand that they are for all departments. Also interested in local flowers



## North Carolina Food Business Survey Summary

This report summarizes the results of a survey to food buyers in North Carolina. The purpose of the survey was to identify the obstacles buyers face when sourcing fresh fruit and vegetable products from local farmers and distributors and help formulate strategies to bridge the gap between farmers and buyers. Appalachian Sustainable Agriculture Project in partnership with North Carolina A&T, North Carolina Cooperative Extension, and the North Carolina Department of Agriculture distributed the survey to buyers in North Carolina that already do some level of local purchasing.

Sections of the report included: Survey Highlights, Survey Results, Appendix A., Appendix B.

**Date of Survey:** February 14-March 9, 2012

**Type of Survey:** Electronic survey

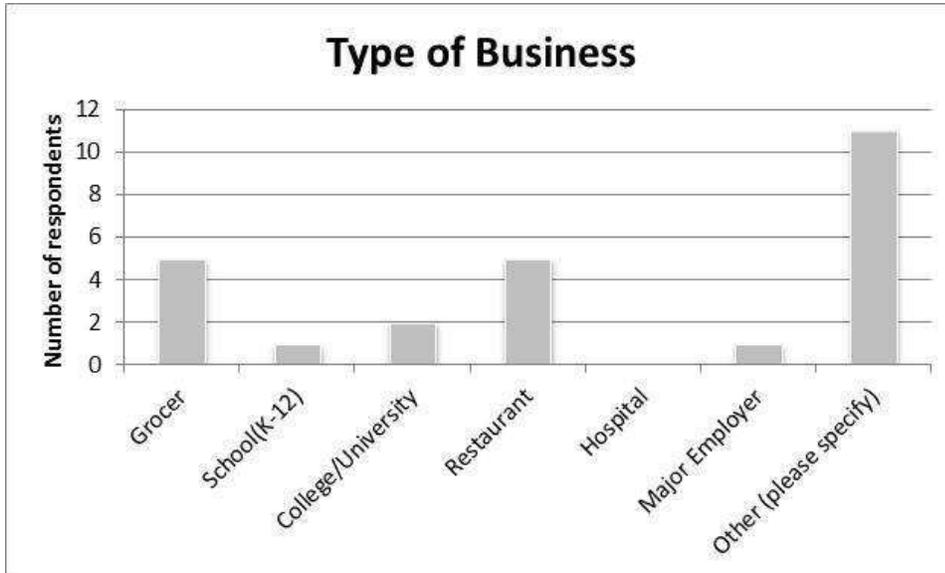
<b>Response</b>	Total Sent Survey: 90
	Total Started Survey: 25 (28%)
	Total Completed Survey: 19 (21%)

## Survey Highlights

- 95.2% of respondents say their business purchases fresh fruits and vegetables that are grown locally
- On average businesses purchase 60% of their summer produce from local farms
- All businesses said they were moderately or very interested in increasing the amount of local produce they purchase next year
- 68.4% of businesses report no barriers to sourcing local produce
- The majority of respondents noted no difficulties in sourcing local produce, but those who did have difficulties cited “inconsistent count/sizing” and “non-standard packaging” as the greatest barrier
- Other than quality and packing standards, the biggest barriers to sourcing local produce are consistent volume (81.3%), price (50%), and communication with producers (37.5%).

## Survey Results

### 11. What type of business are you? (14 responses)



All responses to "other please specify:"
Broker for farmers
Buying Club coordinator
Consumer
Consumer
Distributor
Distributor
Freight, wholesaler
Grower
Individual
Local Food Program
Modified CSA

### 12. Is your business: (16 responses)

	Response Percent	Response Count
<b>Independently owned</b>	<b>79.0%</b>	<b>15</b>
Franchise	0%	0
Part of a regional chain	5.3%	1
Part of a national chain	0%	0
A cooperative*	5.3%	1
Non-profit*	5.3%	1
Buying club*	5.3%	1

\*Starred items were fill in responses to the "other (please specify)" option

**13. What is your role in the company? (choose all that apply) (19 responses)**

	<i>Response Percent</i>	<i>Response Count</i>
Owner	26.3%	5
Manager	26.3%	5
<b>Produce buyer</b>	<b>42.1%</b>	<b>8</b>
Chef	21.1%	4
School Nutrition Director	5.3%	1
Foodservice Director	10.5%	2
Program Director*	5.3%	1
Coordinator*	5.3%	1
Crop Coordinator/Buyer*	5.3%	1

\*Starred items were fill in responses to the “other (please specify)” option

**14. Do you purchase food for more than one location? (21 responses)**

Yes: 33.3% (7)

No: 66.7% (14)

**If “yes” how many?**

	<i>Response Count</i>
2 locations	2
10 locations	2
50 locations	1

**15. How does your business define "local" in the context of local food? (20 responses)**

<i>Category of response</i>	<i>All responses</i>
Radius of miles	We get as much as possible from within a thirty mile radius of the restaurant.
	Within 75 miles
	Within 100 miles.
	100 miles
	Operationally - within 100 miles Conceptually - within 150 miles
	250 mile radius
	Actually, to us, local is any food purchased within a 250 mile radius.
	It is a little vague at the moment, not well defined. I would say within approx. 250 mile radius, including NC, SC, and VA.
	Any products raised and purchased with-in a 300 mile radius
Region/Counties	1st choice--county 2nd state 3rd east coast
	As close to customer as practical, all of NC and within 3 hours of Asheville mostly. Will source regionally as necessary, as far as Georgia, SC but am very clear with customer about source. Have a couple of items which come from Calif but only to maintain consistent supply in offseason of staple items.
	ASAP county region, or 100 miles
	Grown within the county & surrounding counties, but as wide as 100 mile radius. Also, locally produced foods such as breads, trail mixes, etc.
State	Grown in NC, or better, grown in the Piedmont
	NC
	Our service only uses products that are grown in NC
	Within the state of NC
	Anything from NC can be labeled local. Anything from ours or a surrounding county would be labeled by which county it came from. If it is not from a nearby county, it would just say NC grown.
Other	Food that is grown or raised on farms within driving distance to my restaurant.
	Not determined

**16. Does your business purchase fresh fruits and vegetables that are grown LOCALLY? (21**

responses)

Yes: 95.2% (20)

No: 4.8% (1)

**17. What percentage of your produce purchases comes from LOCAL farms? (17 responses)**

	<i>In Spring</i>	<i>In Summer</i>	<i>In Fall</i>	<i>In Winter</i>
Average	49%	60%	54%	44%
Minimum	8%	14%	9%	2%
Maximum	100%	100%	100%	100%
Median	30%	47.5%	40%	25%

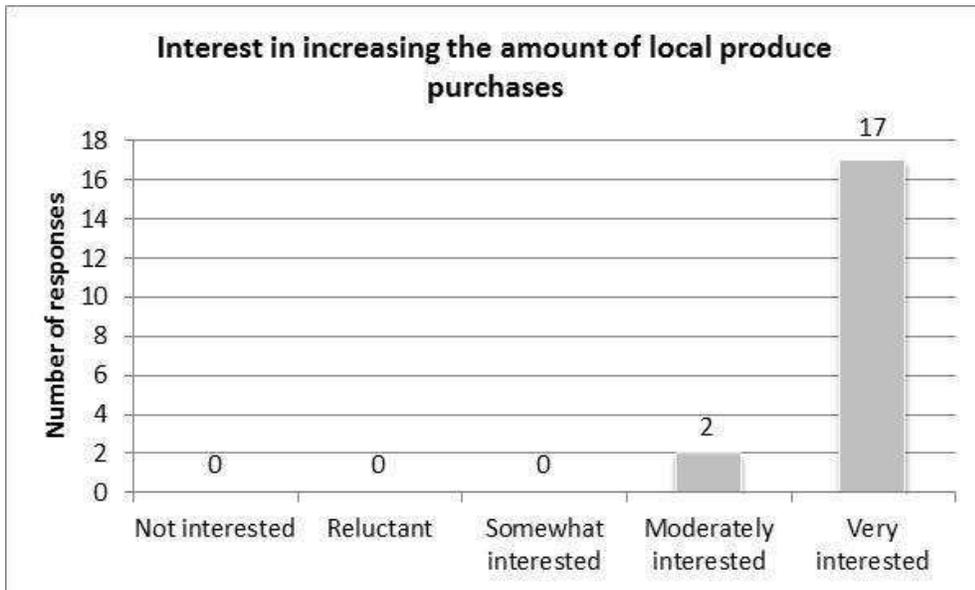
\*For the list of all responses, refer to Appendix A

**18. Why does your business choose to purchase locally grown produce? (18 responses)**

<i>Category of response</i>	<i>Representative responses</i>
<i>Support local farms and the local community</i>	Because it is the right thing to do as long as the pricing is competitive with produce from other regions of the country.
	Better quality, support local farms, the price is higher but worth it
	It is the only ethical choice. I want a relationship with the ppl that grow my food and I want to share that with my customers. In my desire to be part of a community it would be hypocritical to not invest in other local interests such as farming.
	Our customers demand it Better quality and taste reduce fossil fuels support local farmers
	Purchasing from local vendors supports our community and our state. Our store mission statement includes directives to purchase locally. Also, there is a strong demand for local items from our customers.
	shorter supply chain, greater impact on locally families
	To support the local food system. To keep those dollars closer to home.
	To support the local economy and agricultural community, to be able to provide high quality products at good prices in season
<i>Other</i>	This is the mission of our work
	quality, availability, price, growing practices
	It is based on that premise entirely

\*For a list of all responses, refer to Appendix B.

19. How interested is your organization in increasing the amount of LOCAL produce it purchases in the next year? (19 responses)



20. Do company policies or contracts make it easy or hard for you to source LOCALLY grown produce? (19 responses)

	<i>Response Percent</i>	<i>Response Count</i>
There are no policy barriers to sourcing local produce	68.4%	13
There are some policy barriers to sourcing local produce	31.6%	6
There are significant policy barriers to sourcing local produce	0%	0
I'm not authorized to source local produce	0%	0

**21. Thinking specifically about quality and packing standards, which fresh fruits and vegetables do you have the most difficulty sourcing **LOCALLY** and why? (choose all that apply) (16 responses)**

Answer Options	No difficulty sourcing	Inconsistent count/sizing	Unsatisfactory appearance	Wrong temperature	Non-standard packaging	Not clean	Response Count
Tomatoes	12 <b>85.7%</b>	2 14.3%	0 0.0%	0 0.0%	1 7.1%	0 0.0%	14
Colored bell peppers	9 <b>75.0%</b>	2 16.7%	0 0.0%	1 8.3%	0 0.0%	0 0.0%	12
Winter squash	10 <b>83.3%</b>	2 16.7%	0 0.0%	0 0.0%	1 8.3%	0 0.0%	12
Summer squash	12 <b>85.7%</b>	2 14.3%	0 0.0%	0 0.0%	1 7.1%	0 0.0%	14
Cucumbers	11 <b>78.6%</b>	3 21.4%	0 0.0%	0 0.0%	1 7.1%	0 0.0%	14
Greens	11 <b>68.8%</b>	3 18.8%	1 6.3%	1 6.3%	2 12.5%	1 6.3%	16
Lettuce	8 <b>53.3%</b>	3 20.0%	3 20.0%	1 6.7%	1 6.7%	2 13.3%	15
Potatoes	8 <b>61.5%</b>	3 23.1%	0 0.0%	1 7.7%	1 7.7%	2 15.4%	13
Beans	9 <b>75.0%</b>	1 8.3%	2 16.7%	0 0.0%	2 16.7%	0 0.0%	12
Apples	9 <b>69.2%</b>	0 0.0%	3 23.1%	1 7.7%	0 0.0%	0 0.0%	13
Strawberries	11 <b>78.6%</b>	1 7.1%	1 7.1%	2 14.3%	0 0.0%	0 0.0%	14

**22. Are there other produce items that you have difficulty sourcing LOCALLY because of quality and/or packing standards? Please list each item and briefly describe what difficulty in quality and/or packing is associated with the locally grown product. (7 responses)**

<i>Category of response</i>	<i>All responses</i>
1.	Apples that haven't been sprayed with chemicals and free from blemish are very hard to find.
	Due to the climate and soil in SENC, some fruits are more difficult to source locally
	More availability of stone fruits
	Mushrooms - inconsistent quality (wet, dirty)
	Mushrooms, need to always be in paper, never plastic
	Rutabagas and their greens, hard to find
	Sweet corn...but not because of quality or packing standards
2.	Greens - exposure to heat or freezing temps during highway travel in the back of a truck
	Lettuce without bugs
	More early and late season greenhouse vegetables

**23. Other than meeting quality and packing standards, what are your biggest barriers to sourcing LOCALLY grown fresh fruits and vegetables? (choose all that apply) (16 responses)**

	<i>Response Percent</i>	<i>Response count</i>
Delivery timing	18.8%	3
Require GAP certification	6.3%	1
I don't know where to find local product	0%	0
Liability insurance from producer	25%	4
Communication with producer	37.5%	6
Consistent volume when in season	81.3%	13
Price	50.0%	8
Not enough demand from customers	12.5%	2
Contracts and company policies	12.5%	2

<i>Other (please specify):</i>
Availability of a broad variety. I carry as much local produce as I can, but often multiple farmers offer the same items. Also, I think there could be a bigger focus by some growers to focus on season extension. There is obviously much less competition in the winter months, even though our climate can support many crops through much of the winter.
do the farms have a lot of waste products due to the unacceptability of the product to the consumer, ie. blemished produce that they feel that will not be acceptable to the consumer. what do they do with this waste and are they willing to give it away or sell it for a much lower price. I was able to purchase produce in this manner in Pittsburgh thru local markets that had an abundance with in season products
Finding growers with enough quantity to wholesale
Growers really need to establish a market for products before they grow a bunch of something that everyone else is growing, or that consumers have no real demand for.
Lack of year-round local produce.
not all prices, but some growers have unrealistic ideas of what their produce is worth. Prices are based on what the market will bear, not on value.
One thing that is important for growers to realize is that calling the day they want to bring a product is inconvenient, as we have already placed orders to fill our shelves. Need at least one to three days' notice, or more advance planning.
We wish that our organic and local produce was not so costly but recognize that we will have to pay now to ensure that local and organic become the standard not the exception in this country.

**24. What types of support would be most helpful in addressing these barriers? (13 responses)**

<i>Category of response</i>	<i>All responses</i>
<i>Marketing and promotion</i>	Informing growers that buyers like us are available
	Marketing education for small farmers.
<i>Training and technical assistance for farmers</i>	Farmers to know how to use smart phones
	true costs of goods. volume discounts. open, honest communication
	Consumer and social marketing to drive demand, a lot of farmer support about consumer demand, food safety, post-harvest handling, packaging, succession planting, season extension
	Possibly a workshop for growers to learn about wholesaling. Maybe a producer meeting for growers wanting to sell to the store.
<i>Increased/extended production from producers</i>	more green houses
	Develop relationships with growers who can produce large quantities of specialty products
	Farmers who greenhouse or store warm season grown produce throughout the cold months.
<i>Co-ops of producers</i>	Group Co-ops to bring a number of farmers together so that the deliveries and billings will be consolidated.
	Perhaps a coop to pool for insurance and distribution
	Eastern Carolina Organics seems to be very effective at getting products to market in quality and quantity. However, they seem to be most effective in the central part of the state. There may be room in other parts of the state to duplicate their model.
<i>Other</i>	We must all continue to educate the consumer regarding the high cost of eating poorly. We must also make people realize that supporting local growers and business reduces our dependence on foreign oil. Keep doing what you are doing!

**Appendix A:****7. What percentage of your produce purchases comes from LOCAL farms? (All responses)**

In Spring	In Summer	In Fall	In Winter
20	20	20	10
100	100	100	100
90	100	100	90
20	40	30	10
95	98	98	70
8	14	9	2
40	50	40	20
10	40	30	15
40	75	70	35
30	45	40	25
100	100	100	100
25	25	25	25
100	100	100	100
10	20	20	10
20	30	20	10
20		20	20
100	100	100	100

Appendix B:	
8. Why does your business choose to purchase locally grown produce?	
<i>Category of response</i>	<i>All responses</i>
<i>Support local farms and the local community</i>	Because it is the right thing to do as long as the pricing is competitive with produce from other regions of the country.
	Consideration for the environment (transportation/fossil fuels); freshness; to support the local economy; to foster community.
	Better quality, support local farms, the price is higher but worth it
	Consideration for the environment (transportation/fossil fuels); freshness; to support the local economy; to foster community.
	Easier tracking, less petroleum, helps my neighbors
	Freshness of produce, to support local farmers & businesses, to reduce use of energies used to transport, customer demand, store employee preferences.
	It is important to our region and the sustainability of farmers.
	It is part of our mission, to support local farmers and small businesses.
	It is the only ethical choice. I want a relationship with the ppl that grow my food and I want to share that with my customers. In my desire to be part of a community it would be hypocritical to not invest in other local interests such as farming.
	Our customers demand it Better quality and taste reduce fossil fuels support local farmers
	Our menu is seasonal and focuses on the produce available in each season. We support our local economy and believe that local and organic is the only responsible choice.
	Purchasing from local vendors supports our community and our state. Our store mission statement includes directives to purchase locally. Also, there is a strong demand for local items from our customers.
	shorter supply chain, greater impact on locally families
	To support the local food system. To keep those dollars closer to home.
	To ensure our money stays with our local growers
	To support the local economy and agricultural community, to be able to provide high quality products at good prices in season
<i>Other</i>	This is the mission of our work
	quality, availability, price, growing practices
	It is based on that premise entirely

## Project Title: Managing Heat Extremes in Camarosa Strawberry

### PROJECT SUMMARY

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The initial purpose of the project was to evaluate a micro-climatic management technique called 'evaporative cooling' that could possibly allow North Carolina strawberry farmers to prevent heat damage to flower buds and open blooms of the strawberry variety 'Camarosa'. Camarosa is now the leading strawberry variety in the coastal plain, piedmont and Sandhills because of its superior shelf-life compared to Chandler, which was supplanted by Camarosa in the mid-1990s. Camarosa is a much less perishable strawberry than Chandler, and this variety has made it possible for North Carolina growers in these regions to expand their pre-pick and wholesale trade – an area where much opportunity still exists. But, as the 2010 strawberry season demonstrated, Camarosa also has some production weaknesses relative to Chandler, and one of these shortcomings relates to its inability to cope with extremes in heat during the transition period from pre-blossom to open blossom stage in late March and early April. There are few other fresh fruit or vegetable crops that offer North Carolina farmers as much economic opportunity for a profitable income as strawberries. But, despite record consumer demand for local strawberries, a heat wave in the spring of 2010 (during early April) caused strawberry farmers to have a very truncated Camarosa harvest of as little as 2 ½ - 3 weeks, instead of a normal 4-5 week season. Thus, the primary purpose of this two-year research project was to investigate the technical feasibility of utilizing evaporative cooling to mitigate strawberry crop bud and blossom losses to extreme heat during the critical pre-bloom, and bloom period, and to also examine the use of evaporative cooling in the harvest season as well. Utilizing the principle of evaporative cooling, Dr. Ronald Sneed of NC State University, promoted overhead irrigation sprinkling to alleviate heat stress during strawberry bloom and harvest in the 70s and 80s (Sneed, 1990), however, this work was done with the now obsolete matted row system and varieties suited to that growing system (e.g. Atlas, Apollo). Since the late 1980s older matted row varieties have been replaced by Chandler and Camarosa (Poling, 1993), and virtually the entire strawberry industry in North Carolina uses the newer strawberry plasticulture system (Fig. 1).



Fig. 1. North Carolina is the third largest producer of strawberries in the nation by farmgate value of crop, with a 2012 crop value of \$29.4 million on approximately 1600 acres (NASS).

The importance and timeliness of the project. Up-to-date research-based recommendations on evaporative cooling are needed for the strawberry plasticulture system, which is now the dominant growing system in North Carolina (Poling and Durner, 1986; Poling 1993). In most years, farmers are concerned about frost damage to flower buds and blooms in late March and early April, but within 24 hours of a March 31, 2010 frost event, North Carolina strawberry farmers were being advised on extension’s advisory, *berry mg*, of a potential serious heat event on April 1<sup>st</sup>. In reality, the heat event continued over a 7-day period (Figure 2), with a new record high temperature being reached in Raleigh, NC, on April 5 (88 F), and the hottest day was April 6 (90 F). Higher temperatures in the mid-90’s were recorded in the Sandhills of North Carolina during this week.

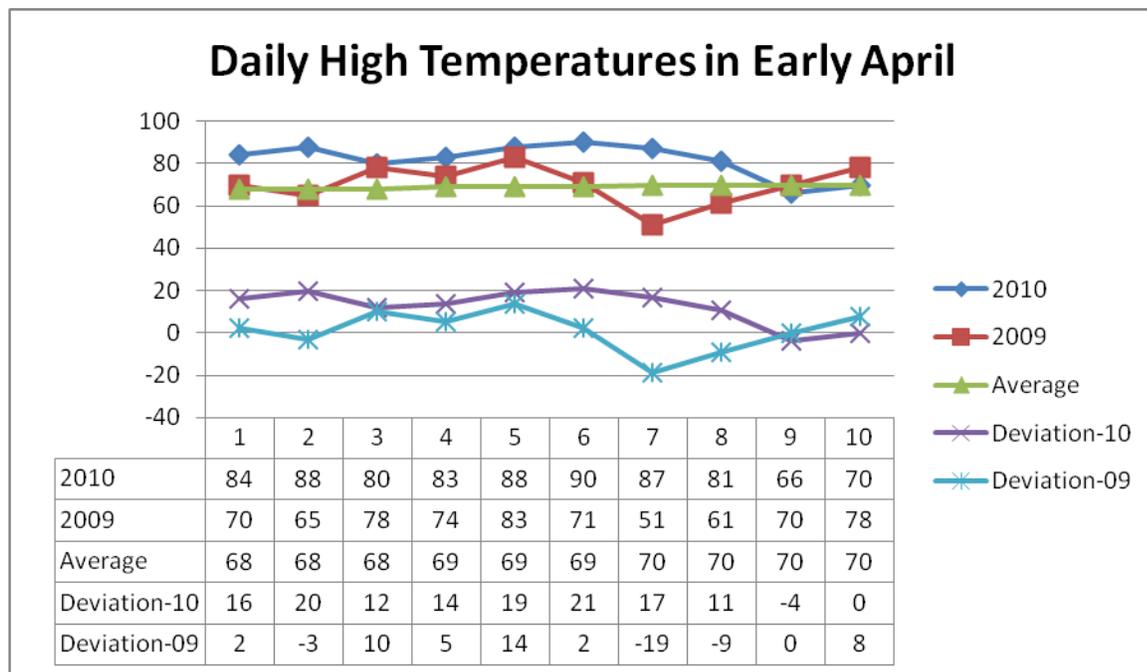


Fig. 2

In North Carolina, the strawberry industry has some familiarity with effects of damaging heat waves during the peak strawberry bloom period that occurs in mid-April, but we have no prior experience with heat waves in the first week of April. In 2002, the whole Southeast experienced a blistering heat wave from April 11-17, that coincided with the crop’s peak bloom, and the strawberry season that year ended quite abruptly in mid-May (exactly 1 month following the heat exposure in mid-April).

Building on previous work. Extreme heat during the pre-bloom and/or bloom periods is a more recent phenomenon in North Carolina. Unfortunately, there has been no previous work with the SCBGP on this specific topic of heat mitigation with evaporative cooling for the strawberry plasticulture growing system. There did not seem to be any cultivar-specific effects observed with the 2002 heat wave, but it came to our attention in 2010 that although the strawberry season

ended for Camarosa in the first week of May (about 2 ½ weeks of harvest), the Chandler crop continued to pick quite well into the third and even fourth weeks of May 2010. This phenomenon may be explained by a difference in the thermo-tolerance of these two cultivars - with Chandler flower buds being more heat tolerant than Camarosa.

## **PROJECT APPROACH**

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A strawberry plasticulture crop in North Carolina costing a minimum of \$12,000/acre before the harvest season is exposed to significant weather risks over an eight-month period that includes these nine developmental stages (these stages may overlap in some seasons):

1. Pre-plant period (late summer)
2. Planting and new plant establishment (early fall)
3. Floral bud initiation and branch crown development (fall/winter)
4. Crop hardening off (late fall)
5. Dormancy (winter)
6. New leaf growth (late winter)
- 7. Emerged flower buds (early March to mid-April)**
- 8. Bloom (spring)**
9. Harvest (spring)

This research project focused on heat stress mitigation strategies in stages 7-8. This is the first time in North America that anyone has scientifically evaluated the relative performance of several evaporative cooling systems in one location for the strawberry plasticulture system. The project was designed to collect “hard data” on the relative benefits of using impact sprinklers (Fig. 3a), microsprinklers (Fig. 3b) and fogging nozzles (not shown) for evaporative cooling (EC) under actual field conditions that would be similar for NC strawberry growers. The field research component of the project was carried out at the Central Crops Research Station, Clayton, NC (Lat. 5.66979°, Long. -78.4926° Elev. 350 feet above sea level) in the springs of 2012 and 2013.



Fig. 3a. Conventional sprinkler system.



Fig. 3b. Micro-sprinkler.

We worked with a university statistician on the final field design and layout. Doing replicated work on different irrigation approaches is very land-intensive, and our final experiment with 4 EC treatments and 3 replicates occupied 1 ½ acres. A professional irrigation engineer assisted in the design and installation of 3 types of EC systems for comparison. A data logger and associated sensors were located within each of the replicated experimental blocks (Fig. 4). Bud temperature, air temperature and relative humidity were closely monitored each day in April and early May of 2012 and 2013. During actual evaporative cooling episodes we also utilized a handheld Omega Digital Thermometer with thermocouple inserted in the blossom to record the actual temperature drop in the blossom after a 25 min. sprinkling cycle (Fig. 4). In the 2013 season we also tagged a group of blossoms in early May, and followed these through harvest, and then recorded average berry weights for these tagged blooms (Fig. 5). From each research plot all ripe berries were harvested two times weekly from mid-April through early June, and total, marketable and cull yield data were recorded in each season (see Tables 1 and 2).



Fig. 4. Our approach was to initiate sprinkling when actual blossom temperatures reached 87-88 F, as determined with a hand-held digital thermometer with thermocouple inserted in the open blossom (exposed to the sun). After 25 minutes of sprinkling, it was not uncommon to see a 7-8 F reduction in blossom temperature due to evaporative cooling. It has previously been reported that air temperature in close proximity to the blossom on sunny windless days are an inadequate indicator of the need for heat stress alleviation (Hellman and Travis, 1988). A digital thermometer gives a precise reading of the actual blossom temperature.

For experimental purposes only, we used evaporative cooling during the May harvest period at Clayton Central Crops in both 2012 and 2013. We experienced excellent “heat stress” conditions that began on May 3, 2012, and again in mid-May 2013, but this occurred during the harvest period (Stage 9) when the crop was well past peak bloom and was now being harvested. On a limited number of late season blossoms, we were able to evaluate evaporative cooling (EC) in both years under temperatures that varied from 87 to 94 F (in the blossom).

However, strawberry growers in North Carolina do not usually use sprinkling during the harvest period because of food safety concerns. Overhead sprinkling for heat reduction is only recommended during the blossom (pre-harvest) period. Growers are advised to use drip irrigation for heat stress during harvest period on days when there is threat of heat 114

injury to ripe and near ripe berries (<http://strawberries.ces.ncsu.edu/2013/05/warm-temps-today-and-tomorrow-8-am-may-15-2013/>).

Table 1. Marketable yield and average berry size (grams/berry) for several evaporative cooling procedures in Spring 2012, Clayton Central Crops Research Station

Evaporative Cooling Procedure	Marketable yield (pounds/acre)	Ave. berry size (grams/berry)
Misting (treatment 4)	39,484 a <sup>z</sup>	16.5 a
Impact sprinklers (treatment 2)	38,983 a	16.3 a
Control (trt 1 - drip irrigation)	38,930 a	16.1 a
Micro-sprinklers (treatment 3)	38,458 a	16.6 a

<sup>z</sup> Means with the same letter are not significantly different.

Table 2. Marketable yield and average berry size (grams/berry) for several evaporative cooling procedures in Spring 2013, Clayton Central Crops Research Station

Evaporative Cooling Procedure	Marketable yield (pounds/acre)	Ave. berry size (grams/berry)
Impact sprinklers (treatment 2)	27,660 a <sup>z</sup>	21.8 a
Micro-sprinklers (treatment 3)	27,633 a	21.6 a
Control (trt 1 - drip irrigation)	27,361 a	21.3 a
Misting (treatment 4)	26,700	a 21.6 a

<sup>z</sup> Means with the same letter are not significantly different.

Conclusions, recommendations and favorable and unfavorable results.

During the warmest days in May in 2012 and 2013, we ran the drip irrigation system aggressively in the very early morning. And, the marketable yield data in both years suggests that this approach (drip irrigation) can be just as successful as the evaporative cooling procedures with impact sprinklers, micro-sprinklers and misting nozzles (Tables 1 and 2). This is an important finding, as the practice of "direct" overhead irrigation with untreated surface waters for crop evaporative cooling *during harvest* (Stage 9) could be

risky from a food safety standpoint. There are opportunities untreated surface waters to become contaminated by upstream wastewater treatment plants, livestock, feral animals, birds, etc., for which the farmer using the water has no control. Thus, from this research we demonstrated that there is not a consistent yield or berry size benefit associated with blossom evaporative cooling during Stage 9.

Thus, our recommendation from this work is that drip irrigation is far less risky heat mitigation tool during the harvest period, and marketable yields and berry size is comparable to crops that have had the EC treatment in Stage 9. Further research work is still needed to determine an optimum drip irrigation program under field conditions during extremely warm harvest conditions (upper 80s and 90s). Some growers believe the drip system needs to be run before sunrise for 1-2 hours, while other producers claim success in using drip at the hottest times of the day.

In this research project we were primarily interested in generating quantitative information showing the yield and perhaps berry size benefit of using evaporative cooling during the April bloom period. However, the “risk” in this type of field research is that we are highly dependent on getting warm/hot temperatures in the month of April, which we did not experience in either year.

Since we were unable to “test” evaporative cooling during crop Stages 7-8, we are currently re-applying for research funding to help support a follow-up investigation in 2014 and 2015 through the NC Strawberry Association, which regularly provides researchers from NC State with about \$30,000 in support each year from a nursery plant check-off program. It may be possible in one or both of these years to evaluate temperatures extremes comparable to what occurred during the early spring bloom in 2010.

#### Benefit to commodities other than strawberry.

The scope of this research project was quite narrow, and there is no project benefit to other commodities outside of strawberry plasticulture.

The field day was not conducted in 2013 as planned. It has been re-scheduled for a date in mid-May 2014 at another research station location, Cunningham Research & Extension Center, Kinston, NC, on a date that is being finalized by NCSU College of Ag and Life Sciences Admin - but, is tentatively being set for Thursday, MAY 15, 2014. The field day<sup>16</sup>

will be promoted through the university and Cooperative Extension, as well as by the NC Strawberry Association (NCSA). An article promoting the field day will appear in the April 2014 newsletter of the NCSA, and this will be shared with Jeff Camden.

A misunderstanding occurred with the NCSA (organization that sponsors the Southeastern Strawberry Expo), and this project was not discussed at the Dec. 2013 Expo. As Dr. Poling is now the Interim Executive Director of this organization, as well as being committee chair for the Expo Program Speakers, it will be possible to include a summary of this important project in the Tuesday, Nov 18, 2014, educational program of the Expo at the Pinehurst Resort (Nov 16-18) this fall as part of a Weather Management Workshop for Strawberry Plasticulture Growers. Jeff Camden will be notified in summer 2014 of the final program agenda.

#### Significant contributions and role of project partners.

The staff at Clayton Central Crops research station provided the Project Leader with exceptional support during the two years of field investigations, and were very cooperative in helping us run evaporative cooling trials in the month of May, which was beyond the scope of the initial research plan.

### **GOALS AND OUTCOMES ACHIEVED**

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This research project attempted to identify the benefits associated with managing heat extremes during the early to peak bloom periods in April with evaporative cooling (EC). Despite the fact that we did not experience stressful temperatures in either season (2012 and 2013), it remains our belief that further scientific research efforts are needed in this area in the future. Efficient use of evaporative cooling in the strawberry plasticulture production system for the state's leading variety, Camarosa, are still needed to provide better guidelines for scheduling irrigation applications during emerged flower bud and bloom stages (7-8). Without this basic information, it is difficult to recommend this practice as an effective strategy for cooling buds and blossoms in periods of extreme heat during Camarosa bloom.

From our studies we have generated quantitative information that demonstrates the feasibility of using drip irrigation during the harvest stage (9) for managing heat extremes, and this new information was presented during the 2013 harvest season to the North Carolina strawberry industry on the Extension Service's portal <http://strawberries.ces.ncsu.edu/>. Further research work is still needed to determine an

optimum drip irrigation program under field conditions during extremely warm harvest conditions (upper 80s and 90s).

## **BENEFICIARIES**

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The most direct beneficiaries of this grant are NC Specialty Crop growers who are trying to profitably grow the Camarosa strawberry variety, which is a more environmentally sensitive variety than Chandler to heat extremes during early and peak bloom. The finding of this project that drip irrigation during Stage 9 can be just as effective for heat mitigation as evaporative cooling is useful information for NC strawberry farmers, and industry suppliers. Growers would still like to have research-based information on the benefits of evaporative cooling during the early and peak bloom period, and so it is important for us to reach out to different organizations like the NC Strawberry Association for support to continue this research in 2014 and beyond. Consumers benefit from having access to locally grown strawberries that are produced with agricultural practices during harvest that minimize risk of microbial contamination.

## **LESSONS LEARNED**

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In addition to the insight we gained from this research that drip irrigations is just as effective for heat mitigation during the harvest period as evaporative cooling, is the observation that there is a significant difference in the relative size of strawberry canopy in May when the plant canopy is completely filled-in and covers nearly 100% of the black plastic mulch (Fig. 5).



Fig. 5. In early May the strawberry plant canopy is completely filled-in, and this may be a very important adaptive feature for keeping air temperatures around blooms cooler on warm/hot days because of canopy shading effects.



Fig. 6. In the early spring the strawberry plant canopy is small/modest in size and a significantly greater area of the black plastic mulch is exposed to the sun than during the harvest period (Fig. 5). This increased surface area of black plastic mulch is likely an important “driver” in causing air temperatures around blooms to become dangerously elevated on days of unseasonably warm/hot temperatures in early April. Evaporative cooling may be of significant advantage for protecting blossoms during the early bloom period before the canopy has filled-in.

## **CONTACT PERSON**

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## **ADDITIONAL INFORMATION**

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Website:

**Heat management case study at Clayton (guidelines)**

<http://strawberries.ces.ncsu.edu/2013/04/heat-management-case-study-at-clayton-guidelines/>

**Quick update on today's temps (9 am, Friday, May 10, 2013)**

<http://strawberries.ces.ncsu.edu/2013/05/quick-update-on-todays-temps-9-am-friday-may-10-2013/>

Website (cont'd)

**Warm Temps Today and Tomorrow (8 am, May 15, 2013)**

<http://strawberries.ces.ncsu.edu/2013/05/warm-temps-today-and-tomorrow-8-am-may-15-2013/>

Meetings/Field Days:

We plan to share the results of our two year field investigation from this trial at a Clayton Central Crops at a Strawberry Research Field Day in May 2014. In addition, and a full report will be provided at the Southeastern Strawberry Expo in fall 2014 in Pinehurst, NC.

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Sneed, R.E. 1980. Mist cooling of strawberries, p.117. In: N.F. Childers (ed.). The Strawberry, Cultivars to marketing. Horticultural Publications, Gainesville, Florida

USDA, 2013. Noncitrus Fruits and Nuts 2012 Preliminary Summary.

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## **Project Title:** Reducing Wireworm Risk in Irish Potato

### **PROJECT SUMMARY**

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Wireworms have become an increasingly serious concern for potato growers in North Carolina in recent years. Wireworm larvae live below the soil surface and feed on the roots and stems of growing plants. The insects are capable of damaging potatoes by feeding on the seed piece shortly after planting, but direct feeding on the developing tubers presents the greatest risk to the crop. There is currently no effective control strategy that specifically targets wireworms feeding on developing tubers. Wireworm damage on table-stock potatoes can be devastating because of low thresholds for external defects. Published reports indicate that in some years as much as 45% of the potato crop can be downgraded in quality because of wireworm damage. Of significant concern is the fact that there is currently no method for growers to ascertain which fields are likely to harbor populations of wireworms. Cultural practices and environmental conditions have been shown to have a significant impact on wireworm abundance and crop damage in numerous studies across the US. Nevertheless, the importance of these factors in determining risk of wireworm damage in potato in North Carolina is unknown. For this reason nearly all potato fields in North Carolina are treated preventatively with insecticide for wireworms whether they need it or not.

The species composition of the wireworm complex present in potato in North Carolina was unknown, and this lack of knowledge presented a significant and fundamental barrier to the development of IPM programs for wireworm in the crop. Studies conducted at North Carolina State University revealed that there are at least eight species of wireworm present in sweetpotato in North Carolina. Each species has its own unique biology, and each responds differently to control tactics. Following the identification of the wireworm complex, management strategies were developed in sweetpotato to specifically target the most economically important species. Preliminary studies (by Abney) in potato indicate that the wireworm complex is different than that found in sweetpotato. This project identified the wireworm species present in potato, characterized the damage potential of two common species, and identified risk factors associated with damage.

### **PROJECT APPROACH**

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A series of studies was conducted over three years to evaluate potential risk factors that influence wireworm damage in potato. A two year commercial field study was conducted to determine the wireworm species composition and the risk factors associated with wireworm damage in potato. Potato fields were selected for the study based on the following potential wireworm risk factors: potato cultivar, harvest date, insecticide use patterns, soil organic matter, and crop rotation schedule. Fields were baited using steam crimped oat baits and potato fields were harvested at 14d intervals post tuber initiation. The wireworm species *Melanotus communis* (Gyllenhal) and *Glyphonyx* spp. comprised over 70% of all wireworm species collected. Knowing what species are attacking the crop is a critical first step in the development of IPM strategies.

Three insecticide efficacy trials were also conducted to determine the most efficacious insecticides for wireworm control in potato and determine the effect of manipulating harvest date on wireworm damage in potato. Insecticides such as fipronil or imidacloprid + bifenthrin consistently reduced wireworm damage incidence and severity from the untreated check. Over a 14d period of tuber harvest, wireworm damage levels increased from 25% to nearly 45% averaged across all insecticide treatments. This result can help growers make harvest timing decisions. For example, when a field with known wireworm populations is nearing maturity, growers may elect to harvest this field early/first to avoid the accumulation of additional wireworm damage.

A laboratory bioassay was conducted to determine the relative susceptibility of six cultivars to wireworm feeding by two species under two soil moisture conditions. Relative susceptibility was measured by: 1) percent of tubers with feeding injury, 2) number of feeding holes per tuber, and 3) volume of tuber consumed. Averaged over all cultivars, *M. communis* created more feeding holes and consumed more tuber tissue than *G. bimarginatus*. *Glyphonyx bimarginatus* feeding was negligible in all cultivars indicating that this species may not be an economically important pest of potato. Dark Red Norland and Yukon Gold cultivars sustained the most wireworm feeding damage and are considered more susceptible relative to other cultivars tested. The manuscript "Relative susceptibility of selected potato cultivars to feeding by two wireworm species at two soil moisture levels" has been accepted for publication in the peer reviewed journal *Crop Protection*.

A field study was conducted at two locations over two years to evaluate the efficacy of insecticides applied to field corn for the reduction of wireworm damage to potato planted in rotation the following year. Field corn was planted in 2011, and potato was planted in 2012 at each location. Fipronil and clothianidin treatments provided a significant reduction in wireworm damage incidence and severity as compared to the untreated check. A combination of baiting and absolute sampling was conducted to evaluate the effect of insecticide on the relative abundance of wireworms in the year after treatment. The number of wireworm larvae collected through both baiting and absolute sampling did not reflect levels of tuber damage observed therefore we cannot rely on baiting to effectively determine whether insecticides applied to corn in 2011 reduced wireworm populations of economically important wireworm species in 2012.

Wireworms live in the soil and are difficult to study both spatially and temporally without destructively sampling their natural habitat and potentially changing their behavior. An X-ray machine was used to evaluate the behavioral response to insecticides applied to the soil. Significantly fewer *M. communis* exposed to bifenthrin permeated the treated zone compared to all other treatments and damage incidence and severity was reduced. Mortality of wireworms exposed to bifenthrin was not different than the untreated check indicating that bifenthrin is not effective at killing *M. communis* and therefore reducing *M. communis* populations. More wireworms exposed to fipronil were found dead, and a reduction in damage incidence and severity was observed. Results indicate that fipronil is a desirable compound to use for the control of *M. communis* in potato production systems in North Carolina. Learning how wireworms respond to insecticides applied to the soil is important for the development of management strategies that optimize insecticide use. This research provided new insights into the biology of wireworms affecting potato in NC

and provided some practical information that can be used by growers to reduce the risk of damage to their crop. This work represents a significant base upon which additional studies can be built if NC State University chooses to invest in the future of the potato industry by hiring a new vegetable entomologist.

Results of completed studies were presented at two NC Irish Potato Growers Extension Meetings in Elizabeth City, NC on 9 February 2011 and 5 December 2011. Data from all studies were analyzed and interpreted and are included in the MS thesis of Mr. Kevin Langdon; the thesis is available to the public online through the NC State University library system. We expect at least one additional peer reviewed publication from this work.

## **GOALS AND OUTCOMES ACHIEVED**

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The scope of the research conducted went far beyond that of the original research proposal. The work was extremely labor and resource intensive, and the additional cost was covered by the project leader. As stated previously, this project was designed to identify the species composition of wireworm in potato and identify risk factors associated with damage. These objectives were met. Research was conducted in commercial potato fields in cooperation with growers as described in the project proposal. The research was conducted by an MS student who has successfully completed and defended his thesis. One manuscript has been accepted for publication in a peer reviewed journal, and we expect at least one additional peer reviewed publication. We identified the most effective insecticides that growers can use to manage the pest and quantified the relative susceptibility of most of the commonly grown cultivars. This information was provided to growers and county Extension faculty at annual grower meetings. Our research findings were also presented at national and regional Entomological Society of America conferences. We evaluated a novel experimental approach to reducing wireworm populations in potato by treating rotation crops with insecticide seed treatments. Understanding how soil insects respond behaviorally to management strategies is important, but gathering the information can be difficult or impossible. Our research with x-ray provided some of the first data that show how wireworms behave in the presence of a variety of insecticides in the soil. The impact of this project on potato production in NC has not been quantified. The project leader left NC State at the conclusion of the project, and there is currently no one available to conduct the appropriate surveys needed to assess the long term benefits/impacts of this work.

Field research was actively conducted up to and beyond the end of the funding period in July 2012. A no-cost extension was requested in spring 2012 that would allow allocated funds to be used for the preparation and dissemination of extension materials to growers and County Extension faculty after the field research was completed. The request was delayed excessively, and funds were not available to produce the Extension documents before the PI left NCSU. Information was to be posted to the NCSU Vegetable Entomology web site, but the site was taken down after the departure of the PI. In spite of these challenges, the work discussed here provided much needed information to NC potato producers and opened the door for additional research and Extension activities. In the absence of a vegetable entomologist at NCSU, the full impact of this research may never be realized. Our original goal of developing a “risk index” for wireworm in potato

was found to be impractical. Most of the environmental and production variables studied had little or no measurable impact on wireworm populations or damage to tubers. Nevertheless, growers now have a much better understanding of the risk factors that were identified. Producers can now make informed decisions about the use of specific potato cultivars, available insecticide options, and the timing of harvest to reduce the likelihood of wireworm damage. Many of our findings went beyond the original scope of the proposal and would require additional research effort to fully investigate and integrate into management recommendations.

## **BENEFICIARIES**

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North Carolina potato producers are the primary beneficiaries of this work. Research results provide growers with knowledge to reduce the risk of wireworm damage to the potato crop through both cultural and chemical control tactics. Any attempt to quantify the economic impact of this work on the crop would be an educated guess that could be disputed. It is clear that potato continues to be of significant economic importance in Eastern North Carolina, and this work should lead to more profitable production through reduced insect damage and greater efficiency of wireworm control. Fewer than twenty North Carolina producers grow approximately 16,000 acres of Irish potato in the state annually. This project was conducted on commercial farms managed by ten different growers and the results were disseminated to others through county Extension meetings. A conservative estimate is that 70% of North Carolina's commercial potato producers were directly involved with this research and benefited from its findings.

## **LESSONS LEARNED**

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Our research provided new information about the wireworm fauna of eastern North Carolina and could provide an excellent starting point for additional research. While no single strategies will eliminate the risk of wireworm damage, this work showed that a combination of tactics including insecticide selection and proper use, cultivar selection and harvest date planning can provide significant benefit to producers. It was clear from the study that while two species of wireworm are abundant in potato fields, only one contributes significantly to damage. We originally planned to produce an Extension publication to highlight findings and provide best management practices to growers. Unfortunately, the response to our request for an extension of grant funds beyond the project end date was delayed so excessively that the Extension educational materials could not be completed prior to the departure of the project leader.

## **CONTACT PERSON**

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## **Project Title:** Evaluating Hop Production in North Carolina

### **PROJECT SUMMARY**

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There is widespread interest in establishing a commercial hops (*Humulus lupulus*) industry in North Carolina. This has been spurred by rising demands from a burgeoning craft brewing industry in the state, a healthy home brewer population, a strong public interest in locally grown ingredients, and significant increases in the market price and transportation costs of hops. The upsurge in the number of growers across the state led to an increased importance for accumulating specific growing information for our region. Until recently, growers were working with information from the industry in the Pacific Northwest, without the benefit of any objective recommendations from recognized local sources.

The primary goal of this project was to help North Carolina farmers meet the growing demand for locally grown hops by researching the best performing hop cultivars and by analyzing key agronomic issues related to nutrition, water management, and disease and pest control. We also wanted to help this industry grow by encouraging networking between growers and brewers and providing information on growing hops to growers and agricultural educators.

A high trellis research hop yard was constructed and planted on the Mountain Horticultural Crops Research Station in Mills River in western North Carolina in the spring of 2011 by Jeanine Davis and Kelly Gaskill (Fig. 1). To accommodate the steep topography of the region, the trellis was designed with a top wire that can be lowered to accommodate harvesting and other practices without the use of ladders or cherry pickers. The yard contains ten varieties that appeared to be best suited for production in this region and are of value to brewers. The Mills River yard compliments the short trellis research hop yard that was constructed on the Lake Wheeler Road Field Facility in Raleigh in eastern North Carolina in 2010 by Rob Austin and Scott King (Fig. 1). It also contains ten varieties and was constructed with funding from a Golden LEAF Foundation grant. In 2011 and 2012 data were collected on growth rates, yields, and disease and insect pressure. Cones were harvested multiple times per season and dried. Dried cones were analyzed for alpha and beta acids and essential oils. Samples were provided to breweries and home brewers to evaluate their brewing properties. In 2011, students in the fermentation program at Appalachian State University analyzed the hops and brewed beer that was used in taste tests at a large meeting in Asheville in the spring of 2012. In 2012 ASU students served beer at the annual Beer Fest in Boone, NC using hops they harvested from the Mills River hop yard, analyzed, and brewed.

The 2010 GoldenLEAF grant supported the creation of a small network of cooperating farmers in western North Carolina. This grant allowed us to expand that network and collect soil and tissue samples from commercial hop yards across the state. The information gained from that testing resulted

in development of fertility recommendations for hops grown in North Carolina. There is now a hop code (119) on the North Carolina Department of Agriculture & Consumer Services soil sample information form. The recommendations received are based on the soil samples obtained through these two grant projects.

Outreach was a large part of this project. Successful field days were held at the research hop yards attracting about 300 people. Hundreds more attended presentations at state, regional and county conferences and meetings. Over 100 people made appointments to visit the Mills River hop yard and speak with us personally. Post-season grower meetings were held both years in Mills River for hop growers, future growers, and extension personnel to share information and provide advice for the future of the program. Our blog, <http://ncalternativecropsandorganics.blogspot.com>, kept the public

updated on the project. Lively discussions ensued through Facebook and Twitter. The NC Hops Project website <http://nchops.soil.ncsu.edu/> will continue to be a resource for information on this project and future studies. The Southern Appalachian Hops Guild grew out of this project and has proved to be a valuable networking tool for growers and brewers. They maintain a Facebook page and blog to facilitate communication.

To gauge the impact of this program, we sent three questions to everyone on the email listserv that we have developed over the course of this project. There are 350 contacts on that list. Results from the survey revealed that 98% of respondents know more about growing hops now than they did two years ago, 93% are more knowledgeable about varieties than they were two years ago, and 98% said there is more information available about growing hops than two years ago.

We are in contact with numerous farms, breweries, and brewing clubs across North Carolina that are currently attempting to or have recently established hop yards to serve the demands of growing interest in hops production. North Carolina has seen the number of hop growers rise from 30 to over 80 in the past two years. The size of these hop yards vary from a few plants up to 3 acres. There are known growers in Ashe, Avery, Buncombe, Haywood, Madison, Polk, Granville, Durham, Rutherford, Guilford, Wake, Lenoir, Yadkin, Catawba, and Alamance counties. The number of breweries has also exploded. There are more than 70 craft breweries in the state. Three national craft breweries have chosen western North Carolina for their eastern U.S. breweries. Oskar Blues is already in operation in Brevard, Sierra Nevada plans to open their brewery, which is adjacent to the research station in Mills River in July 2013, and New Belgium plans to start brewing in Asheville within two years.

Using today's open market price of \$11.00/lb for Cascade, a popular variety with craft breweries, a farmer could expect to earn approximately \$18,700 from one acre producing 1,700 pounds. With a total potential demand of 185,000 to 370,000 pounds per year the entire North Carolina hop market could range from \$2.0 to \$4.0 million. To fill this demand North Carolina would need around 100 - 200 acres in hops production. It is likely this demand will be filled by many 0.5 to 2 acre plantings that smaller farms will need in order to diversify income and reduce risk.

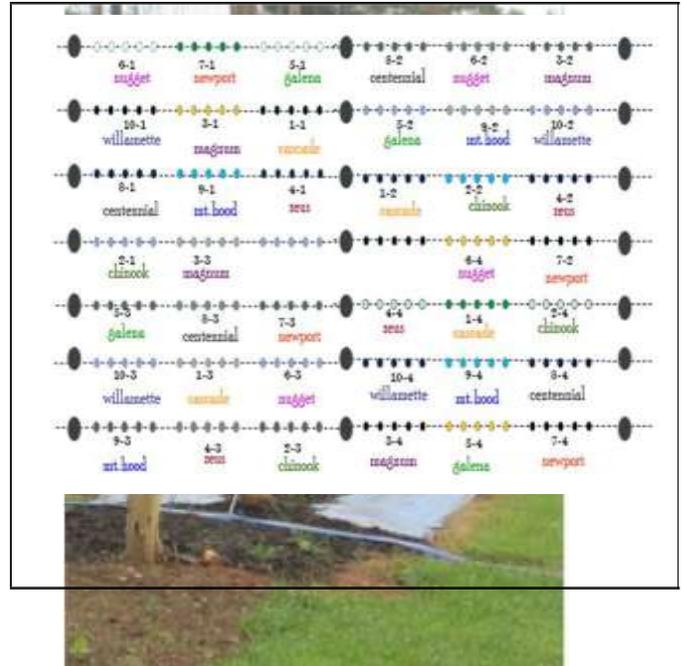


Figure 1. Research hop yards in Raleigh (left) and Mills River (right).

## PROJECT APPROACH

A research hop yard was constructed and planted with 10 varieties in Mills River at the Mountain Horticultural Crops Research Station in Mills River in the southern mountains of western North Carolina in the spring of 2011 (Fig. 1). It is a 20 foot tall trellis constructed of locust poles sourced from local horse loggers. Most hardware and other supplies used in the hop yard construction were also obtained from local sources. Eight of the hop cultivars planted were the same as the ones in the research hop yard in Raleigh. They were selected for their expected suitability for production in the Southeastern U.S. and for their desirability by local brewers. The other two varieties were ones that looked promising in other trials and replaced ones that performed very poorly in Raleigh.

- Each hop yard was established as a randomized complete block with 5 plants of each variety and four replications (Fig. 2). Varieties were selected based on their range of alpha acids (bitterness), yield potential, disease and insect resistance, total U.S. production, and demand by local craft breweries. Both sites contained Centennial, Nugget, Zeus, Cascade, Newport, Mt. Hood, Willamette, and Chinook. The Raleigh yard also had Sterling and Northern Brewer. The Mills River yard had Galena and Magnum.



Figure 2. Hop yard designs for Raleigh (left) and Mills River (right)

- Both of the research hop yards were maintained by weekly pruning; training; scouting; insect, disease, and weed control; irrigating; and photo recording. Major pests were identified and monitored and new spray programs were tested and implemented to control Downy mildew, spider mites, and Japanese beetles.
- Although there are numerous reports on how much it costs to establish a hop yard, we noticed that growers were greatly underestimating annual labor requirements. We maintained records on the amount of labor required to conduct standard practices in a hop yard. As shown in the graph below (Table 1), growing hops is labor intensive. Even though this was a research hop yard and not a commercial hop yard, discussions with growers revealed that this was fairly accurate.

Mills River Hop Yard 2011				
Production Labor		Quantity	Unit	Cost
Tying Twine	15	hour	\$10.00	\$ 150.00
Stripping Leaves	81	hour	\$10.00	\$ 810.00
Fertilizing	2	hour	\$10.00	\$ 20.00
Mulching	1	hour	\$10.00	\$ 10.00
Mowing	5	hour	\$10.00	\$ 50.00
Weeding	22	hour	\$10.00	\$ 220.00
Spraying	17	hour	\$10.00	\$ 170.00
Scouting	16	hour	\$10.00	\$ 160.00
Harvesting	138	hour	\$10.00	\$1,380.00
<b>Total</b>				<b>\$2,970.00</b>

Table 1. Labor required to maintain a one-quarter acre (200 plants) research hop yard.

- Variety differences were evaluated by comparing plant high, vigor, susceptibility to pest and disease, cone yield, plant tissue nutrients, and dried cone analyses.

Observations and data were collected weekly throughout the growing season; April through September.

- Clear differences in the 10 cultivars were seen in the vigor of lateral growth, plant height; tolerance, resistance, and susceptibility to pest and disease; and cone formation and yield.

### Mills River average plant heights- year 1

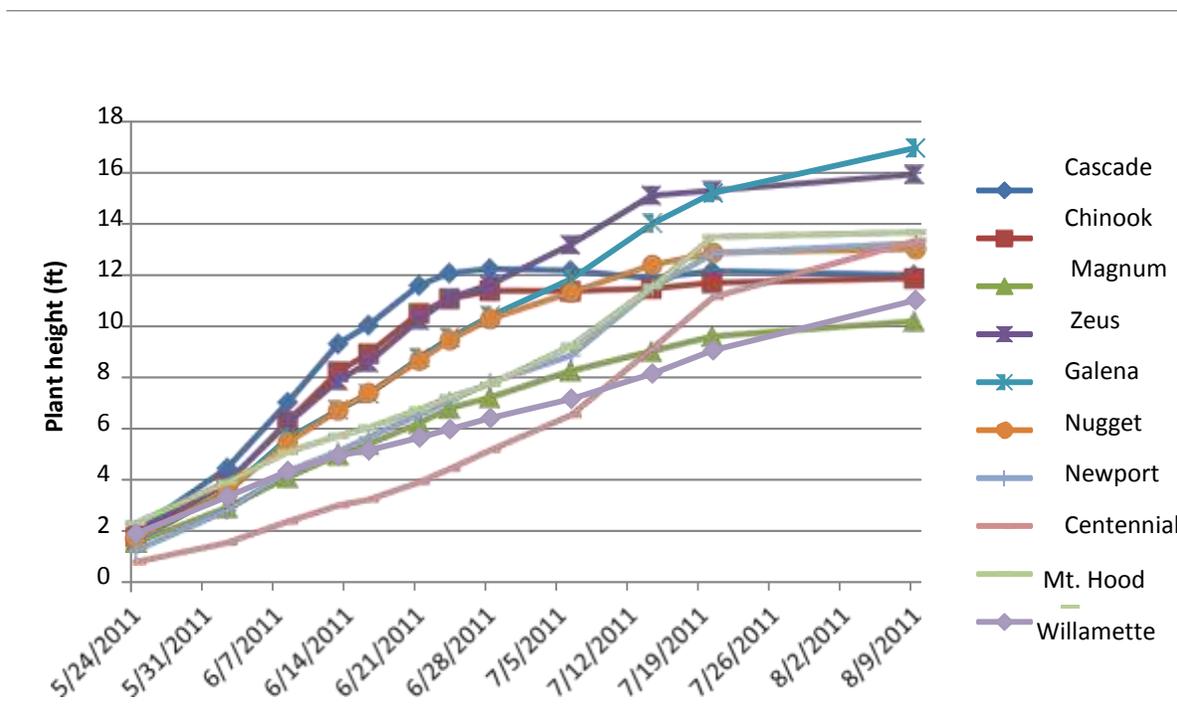


Figure 3. Plant heights in 2011 at the Mills River Research Hop Yard

### Mills River average plant heights- year 2

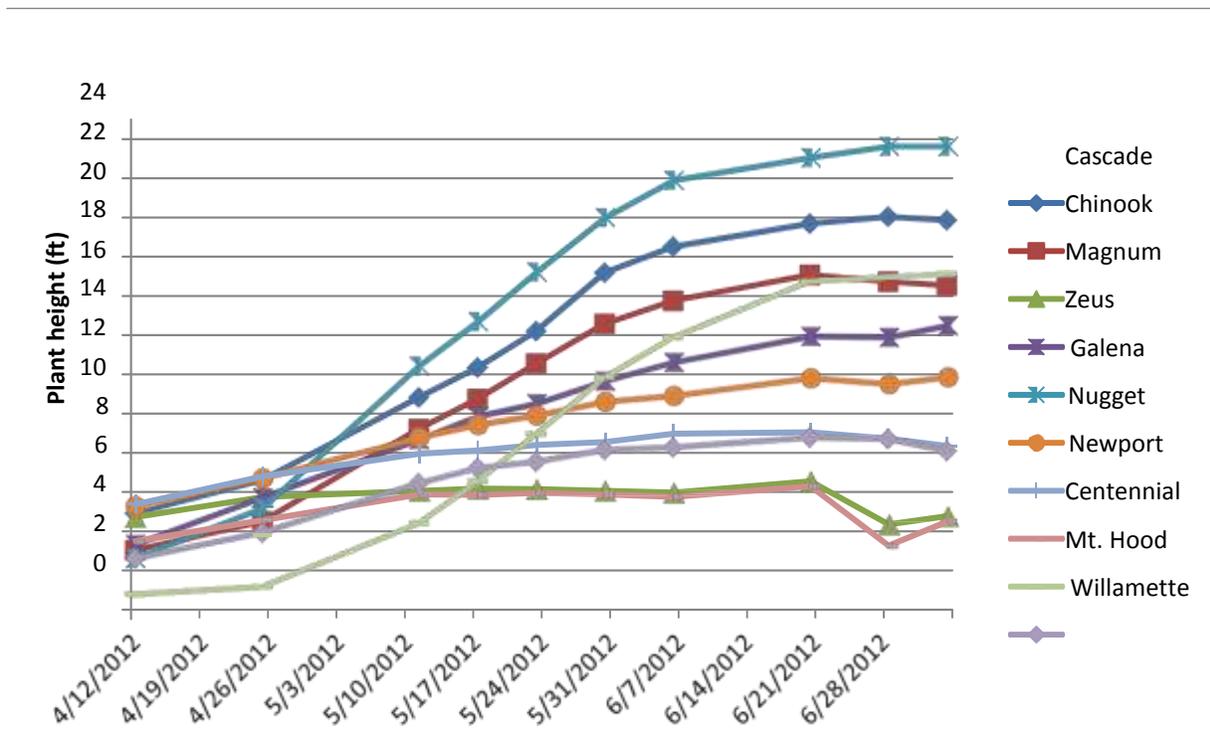


Figure 4. Plant heights in 2012 at the Mills River Research Hop Yard

- There was a large difference in the total growth length of bines. As shown in Figure 3, at the Mills River yard in 2011 the varieties ranged from 10 feet to 17 feet in length. The longest bines were Galena and Zeus and the shortest were Willamette and Magnum. In 2012 (Fig. 4) the bines ranged from about 5 feet to almost 24 feet in length. The longest bines were Galena and Cascade and the shortest were Centennial and Magnum.



Figure 5. Harvesting the Mills River hop yard (left) and buckets of fresh hops from the Mills River hop yard being weighed (right)

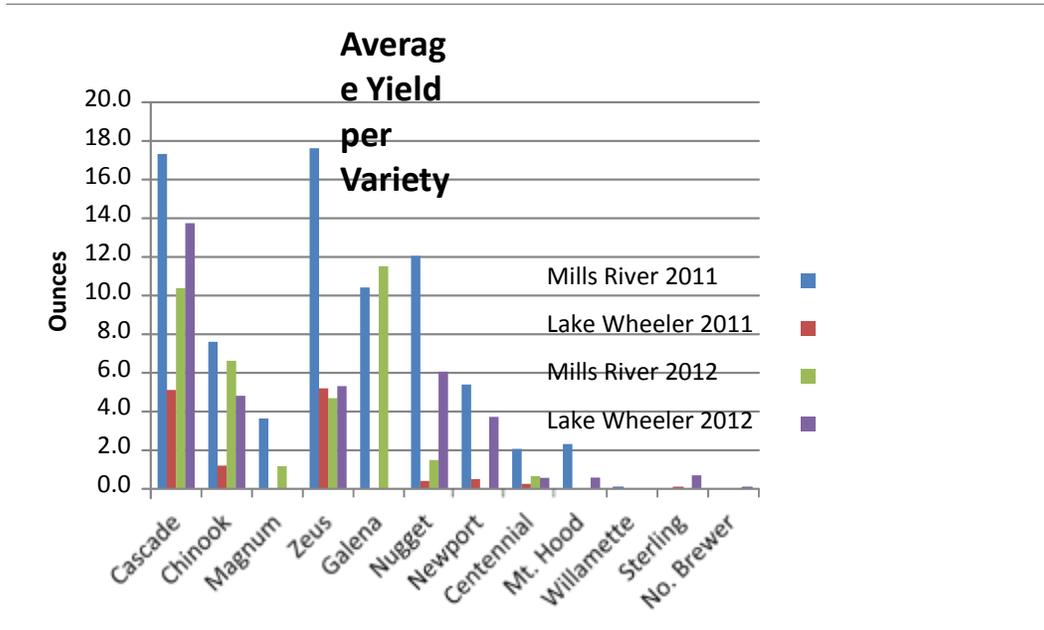


Figure 6. Average fresh weight cone yields for both research hop yards. Note that Sterling and Northern Brewer were grown only in Raleigh and Galena and Magnum were grown only in Mills River.

- Harvests were conducted on multiple dates at each yard both in 2011 and 2012 (Fig. 5). Cones were hand-picked and fresh weights were measured on a per plant basis.
- As seen in Figure 6, in 2011 all varieties produced higher yields in Mills River than in Raleigh, even though the Raleigh yard was a year older than the Mills River yard. That changed dramatically in 2012 when four of the varieties in Raleigh out-yielded those in Mills River. This was the result of a severe outbreak of Downy Mildew in Mills River that seriously reduced yields after the first harvest. Cascade was the most reliable producer. This proved to be true in growers' yards across the state also. Cascade is also used by all breweries and home brewers.
- We also experimented with drying hops (Fig. 7). In Mills River we used several dryers that were built for drying herbs. They worked well. Low temperatures and high air flow are important for maintaining the green color and not driving off the oils.



Figure 7. Drying hops at the Mills River research station.

- Dried cone samples were sent to Siebel Labs in California in 2011 and to cooperating scientists in the fermentation science program at Appalachian State University for analysis in 2012.
- Home brewers, students at the fermentation science program at ASU, several craft breweries, and other companies that use hops in their products evaluated samples of hops from the Mills River hop yard and compared them to commercially available hops.
- The fermentation program at ASU conducted a taste test with beers they brewed from commercial hops from the Pacific Northwest, hops from two commercial hop yards in western NC, and hops from our program. As shown in Table 2, for the variety Cascade, the beer brewed from commercial hops from the Pacific Northwest resulted in a more palatable beer than that made from hops grown in the western North Carolina. For the variety Nugget, however, the beers brewed from hops from the research hop yard and one of the western North Carolina commercial yards were rated as better than the one brewed from Pacific Northwest hops.

Hops Source	Cascad	Nugge
Pacific Northwest	3.28	2.20
WNC Hop Yard 1	2.05	2.34
WNC Hop Yard 2		1.97
Mills River Hop Yard	2.29	2.32

Table 2. Taste test results for beers brewed from hops from different sources. Rated on a scale of 1 to 5 with one being unpalatable and 5 being most palatable.

Mills River Yard			Typical Ranges		
Variety	Alpha Acids	Beta Acids	Variety	Alpha Acids	Beta Acids
Cascade	4	2.6	Cascade	4.5 -	4.5 - 7
Chinook	6.7	1.7	Chinook	10 - 14	3 -
Magnum	6.9	2.6	Magnum	13 - 15	4.5 - 5.5
Zeus	5.5	3.8	Zeus	13 - 17	4.5 - 5.5
Galena	9.6	5.3	Galena	10 - 14	7 -
Nugget	8.9	2.8	Nugget	11 - 14.5	4.5 - 5.5
Newport	7.8	3.7	Newport	13 - 17	7 -
Centennial	6	2	Centennial	9.5 - 11.5	3.5 - 4.5
Mt. Hood	3.9	4.1	Mt. Hood	4 -	5 -

Table 3. Dried cone analysis for the 2011 harvest from the Mills River hop yard

- Each variety was tested for its bittering potential (alpha acid units) and compared to industry standards. These ranges help determine marketability. As noted in Table 3., alpha and beta acids in first year plants in Mills River were lower than typically found. This was not unexpected and should improve over the next few years.
- Diseases and insects were closely monitored at both yards and entomologists and plant pathologists at NC State University assisted with identification and recommendations for control and prevention practices and products. The greatest challenges encountered were caused by Downy Mildew (Fig. 8), spider mites, and Japanese beetles. Comma butterfly caterpillars (Fig. 8) caused damage the first year but were easily controlled with Bt products. A large number of fungicides, biocontrol products, and insecticides were used in an attempt to keep the plants alive and growing (Table 4). Growing hops in the Southeast is a challenge because of our high disease pressure, which we expected, and high mite and insect pressure, which we did not expect. This is clearly an area that needs more research.



Figure 8. Comma butterfly caterpillar (left) and Downy Mildew (right).

ACTIVITY DATE	DESCRIPTION	TYPE	RATE PER ACRE
2011,06,10	Dipel 2X - EPA #275-37	I	1 lb.
2011,06,22	Kocide 3000 - EPA #352-662	F	1 lb.
2011,06,22	Tanos - EPA #352-604	F	6 oz.
2011,07,01	Aliette WDG - EPA #264-516	F	2.5 lb.
2011,07,01	Malathion 25% WP - EPA #829-75	I	6 lb.
2011,07,08	Kocide 3000 - EPA #352-662	F	1 lb.
2011,07,08	Malathion 25% WP - EPA #829-75	I	6 lb.
2011,07,08	Tanos - EPA #352-604	F	6 oz.
2011,07,29	M-Pede - EPA #53219-6	I	175 oz.
2011,08,05	M-Pede - EPA #53219-6	I	175 oz.
2011,08,12	M-Pede - EPA #53219-6	I	175 oz.
2011,08,19	M-Pede - EPA #53219-6	I	175 oz.
2011,08,26	M-Pede - EPA #53219-6	I	175 oz.

Table 4. Products tested for controlling diseases and insects on the research hop yards.

- Monitoring was conducted at eleven hop yards throughout the state to evaluate current and effective practices (Fig. 9). We collected soil and tissue samples from these hop yards (Fig. 10) and the growers kept us informed about their hop plant performance, cultural practices, harvest details and marketing techniques. The soil test and plant tissue test data (Fig. 10) collected from all the cooperating farms and research hop yards were used to develop recommendations for fertilizing hops in North Carolina. This information is now used by the North Carolina Department of Agriculture and Consumer Services Agronomic Division.



Figure 9. Examples of the cooperating hop yards.

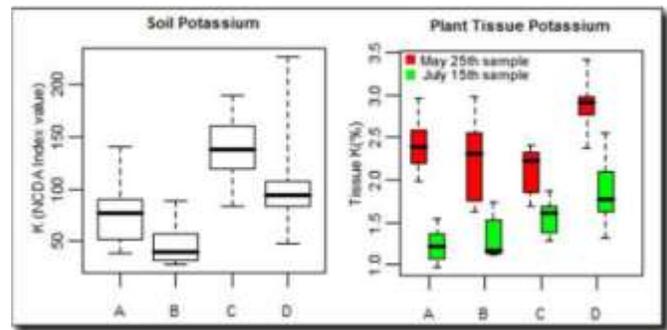


Figure 10. Scott King pulling soil samples (left) and example of soil and plant tissue results from one of the yards (top).

- We also worked closely with members of the Southern Appalachian Hops Guild, an association formed during the course of this project to support networking, production, sales and marketing of locally grown hops. They have a Facebook page and blog.
- Jeanine Davis created a blog and Rob Austin created a website to help disseminate information developed from this project. Twitter, Facebook, and listservs were also used to communicate with growers and brewers.
- Presentations were given on hops at various educational events in North Carolina, South Carolina, and Virginia and at national professional society meetings. These included a workshop on organic hop production at the Sustainable Agriculture Conference, a workshop at the Heritage Harvest Festival, and presentations at the Southeastern Vegetable and Fruit Expo, the

Appalachian State University Beer Fest; the Piedmont Farm School; the South Carolina Master Gardeners meeting, and a research poster presentation at the American Society for Horticultural Science conference. Over 2,000 people were educated at these events. Jeanine Davis gave presentations at two large workshops put on by the fermentation program at Appalachian State University. One was held in Morganton and one in Asheville. Over 250 people registered for those events.

- Field days were held at both research hops yards (Fig. 11). About 300 people attended these field days to learn about growing hops, examine the varieties, and talk to growers.
- Post-season grower meetings were held in 2011 and 2012 in Mills River. Growers and researchers participated in person and via Skype in 2011 and in person and via conference call in 2012. Over 30 people attended each. These were extremely valuable sessions where everyone shared their experiences and “lessons learned”, helped each other analyze problems, shared prices and market issues, and gave us direction on our research and extension program.
- We have developed a relationship with the owners and managers of Sierra Nevada Brewing Company, the second largest craft brewery in the country. They are currently building their east coast brewery on land adjacent to the research station in Mills River. They are supportive of this project and will be valuable partners and advisors for the young hop industry.



Figure 11. Field day in Mills River in 2011.

## GOALS AND OUTCOMES ACHIEVED

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The Expected Measureable Outcomes as stated in the proposal were: We plan to conduct 5 field days to educate growers, extension personnel, and other crop advisors at the two research sites and a private hop yard, all designed to improve the viability of hops as a long-term alternative crop (GOAL). Field days concerning hops, specifically by being able to make basic recommendations on variety selection, fertility requirements, and pest/disease/weed management, have not previously been conducted (BENCHMARK). We anticipate that 70 percent of the participants will be more knowledgeable about hops production by the end of the each field day (TARGET). This will be measured by pre- and post-field day surveys (PERFORMANCE MEASURE).

This is what we achieved:

- Three field days were held specifically for hops and the Mills River hop yard was included as a stop in two other major field days. It was also included in numerous research station tours including the state Extension Advisory tour, the Chancellor tour, the Dean tour, several international group tours, and tours organized by extension agents.
- These were the first such opportunities people have had in this region to visit replicated hop variety trials and meet with researchers, extension personnel, state agronomists, and other growers already working with hops. Researchers provided recommendations on varieties, soil fertility, disease and insect control, drying of cones, and where to get cone testing done.
- When we initiated this project we knew of a handful of commercial hop growers in the state. After the first year of this project we knew of 30 growers and by the end of the project we knew of 80 growers.
- We can't claim credit for this, but we think this project has contributed to the beer and hops culture in North Carolina that has attracted three national breweries to the western North Carolina region, Sierra Nevada, New Belgium, and Oskar Blues.
- We sent three questions to everyone on the email listserv that we have developed over the course of this project. There are 350 contacts on that list. Results from the survey revealed that 98% of respondents know more about growing hops now than they did two years ago, 93% are more knowledgeable about varieties than they were two years ago, and 98% said there is more information available about growing hops than two years ago.

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## **BENEFICIARIES**

- We worked closely with 11 hop growers throughout the state sharing information on growing practices, marketing strategies and future ideas. The

mountain growers include Blue Ridge Hops, Echoview Farm, Holmes Brother's Hops, Hop N' Blueberry Farm, New River Hops, and Winding River Hops, and in the Piedmont; Battleground Brewers, Bracken Brae Farm, Butner Hop Farm, Durham Hop Yard, and Zebulon Hop Yard. Most of the mountain growers are involved with the Southern Appalachian Hops Guild group.

- Many of the people establishing hop yards are farmers. Some of them are Christmas tree growers, grape growers, nurserymen, cattle farmers, and vegetable growers. Many have never grown a commercial crop of any sort before.
- There are over 350 people included on our email listserv through which they receive information about the project and other information pertaining to growing hops in North Carolina.
- Our research and data compiled in the enterprise budget that was funded by the cooperating GoldenLeaf grant has served as an educational tool in order to help provide local farmers make decisions concerning growing hops and provides local brewers the cost analysis of using locally grown hops compared to using non local sources.
- One of our cooperating local organic growers has shared that they are selling fresh Cascade hops directly to breweries at \$20/lb., and dry whole hop cones to home brewers at \$5/oz. Comparatively, large- scale hop growers of the Pacific Northwest sell dry whole leaf hop cones from \$1-\$2/oz.

## LESSONS LEARNED

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- We estimate that it will take about ten years to really establish a hops industry here. Growers and brewers have to work together to develop the infrastructure and agree on prices and volumes that meet everyone's needs.
- We need to overcome the day length issues that currently limit yields this far south. This will be done by continued variety testing and studies on cultural practices. Better disease and insect control recommendations need to be developed.
- We conclude that these lower than average alpha and beta acid numbers may be due in part to young plant age, premature harvest, and/or insufficient drying of the cones post-harvest.

## CONTACT PERSON

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## ADDITIONAL INFORMATION

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Mills River Hop Yard

### Additional Information:

1. NC Hops Research Project website: <http://nchops.soil.ncsu.edu/>
2. Blog posts on the hops project:  
<http://ncalternativecropsandorganics.blogspot.com/search/label/hops>
3. Notes from the 2012 post-season hops grower meeting, on the Southern Appalachian Hops Guild blog:  
<http://southernappalachianhopsguild.blogspot.com/2012/11/2012post-season-hops-grower-meeting.html>
4. Powerpoint presented at the 2012 Hops Field Day in Raleigh:  
[http://www.ces.ncsu.edu/fletcher/programs/herbs/crops/hops/2012%20Hops%20Field%20Day%20Presentation\\_Raleigh\\_July.pdf](http://www.ces.ncsu.edu/fletcher/programs/herbs/crops/hops/2012%20Hops%20Field%20Day%20Presentation_Raleigh_July.pdf)
5. Excellent article in the Wort & Yeast blog about the local beer movement and the opportunities for farmers and other businesses. Includes our hops project and local growers:  
<http://www.wortandyeast.com/2012/bringing-it-home>
6. Encore Online, Wilmington, NC newspaper article on the hops industry:  
<http://www.encorepub.com/welcome/the-next-cash-crop/>
7. Southeast Farm Press article on the hops project:  
<http://southeastfarmpress.com/carolina-grower-hopping-new-crop>
8. IndyWeek article on beer and hops in NC:  
<http://www.indyweek.com/indyweek/is-there-a-future-for-north-carolina-hops-farming/Content?oid=3100964>

## **Project Title:** Organic Nutrient Management in High Tunnels

### **PROJECT SUMMARY**

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Specialty crops growers in North Carolina are extending growing seasons with high tunnels for more profits. However, little has been studied on soil management practices for fall organic tomato production in high tunnels, when sale price is relatively higher. The objectives were to determine 1) best nutrient management practices for production of organically grown produce in a high tunnel structure, and 2) the economic potential of high tunnel production of organic tomatoes for late season markets.

High tunnels are unheated, plastic-covered structures that provide an intermediate level of environmental protection and control compared to open field conditions. The cost for a high tunnel could be as little as \$0.50 - \$3/ft<sup>2</sup> compared to about \$20/ft<sup>2</sup> for a greenhouse. Growing crops during off-season in high tunnels would garner a greater market share for growers. As a result, high tunnels have gained popularity among small farmers. Growers will gain even more income if they grow crops organically, for example, organic tomatoes in high tunnels. For organic vegetable production, healthy soil is the key to success. The National Organic Program requires organic farmers to manage crop nutrients and soil fertility to maintain or improve soil organic matter content. Farmers as well researchers need better understanding of soil fertility and the economic importance of using either cover crops or compost in supplementing fertilization, which is vital to soil sustainability. This project targets this knowledge gap by focusing on soil management of organic tomatoes in high tunnel settings

This project was not built upon a previous SCBGP. It was, however, a continuation of a 2009 Tobacco Trust Fund project.

### **PROJECT APPROACH**

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Four 96' x 30' high tunnels, two at North Carolina Agricultural & Technical State University (NCA&TSU) Farm in Greensboro, NC were constructed and used for this project. Two existing high tunnels were used for this project at the Center for Environmental Farming Systems (CEFS) in Goldsboro, NC. Each year, the project started with an early spring crop of organic lettuce, followed by summer cover crop treatments (with or without cover crops--soybeans). In 2011, we only planted tomatoes at the CEFS location because the high tunnel at the NCA&TSU farm were damaged during a storm. On July 7, 2011, three treatments were applied to the soil in each high tunnel: 1) compost, 2) cover crop and 3) neither compost nor cover crop. Each treatment plot was split into two sub-plots. One subplot received organic

fertilizer and the other half received none (control). Experiment design was a split-plot block design with four replications. Tomato plants (*cultivar Solar Fire*) were raised in a greenhouse and planted on July 14, 2011. Weekly tomato yield was collected. Soil samples were collected before planting on January 8, 2011 and during peak harvest on October 20, 2011 for lab analyses. In 2012, the same procedures described above were replicated at both locations. We treated the soil at CEFS on July 12, 2012 and at NCA&TSU farm on July 2, 2012. Transplants were planted at CEFS on September 5, 2012 and at NCA&TSU farm on July 11, 2012. There was a delay in the CEFS planting because the seedlings were damaged during transport. Soil samples were collected from the NCA&TSU site in November 2012 after the season ended and in January 2013 at the CEFS. Each year, a fall field day was organized for interested growers and educators.

The CEFS site. We harvested and donated around 1880 lbs organic lettuce to the local food bank in spring each year. In 2011, our results showed that tomato yield of cover crop plus fertilizer treatment (11.4 lbs/plant) was higher than that of other treatments. The yield of the control was the lowest (7.5 lbs/plant). In November we conducted a high tunnel production workshop with approximately 50 participants. In 2012, our tomato transplants were damaged in transit and we were not able to plant new transplants until late September. As a result, we were only able to harvest very few marketable fruit at the end of growing season, although soil samples were still collected. We conducted another field day with approximately 90 attendees. Survey results of the field days indicated that participants will use the information they learned when planting their gardens and preparing their planting calendars. The large majority of attendees stated that they learned new farm practices and of farmers in attendees indicated their willingness to try cover crops.

The NCA&TSU site. In 2011, a high tunnel was destroyed by winds and no planting could be done until the high tunnel was replaced. We were not able to collect yield data. In 2012, we harvested 1,160 lbs lettuce from both high tunnels and donated them to the local food bank. The fall tomato trial was concluded four weeks after the initial harvesting because of the downy mildew and powdery mildew diseases. Data showed that treatment of cover crop plus fertilizer was higher in yield than all other treatments. We also conducted a fall field day in October with about 80 participants. Survey results from this field day were similar to the reports received from participants at the CEFS site. Attendees reported that they believed they were exposed to information and practices that they would like to try on their farms.

The CEFS allowed us to use their high tunnels and some of their interns and workers. NRCS as well as Carolina Farm Stewardship Association assisted us with marketing of the field days and inviting their customers.

The Work Plan indicated that project results would be published via the web and printed documents. However, due to the challenges we experienced during the two-year project period at both sites, i.e., losing the high tunnel at NC A&T and losing the transplants at CEFS, we did not have consecutive data years. We did not think it was prudent to publish unfinished results online because we were unable to replicate the project to demonstrate consistency because of the losses we experienced. We did prepare a poster that showed the results we achieved for the one year at CEFS. The poster was presented at the Southern Sustainable Working Group Conference in Arkansas where there were approximately 800 persons in attendance.

## **GOALS AND OUTCOMES ACHIEVED**

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This is a research project with some outreach components. Activities were summarized in the previous session. In short, we built the high tunnels, planted organic lettuce in January, harvested them and planted cover crops based on the project design written in the original proposal. In July, we prepared high tunnel soils, applied treatments and planted organic tomatoes for fall production. We organized three field days that reached over 220 participants and shared our research findings and recommendations with the participants.

We are still in the process of analyzing soil samples. Recommendations of fall organic tomato production in high tunnels will be made available in 2013. Changes in farming practices by North Carolina growers will be surveyed in late 2013 to reflect the mid-term outcome. The target group will be those who participated in our field days.

The primary goals of this project were to 1) determine best nutrient management practices for production of organically-grown produce in a high tunnel structure and 2) determine the economic potential of high tunnel production of organic tomatoes for late season marketing. We are going to continue a 3<sup>rd</sup> year trial beyond this funding because data of two growing seasons may not be enough for developing the best nutrient management practices. For objective two, our data showed strong economic potential for fall high tunnel tomatoes. Farmers will obtain higher prices and increase income by growing organic tomatoes in high tunnels that target the

Farmers' market prices across the Piedmont area and the Goldsboro area for organic fall tomatoes ranged from \$2.50 to \$3.50 per lb. Thus, the economic impact to a farmer growing organic fall tomatoes in a standard size high tunnel would be approximately \$4,000 during a time when most farmers are closed for the season based on the yield data presented below.

<b>Treatment</b>	<b>Yield (lb) per block of 16 plants</b>	<b>Total number of fruit</b>	<b>Yield (lb) per plant</b>
<b>control</b>	279.0	509	17.4
<b>cover crop +fertilizer</b>	325.3	537	20.3
<b>cover crop +no fertilizer</b>	326.7	580	20.4
<b>compost + no fertilizer</b>	312.5	535	19.5
<b>compost + fertilizer</b>	371.0	597	23.2

We hosted three field days over the course of the grant with over 220 participants. Field day participation by farmers, NRCS, NCDA, extension agents and the wider public grew over the two-year period. Of the participants sampled, 89% indicated the quality of the workshop was good to outstanding; 97% said the information presented was useful; 76% stated that they gained much to very much knowledge as a result of their participation in the workshop; 84% indicated that the knowledge they gained would help them save or make money; and 100% of respondents stated that they planned to implement from one to five or more ideas gained from the workshop within the coming year. Participants appreciated the opportunity to engage in hands-on demonstrations and to have questions answered by knowledgeable staff. In addition, more farmers have applied for NRCS EQIP Seasonal High Tunnels for Crops Pilot program. We also have seen more farmers pursuing fall crop production in high tunnels.

## **BENEFICIARIES**

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Some farmers who attended our workshops applied for Seasonal High Tunnels for Crops Pilot program and were approved to receive cost share from NRCS. Extension agents who participated in our events enhanced their knowledge of season extension practices and soil building strategies, which enabled them to better help their small farmers.

While the treatment of cover crop plus fertilizer gave us the highest yield, the cover crop without fertilizer treatment also produced reasonably high yield. This finding indicates that farmers can reduce the input of organic fertilizers but still build soil fertility. According to the Census of Agriculture (2007), 1,365 operators

produced \$33.7 million worth of tomatoes on 3,671 acres in North Carolina. A high tunnel of 24 feet by 96 feet (about 0.05 acre) can house 350 to 400 tomato plants depending on row spacing. One tomato plant could produce 15-20 lbs in a high tunnel. Assuming an average price of \$2 per pound, every 24x96 high tunnel would generate \$10,000 to \$14,000 gross income, compared to the estimated field tomato of about \$3,200 on the same area.

## LESSONS LEARNED

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We successfully demonstrated that it is possible to grow tomatoes for a fall/winter harvests. We grew a summer cover crop before planting the fall tomatoes. We learned that timing is critical for fall tomato production in a high tunnel because there is less sunlight available due to the time change in fall and winter months. Because of limited sunlight, it is important to plant mature transplants that can flourish despite the shortened daylight hours. It is important to pay attention to disease pressure which could be high. The cool weather conditions in fall and winter are favorable for the development of more fungal diseases. Also, severe weather, such as strong gusts of wind, could be disastrous by tearing high tunnel films or even destroy the whole structure.

The project was overall a success for the most part. Challenges to this project include changing of PI, unexpected wind damage to the high tunnels and unexpected devastation of tomato transplants.

Disease and severe weather could be disastrous to organic vegetables in high tunnels. To mitigate occurrences of disease outbreaks, it is important to utilize best management practices. Weather mishaps can be challenging to control; however, it is a good idea to be prepared with or have access to extra materials so repairing to high tunnels can be done quickly if weather damage is experienced.

## CONTACT PERSON

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## ADDITIONAL INFORMATION

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We presented a poster at the Southern Sustainable Agriculture Working Group that outlined the project that was well received by the conference attendees.

**Project Title:** Maturing the High Country Local Food System  
*Previously approved final report*

## **PROJECT SUMMARY**

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The goal of the project was to mature the local food system in the High Country of North Carolina. This included helping local farmers to sustain production of diverse specialty crops throughout the year, agriculture related businesses that can support farmers, and local points of distribution. There was also a need to educate consumers on the value of locally grown produce and strengthen networks and marketing strategies with retailers and consumers.

This project was important due to the growing interest in local foods. CSAs (community supported agriculture) had been developed but needed enhancement and expansion. New River Organic Growers and its network of over 40 farmers, high country CSA and its network of over 20 producers, Blue Ridge Women in Agriculture and its many members, and many farmers who rely on Cooperative Extension to provide technical production training have been building their capacity to expand production of specialty crops to sell to local restaurants. While there was a great deal of interest in local food as evidenced by the growth in the farmers market, there was also a continuing need to educate a broader range of consumers as to the value of local food.

## **PROJECT APPROACH**

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- a. New River Organic Growers and their network of over 40 farmers was able to double sales of specialty crops in both 2011 and 2012. This year NROG sold over \$225,000 in specialty crops. We were able to double the number of farms selling to us from 20 to 44 thereby significantly increasing the amount of specialty crops we had to sell. In 2012 we made the decision to expand our sales to the Asheville area which has provided a huge new market for us and increased the retail outlets for specialty crops to 60. Our marketer has spent a great deal of time marketing our specialty crops in that area and establishing relationships with restaurants who as a result of the contact made, provide local produce to their customers. We see this as a viable growing market for us. As a result of our growth, NROG is at the next phase of expansion. At this time we do not have a distribution center. As a result some of our farmers had to sell crops which could be held through the winter (squash and potatoes) to other outlets off the mountain. For 2013 we plan to rent a facility. A walk in cooler has been donated to us so we will be able to hold specialty crops through the winter and increase our winter sales. The distribution center will also be a drop off point for our farmers as well. This will also allow us to hold products for late orders and deliveries.

- b. High Country CSA, a project partner, revised their website in part due to grant funding and sold 59 full shares OF SPECIALTY CROPS for the 2011 summer season. Also, with the help of COOPERATIVE EXTENSION, a project partner, another grower was able to increase their CSA shares by 70 in 2011 and market their CSA to employees of the local hospital. HIGH COUNTRY CSA SOLD 99 CSA shares OF SPECIALTY CROPS in 2012, so the HCCSA has continued to grow through support from the grant.

In spring of 2012, PROJECT PARTNERS hosted a CSA fair at a local restaurant in Boone. A dozen farms attended to highlight and promote their CSAs and 50 participants attended. Cooperative Extension helped market the event with fliers and mentions in social media and the local papers. As a result, at least 10 new CSA contracts were made with participating farmers.

Blue Ridge Women in Agriculture worked with High Country CSA and the Appalachian District Health Department TO PROVIDE 25 CSA shares OF SPECIALTY CROPS (VEGETABLES) FROM OVER 20 LOCAL FARMERS to low-income single-parent families.

- c. Blue Ridge Women in Agriculture (BRWIA) held a successful High Country Farm Tour in August of 2011 with 19 participating farms and 526 visitors. In 2012 22 farms participated in the tour with 517 people in attendance. The farm tour has been highly successful and has been a great hands-on approach to teaching others about farming.
- d. The project partners agreed on the branding name of High Country Grown to showcase local produce. A logo was created, along with an educational rack card and a web presence at: [www.highcountrygrown.org](http://www.highcountrygrown.org). This website will be continued after the end of the grant. Since the website's launch in June of 2011 there have been 21,403 visitors to the website. It is continually updated to add new farmers, restaurants and information about local food events.
- e. The theme for the 2011 Farm City Banquet was "High Country Grown". There were 200 participants that each received a bumper sticker and a rack card promoting this marketing project. High Country Grown was also promoted at Cove Creek Farm Heritage Days, All About Women exhibition, Sustainability Symposium at Appalachian State University, at the farmer's market and at a Farm to Table dinner.
- f. The Broccoli Production Field Day of 8/15/11 brought together thirty-three growers in addition to host farmer Charles Church. Participants received a mix of print and electronic resources, including a CD with several Extension broccoli productions guides, and several handouts on insects of concern to broccoli producers. Speakers included Charles Church of Watauga River Farms, Jim Walgenbach of NCSU, Jeanine Davis of NCSU, Emily Bernstein of NCSU, and Richard Boylan of NCA&T Cooperative Extension.  
The Season Extension Field Day of 9/22/11 brought together nine area growers

in addition to the host farmers themselves. Participants were able to choose from a wide range of books and other materials on season extension available at the workshop. Speakers included Hollis Wild of Appalachian Trees, Wayne & Jeanne Berry of Berry Patch Farm, Alan Hanson of Blue Ridge Organics, Richard Boylan of NCA&T Cooperative Extension, and Rick Holness of NCA&T Cooperative Extension. The Strawberry Production Field Day of 7/26/12 drew eighteen participants in addition to host farmers Jim and Kathy Barlow. Participants received materials on day neutral strawberry variety choices, strawberry disease identification and management, and strawberry insect management. Speakers included Hannah Burrack of NCSU, Jeremy Pattison of NCSU, and Richard Boylan of NCA&T Cooperative Extension.

The Cucurbit Production Field Day of 8/21/12 drew forty-four participants in addition to host farmers Deb & Sanford Fishel. Participants received materials on Disease Identification in Cucurbit crops, insect management in Cucurbit crops, and variety choices. Speakers included Kelly Ivors of NCSU, Jim Walgenbach of NCSU, Jonathan Schultheis of NCSU, and Richard Boylan of NCA&T Cooperative Extension.

BRWIA along with the Seeds of Change project sponsored a workshop on the use of the Ashe County commercial kitchen facility and its use for the promotion of value added products which could be produced from specialty crops being grown by the farmers. Twenty people were in attendance.

- g. BRWIA held 10 cooking demonstrations at the Farmer's Market from June through September in both 2011 and 2012 using specialty crops and sharing the recipes and samples with the public. Each year approximately 4000 people participated in these demonstrations. All ingredients used were specialty crops bought from farmers at the market to teach customers how to cook and eat local produce seasonally. Rack cards highlighting the value of local foods were also available at these demonstrations.
- h. The high tunnel bedders and the mulch lifter have been purchased and are in use by farmers in the area. Twenty farmers have used the bedders. Five farmers used the mulch lifter, however it was purchased after the end of the season when many farmers had already pulled up their plastic. At least 15 farmers have high tunnels which are in production year round to produce specialty crops. Both the bedders and mulch lifter have been very helpful in the ease of tunnel preparation.
- i. In 2011 the extension office and BWRIA worked with the local high school to promote eating local. Classes harvested 15 bushels of apples, a specialty crop, with a local grower; the marketing/tourism students developed a t-shirt/logo and handed out 15 bushels of apples to students, culinary students prepared local apple dishes for a healthy recipe competition. An estimated 400 students visited

the 'buy local' table to sample the winning apple dishes and to receive information on why it is important to buy local food.

- j. In 2011 Cooperative Extension, New River Organic Growers, and Vidalia restaurant teamed up to host the September Boone Area Chamber "After Hours" event to increase awareness of local specialty crops. High Country Local First, Blue Ridge Women in Agriculture, and High Country CSA were also at the event to raise the business community's awareness of local agriculture. At least 70 people attended the event.
- k. In 2012 NROG provided the mystery ingredients for the local chefs' challenge, Fire on the Rock. Our marketer introduced the ingredients- radishes and sun chokes, 2 specialty crops and explained how they are grown by local farmers. Our participation in that event generated more interest in NROG and new calls to the marketer who sells specialty crops. One hundred people were in attendance at the chefs challenge.
- l. The partners worked with a designer to create a High Country Grown chalkboard for 12 area restaurants which have shown the most interest in local food. The chalkboards will be used to showcase what specialty crops the restaurant is serving that is sourced from the High Country. Rack cards and bumper stickers with the High Country logo will also be available at those restaurants as well as several other area restaurants to highlight farmers and the benefits of eating local produce.
- m. In 2012 Watauga extension along with 2 local chefs and produce from 8 local farms provided a local food cooking demonstration with 15 in attendance. A seasonal cooking class for the ASU women's club was provided with 20 in attendance. Cooking classes were also provided to 50 children in 3 elementary classes. The focus was on eating new types of vegetables.

Through the grant the four partnering groups were able to significantly raise awareness of local food in a variety of different ways; through marketers, printed media and hands on experience for farmers, customers and retailers. Over 100 local farmers were able to obtain new knowledge for more successful farming and have expanded the variety of specialty crops they are able to grow. Additionally they were given new tools to be more successful at season extension through the use of high tunnels in the growth of specialty crops. The High Country Grown website has continued to grow as more restaurants and farms providing local food have been added. The website will continue through the support of a new grant from the Seeds of Change project. Community Supported Agriculture (CSAs) shares of specialty crops have doubled and have continued to increase in number and participants over the two years.

NROG,S network of farmers has grown significantly over the past two years. With sales of \$225,000 and growth potential in the Charlotte and Hickory areas, NROG plans to continue to expand in sales and recruitment of new farmers to grow specialty crops. The planned addition of a distribution center will enhance our continued growth. The addition of high tunnels, along with the new high tunnel equipment, has allowed us to double winter sales for the past two years. In 2011 one of the largest Christmas tree growers in Ashe County began growing vegetables. Many of the Christmas tree growers have unused land as trees cannot be grown at lower altitudes. Project partners are hoping with the success of this one farmer, others may become interested, thereby increasing the number of farmers in this area.

## **GOALS AND OUTCOMES ACHIEVED**

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The overall goal of the project was to mature the local food system in the High Country. To accomplish this, the project would:

1. Improve the technical proficiency of local growers to diversify and improve their production of vegetables and other specialty crops.

The benchmark for this objective was to provide 80 growers with access to specialists and resources. There were 104 farmers attending the workshops. To continue to provide technical proficiency, project partners will use resources, materials, and production skills gained from the specialty crop block grant to recruit additional farmers and educate producers as to the specialty crops needed for sales. The bedders and mulch lifter will be available to all farmers in working within their hoop houses. These have proven to be time savers and have made it easier to work within the small space

2. Leverage partner groups' efforts to educate consumers on the value of locally produced crops and nutrition.

The performance measure for this objective was the number of participants in local cooking classes and an increase of participants in the annual farm tour.

With all the activities outlined above there were approximately 4755 people exposed to some type of cooking class. In addition, the activities of the CSAs, the workshop for new CSA farmers, the farm tour, the website and the distribution of rack cards and bumper stickers were very effective in raising awareness of local food. The farm tour for both years generated about the same number of participants, 526 in 2011 and 517 in 2012 although the number of farms participating increased from 19 to 22. BRWIA plans to continue to sponsor the farm tour and identify ways to attract more participants.

The use of the chalkboards by local restaurants to promote local food will continue the awareness efforts regarding specialty crops and eating local after the expiration of the grant. The website will also continue to be maintained with the High Country Grown branding.

3. Partner organizations will develop high quality marketing resources to enhance promotion of local produce and specialty crops.

The performance measure was the number of growers who adopt ASAP's Appalachian Grown label; measuring the increase in the number of CSA contracts filled; documenting the increase in total number of restaurants and retailers that purchased local produce.

After much discussion among the partner groups and contact with local farmers, it was decided that Appalachian Grown is not a branding people associate with the high country. The group decided to develop its own branding, High Country Grown, which is being used on the website and in all printed literature.

The number of CSA contracts of specialty crops for the HCCSA has almost doubled over the grant period, from 59 to 99. During the past two years 2 new growers have added CSA programs and a third grower has added 70 new customers through a partnership with the local hospital. The CSAs will continue as viable ways to reach customers who may not utilize the local farmers market.

From 2011 to 2012 NROG added 25 new regular customers for sales of specialty crops. These included restaurants and retail outlets such as Earth Fare in Asheville. Sales have nearly doubled from \$125,000 in 2011 to over \$225,000 in 2012. The number of farmers participating has more than doubled from 20 to 44 in 2012. NROG will continue marketing efforts to both farmers and restaurant and retailers to grow our business in the high country.

## **BENEFICIARIES**

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The beneficiaries of this grant included NROG and its network of close to 50 farmers, High Country CSA and its network of 20 farmers, and retail outlets such as 65 restaurants and 3 farmers markets. The number of farmers who joined NROG specifically to offer produce and specialty crops increased from 20 in 2011 to 44 in 2012. NROG also increased its number of retail outlets from 40 to 65. this translated to an increase in sales from \$125,000 in 2011 to over \$225,000 in 2012 through expansion to the Asheville market.

The number of individuals participating in the high country CSA and other farmers offering CSAs increased which benefits both farmers and customers. At least 140 new CSA shares were sold as a result of this project. Also 10 farmers added CSAs of specialty crops as a result of the workshop and marketing materials sponsored by partners in the grant.

The 104 TOTAL farmers participating in the grant workshops offered by project partners (cooperative extension, Blue Ridge Women in Agriculture, High Country CSA, and NROG) increased their knowledge of specialty crops and now have the knowledge necessary to add these to their list of available crops.

This increase in sales has insured the future viability of of farmers in the region to provide specialty crops to the regional local food economy. The project also

strengthened NROG and High Country CSA as stable agricultural businesses to provide sales outlets for local farmers in the high country. Consumers also benefited from the grant as awareness was raised about local sources of food and their benefits. Over 5,000 people participated in cooking classes, demonstrations, specialty crop awareness activities in local schools, the high country chef challenge (which featured radishes & jerusalem artichokes—local specialty crops), and the high country farm tour.

## **LESSONS LEARNED**

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The local food system for the high country region is complex and diversified and will continue to need support from new and existing partners to further mature the production and distribution challenges. While progress was made with the help of the grant, there continues to be a lot of work to fully mature the system. The marketing and branding strategies that we originally proposed were altered based on feedback from partners. Rather than a billboard it was suggested that we use more hands on material and experiences such as the farm tour and cooking classes.

The grant writers had anticipated using the ASAP (Appalachian Sustainable Agriculture Project) branding for high country farmers. With input from farmers and other key players it was determined that people did not see ASAP as a local brand hence the need for the creation of one of our own. High Country Grown fit the description of the area and offered a distinctive brand for farmers and customers.

## **CONTACT PERSON**

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## **Project Title:** Building the Market for N.C. Strawberries

### **PROJECT SUMMARY**

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Strawberries are an important crop in North Carolina with a farmgate value of \$29.4 million on 1600 acres. Strawberries are popular among North Carolina's consumers, but many of them do not distinguish the locally produced crop from strawberries brought in from other areas, though they are increasingly interested in buying locally produced foods. This project continued and expanded a campaign started in 2010 (through a 2009 SCBG) to convince North Carolina consumers and market outlets to preferentially choose local North Carolina-grown strawberries during the North Carolina strawberry harvest season. It used a unified program of media relations, advertising, web-based communication technologies, and signage and other new tools to help growers plan and conduct their own marketing. The burgeoning consumer interest in local foods made this project particularly timely.

### **PROJECT APPROACH**

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Originally designed as a one-year project, the project was expanded to two years. No funds were used on other crops, specialty or otherwise. Member strawberry growers in other states had the opportunity to take advantage of educational programs and some of materials prepared during the project, but if funds were needed (eg for printing and shipping), project funds were not expended for these and were accounted separately. *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.*

#### **Print products**

1. Four new roadside signs for NC growers were designed in 2011, and 700 were printed. Approximately, 600 were ordered by grower and delivered (the rest remained as inventory for 2012). Another 200 signs were printed for distribution in 2012 and the designs continue to be offered in 2013.
2. Full-color recipe brochures were designed in 2011; 100 were distributed free to all member growers in NC for free (they could order and buy more) as well as to extension agents, state Welcome Centers, special events, and the NC Department of Agriculture. The recipe brochures were reprinted in 2012.
3. A 30 x 36-inch consumer education poster was designed, printed on durable vinyl material, and distributed free to more than 125 growers in North Carolina in spring of 2012. A few additional copies were sold. Numerous growers have reported that the poster has been very effective and useful for them.

#### **Promotions**

1. Placed a half-page ad in the May 2011 issue of *Our State* magazine
2. Created an iPhone Strawberry Farm Locator App and interactive online map of NC

strawberry growers, expanded blogging and media coverage.

3. Developed a YouTube Channel for the Association  
<http://www.youtube.com/user/NCStrawberry> and created four videos of our own.
4. Expanded and maintained an active web and Facebook presence
5. Conducted a recipe contest, kids' art contest, and "Sweet Tweet" Twitter contest in 2011, and two recipe contests and a YouTube video contest in 2012.
6. Worked with media consultant Communicopia to send out media releases (both 2011 and 2012). One of these, sent out at the beginning of the 2012 harvest, alerting the media and the public to an exceptionally early harvest season, was picked up widely and especially effective at getting this important message out.
7. Sponsored an online recipe contest by *Our State* magazine, a statewide and popular magazine in 2012.
8. Cooperated with the NCDA&CS to hold Strawberry Days at the state-operated farmers markets

### **Grower Education**

1. Conducted a workshop at the Southeast Strawberry Expo in 2011 on "Promoting your Farm with Social Media and the Web"
2. Conducted breakout sessions at the Southeast Strawberry Expo in 2011 on "Getting Customers There When You Need Them", "Using QR Codes" and "Strategic Thinking to Grow Your Strawberry Business" Two successful farmers (Curtis Smith, Kinston, NC and Mark Waller, Durham, NC) shared their marketing/promotional practices during Grower Spotlights.
3. Conducted workshops at the Southeast Strawberry Expo in 2012 on Social Media for Beginners, and Get the Picture – and Use it (using photography to promote your farm)
4. Conducted breakout sessions at the Southeast Strawberry Expo in 2012 on Using Pinterest: a New Social Media Tour; Signs and Displays that Work for Retail Stands and Markets, and Working with Schools and School Groups. Two successful farmers (Bob Hall, York, SC and Danny McConnell, Hendersonville, NC) shared marketing strategies during Grower Spotlights
5. Wrote/ published articles and resource notes in the Strawberry Grower newsletter on
  - a. Strawberry Media Outreach (and working with the media)
  - b. NCSA's Survey of Direct Market Pricing (May, 2011)
  - c. Moving Surplus Berries (May, 2011)
  - d. NC Strawberry Project's taste tests (July, 2011)
  - e. Can social media benefit your farm? (October, 2011)
  - f. Getting custom-made signs (March 2012)
  - g. Wholesale opportunities (March 2012)
  - h. Pricing of berries in different regions (May, 2012)
  - i. Keeping customers coming (June, 2012)

### **Additional efforts**

Through this grant, the Association continued to build its stock of photos and video through visits to farms through the production year and harvest season. Photographs of grower signs for specific issues (e.g. managing children, liability, food safety, sampling,

failure to pay, etc.) were collected to use as models for other growers.

While the original proposal included funds to hold focus groups, the advisory committee determined that the needs that would be addressed by focus groups (gathering consumer ideas and reactions to materials and determining most effective approaches), could be addressed in other ways, allowing funds budgeted for focus groups to be spent in ways that would provide more immediate direct benefit to the strawberry industry. Our project cooperated with the NC Strawberry Project (a cooperative project of NC State University and Johnson and Wales University, funded by the Golden Leaf foundation) in their project's consumer survey, helping design the survey and assisting with distribution to farms; information from the survey was shared at the 2011 SE Strawberry Expo. Our Project also utilized several other sources of information: Our own online survey of more than 750 consumers through our 2009 Specialty Crop Grant, for which a focus group company acted as consultant, was a mine of good information. The study *Producing and Marketing Strawberries for Direct Marketing* (2009) by Dr. Charles Safley of NC State University provided excellent and relevant material. The growers on the Project advisory committee had decades of experience in direct contact with customers (unlike the food merchandising companies that usual contract for Focus Groups), and could also conduct informal discussions with customers as materials were in production. The scope of the grant remained unchanged: to increase consumer awareness of North Carolina strawberries and their harvest season and to increase market share.

### **Significant contributions and role of project partners**

This project has been guided by an advisory committee of growers along with our media consultant (Communicopia Marketing), NCDA&CS Marketing Specialist, and NCSA staff, starting with an initial planning meeting in February each year and following up primarily via email consultation. In design of materials (eg brochures, signs, and consumer education poster), the growers provided crucial input on content, wording, and images, sometimes providing photographs. Communicopia took the lead on writing and sending out media releases and working on YouTube videos and the contest. NCDA&CS coordinated Strawberry Days and recipe contests at farmers' markets.

## **GOALS AND OUTCOMES ACHIEVED**

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The project has been very successful in creating and providing concrete and useful tools to growers, as listed above. Feedback from individual growers and their willingness to purchase these items after the end of the project speak to their continuing usefulness, and at least 150 farms received items created by the project each year. With regard to educational materials and workshops, close to 300 farms/extension agents received each issue of the newsletter with relevant articles; more than 300 people attended each Southeast Strawberry Expo. Media outreach has also been very successful as measured by our partner, Communicopia (see attached).

Acquiring other quantitative measurements of the success of the project has proven more difficult. While surveys were distributed to growers at the 2011

Southeast Strawberry Expo and with membership renewal forms, returns were very poor; growers appear to be “surveyed out.” In addition, the consumer survey conducted by the NCSU Strawberry Project appeared to have structural flaws or so that fewer returns than expected were returned. Obtaining data on website use has been difficult due to the nature of how our website is managed; a recent shift to new web management will rectify that problem.

Growth in our social media reach has been lower than project goals. Facebook “likes” stabilized at around 1800 (they have grown slowly to almost 1900), with each post reaching 200-900 people. We are learning what kind of messages have the most viral appeal, and Facebook will continue to be an important part of our harvest season. Twitter followers increased from almost 500 to 891. Participation in our Twitter contest was modest and that in our YouTube contest was very poor, and our YouTube channel has less than 10 subscribers. We speculate that these social media platforms are less used by our target consumer audience (and our growers), and that it is difficult to make. In 2013, we will begin exploring Pinterest as a more promising platform.

## **BENEFICIARIES**

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The chief beneficiaries of this project are North Carolina’s approximately 250 strawberry farmers. More than 150 received direct benefit from project materials; the strawberry industry as a whole benefited from media outreach to increase awareness of the local crop and encourage consumers to seek out locally produced berries. This was especially beneficial in the unusually early harvest season of 2012 when consumers might otherwise have been unaware that the season was starting two weeks early. While there are many factors at play, the farm gate value of the NC strawberry crop, as reported by USDA, has risen from \$24,300,000 in 2010 to \$27,300,000 in 2011 to \$29,435,000 in 2012.

North Carolina consumers benefited from increased awareness of and opportunity to purchase (or pick) fresh, nutritious local berries. Those who visited a farm for the first time due to project outreach are likely to return.

## **LESSONS LEARNED**

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Most of the lessons of this project are included above, especially in the Goals and Outcomes session. A few others are:

1. Growers (NC Strawberry Association board members/members) don’t much like surveys. They can’t see the point of tools as abstract (and expensive) as focus groups. They do, however, have direct and insightful experience of consumers that they will share to inform outreach efforts.
2. High quality quantitative data is difficult to come by, and with limited staff and resources, it is problematic to promise.
3. Partnerships can be unexpected and should be cultivated. For example, the Virginia Department of Agriculture and Consumer Services has purchased and distributed

to Virginia growers materials developed by NCSA; Virginia marketing and promotion efforts also inspire those in NC. In early 2013, a regional health alliance in NC ordered almost 100 of our NC project-designed signs (as well as stickers and brochures) as part of a federally funded fresh food/health initiative; these will be distributed to farmers markets, farmstands, health departments, small stores, and others. Now that we know about this project, NCSA is exploring ways to partner with this Alliance in our current Specialty Crop grant project involving educational materials for children.

Social media is not a panacea for reaching target consumer audiences. It is low cost and fast, but requires frequent and savvy attention. We are learning!

## **CONTACT PERSON**

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## **ADDITIONAL INFORMATION**

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*Recap Report- Communicopia June 2011*



### **North Carolina Strawberry Association Media Relations, March – June 2011**

#### **Executive Summary**

The following report provides an overview of media relations work done by Communicopia Marketing Services, Inc. on behalf of the North Carolina Strawberry Association (NCSA) from March – June, 2011. Communicopia fulfilled the key objective of increasing awareness of fresh North Carolina strawberries purchased from farms, farm stands and local stores. Communicopia distributed key messages to target audiences through magazine articles, news releases, media alerts, television appearances, radio interviews, social media and online content generation. As a result, NC strawberries, growers and the association received favorable mention and increased interest throughout the state of North Carolina and beyond.

Communicopia pitched, placed and wrote articles for placement in relevant media outlets that reached consumers who bought NC strawberries. From March to June, these efforts have resulted in more than 150 placements with an audience of more than 5 million people. From the 14 placements in North Carolina's top-10 newspapers there were approximately 1,542,800 impressions (single displays of a press release, story etc.). These 14 placements were in the following newspapers: *Charlotte Observer*,

*Raleigh News & Observer, Greensboro News & Record, Winston-Salem Journal, Fayetteville Observer, Asheville Citizen-Times, Wilmington Star-News, Durham Herald-Sun, Gaston Gazette, and Salisbury Post.*

The public relations value in dollars of the 136 article placements is conservatively more than \$350,000 (To get this number we took the average cost of what advertising space would cost in the publications, calculated the column-inch length of the articles and multiplied that by 3 --PR value and readership is said to be 3x to 8x more valuable than a paid advertisement). With a PR value of \$350,000, the return on investment to the NCSA from its public relations efforts was \$344,000.

National media coverage was secured in USA Today, newspaper. The "North Carolina Strawberry Season Begins Soon" received placement in the "Across the USA News from every state" section of *USA Today*. *USA TODAY* remains number one in total daily print circulation in the United States with a daily print circulation of approximately 1.8 million as of March 2011. The press release was also picked up and turned into a story by the Associated Press and distributed far and wide across the state and beyond.

Local television media coverage was secured with clips airing on NBC-17's "My Carolina Today" show and on News 14 Carolina's 24-hour news cycle. Valonda Calloway, host of "My Carolina Today" visited Page Farms in Wake County to talk to owner Danny Page and the North Carolina Strawberry Association about strawberry picking all over the state. "My Carolina Today" reaches out to thousands of viewers per show. News 14 Carolina visited Swift Creek Elementary School in Raleigh to interview students in Megan Sedaghat's second and third grade classes tending to the school strawberry garden. The clip aired on May 4 and re-aired throughout the 24 hour news cycle. News 14 Carolina reaches more than 1.5 million households throughout North Carolina.

Public relations activities that Communicopia conducted on behalf of the NCSA were also successful through social media channels (Facebook and Twitter). Through "Tweets", "Re-Tweets" and Facebook posts, word about the NCSA quickly spread throughout the internet. There was a total of 45,022 social media impressions resulting from the published press releases.

All instances of coverage presented the North Carolina Strawberry Association in a positive light, with no instances of negative media coverage.

## **Public Relations Activities in Review**

Communicopia wrote news stories, pitched stories to editors & writers and distributed news releases to local media. An overview of all news stories written, pitched and placed between March and May 2011 follows.

- News Release: "North Carolina Strawberry Season Begins Soon"
  - Written by Communicopia. Released March 17, 2011. This release was published in an online format and can be found here: (<http://www.globalshrinking.com/client/ncstrawberry/news/2011/0317.aspx>) It was distributed to a master media list compiled by Communicopia and posted on approximately 30 press release publishing sites. The NCSA media list includes contacts for local and state food writers/editors, local and state parenting media, local and state magazines, North Carolina newspapers (daily and weekly), North Carolina agriculture

media, regional food blogs and magazines and North Carolina college newspapers. This release announced the beginning of strawberry season in North Carolina, described the health benefits of North Carolina strawberries and the impact of strawberry farming on the state economy, and included information from an interview with the Rudd family of Greensboro, NC. The release encouraged people to go out and visit North Carolina strawberry farms and pick and purchase fresh, local strawberries. Media placements can be seen in the press tracker for this release.

- Total Placements: 102
- Social Media Impressions: 26,191
- Talking Points: “My Carolina Today”
  - This set of talking points was compiled by Communicopia for “My Carolina Today” staff to prepare them for what could be covered during the taping for their television segment. (see below)
- Talking Points: NCSA Growers
  - These talking points expounded upon the “My Carolina Today” talking points and were designed to give strawberry growers easy-to-use information about North Carolina strawberries in the case that they were contacted by reporters.
- Magazine Article: “Ripe, Red & Ready: Fresh North Carolina strawberries make a delicious, sweet treat”
  - Article written by Communicopia and published in May 2011 issue of Carolina Country Magazine (Circulation: 675,000). Carolina Country Magazine is distributed to members of North Carolina’s electric cooperatives. This article described the effect of strawberry farming on the North Carolina economy, how to pick the perfect strawberry and included information from an interview with NCSA president Michael Beal, along with a traditional Beal family strawberry recipe. In order to secure placement in Carolina Country, Communicopia pitched magazine editor Michael Gery via phone and email. An interview was conducted with Michael Beal and incorporated into the story.
  
- Media Alert: “Local Elementary School Children Savor Fresh Picked Strawberries from their Own Garden” Released April 29 and May 5, 2011. This media alert was sent to Raleigh-area online, print, radio and TV broadcast media to encourage them to attend an event at Swift Creek Elementary School in Raleigh where Megan Sedaghat’s second and third grade classes would be caring for and picking strawberries from the school strawberry garden. News 14 Carolina sent a cameraman to the event and recorded the students in their strawberry garden and taped interviews with several students and the teacher. The clip aired on May 4 and re-aired throughout the 24 hour news cycle.
  - News 14 Carolina reaches more than 1.5 million households throughout North Carolina. The clip can be found here: <http://triangle.news14.com/content/640536/area-elementary-students-celebrate-strawberry-month>
- News Release: Local Kids Grow and Harvest Strawberries from Elementary School Garden” Released May 4, 2011. Following the event for broadcast media, a news release was to media outlets in the Raleigh area (radio, print, online, TV) and posted to several local press release posting sites. The release described the event that took place at Swift Creek Elementary School in Raleigh, where Megan Sedaghat’s second and third grade classes picked and ate strawberries from the school’s strawberry garden. The release also described the help that the school had received from the NCSA in setting up the garden. Agricultural education and its importance in

relation to North Carolina strawberries was also described in the release. Pictures taken at the event were sent to local media along with the press release.

- Total Placements: 8
- Social Media Impressions:2,530
- Television Broadcast: “My Carolina Today” – My Carolina Today (morning show on NBC-17) host Valonda Calloway visited Page Farms in Wake County and talked with farm owner Danny Page and with the NC Strawberry Association to learn about strawberry picking all over the state. The clip aired on My Carolina Today the week of May 9 and a video clip of the broadcast has remained on its website for viewers to see. The clip can be found here:  
<http://www.mycarolinatoday.com/2011/05/strawberry-season/>
- News Release: “Free Phone App Locates Strawberry Farms across North Carolina”
  - Written by Communicopia. Released May 9, 2011. This release was published in online format (<http://www.globalshrinking.com/client/ncstrawberry/news/2011/0510.aspx>), distributed to media around the state and posted on approximately 30 press release publishing sites. This press release announced the new NCSA Farm Locator App, a free iPhone app that gives users an easy way to find North Carolina strawberry farms. The release also described a website with the same features as the App that could be utilized by web-enabled mobile device users. The release encouraged people to download the app or use the mobile site to find farms where they could pick and purchase fresh North Carolina strawberries. Media placements can be seen in the press tracker for this release.
  - Total Placements: 30
  - Social Media Impressions: 11,186
- Social Media Contest: Sweet Tweet – Communicopia wrote Twitter and Facebook content for contest. Communicopia also updated Twitter posts daily and compiled list of entries for NCSA. There were a total of 14 entries in the Sweet Tweet contest. The winning “Tweet” stated: “Why I <3 NC Strawberries - because they make the best homemade ice cream! Supporting local economy has never tasted better :D” Communicopia also suggested the Mother’s Day contest run by the NCSA, showcasing mothers in the field picking and enjoying fresh, delicious North Carolina strawberries.
- News Release: “North Carolina Strawberry Association Launches “Sweet Tweet” Contest”
  - Written by Communicopia. Released May 19, 2011. This press release was sent to media outlets in the Raleigh area (radio, print, online, TV) and posted to several local press release posting sites. It was also sent to technology reporters and editors for the top ten newspapers in North Carolina, as well as “tweeted” to the Twitter accounts of those reporters. The release announced the “Sweet Tweet” contest and described the contest rules and how to enter. This release was supported by posts to the Twitter and Facebook accounts for the NCSA. The news release was picked up by both the Charlotte Observer and the Raleigh News & Observer, the two largest daily newspapers in the state. Media placements can be seen in the press tracker for this release.
  - Total Placements: 13
  - Social Media Impressions:5,115
  - @NC\_Strawberry has 730 followers on Twitter.
  - 1, 527 people “Like” the NC Strawberry page on Facebook.

## **Account Coordination**

Communicopia coordinated the NCSA public relations activities with Debby Wechsler, executive secretary, through regular calls, conference calls and emails. Communicopia helped add value to the NCSA's promotional efforts by distributing information in a timely manner; identifying and creating key messages about strawberries and the Association that resonated with target audiences; building relationships with key influencers such as food editors, reporters and school and community leaders; and providing advice, consultation and expertise to guide public relations efforts.

Main objectives included: increasing awareness among consumers of North Carolina-produced fresh strawberries available in the spring (April, May, June); encouraging consumers to buy locally produced strawberries on farms and from retail stands and to ask for locally grown strawberries at grocery stores; help member growers sell more strawberries.

Communicopia accomplished these objectives through regular communication with the NCSA, proactive pitching to local and state media outlets, providing detailed press releases, fact sheets and media alerts to these media outlets and through providing content for NCSA social media channels. All communications efforts were written in a clear, concise manner designed to be easily digested by target audiences. Results included a vast amount of favorable media coverage for the NCSA, both online and in print.

Through this coverage, the NCSA was portrayed as a progressive, savvy association acting in the best interests of North Carolina strawberry growers and the state's citizens in general. Media outlets saw the value of a statewide organization that supported the local economy, encouraged healthy living through consuming fresh strawberries, aimed to educate citizens on an important crop and sought to make strawberry picking and buying easy. Target publics were invited to experience the fun of strawberry picking and consumption and were educated on the benefits of delicious North Carolina strawberries. Overall, the 2011 strawberry season garnered increased awareness for the North Carolina Strawberry Association, its members and the strawberry crop in general.

## **Communicopia's Next Steps for continued PR prior to 2012 season**

- Send pitch (or article) to Our State magazine in late 2011 for a unique feature story with photos in the March or April 2012 issue.
- Pitch or write article for NC Savor magazine.
- Contact North Carolina food/living magazines in late 2011 for spring story placements.
- Develop Facebook and Twitter contests that can be used pre-season and during the season.
- Set-up a YouTube channel in late 2011 for NCSA and populate with edited footage gathered during the 2010 and 2011 season.
- Update media lists in January 2012.
- Develop story angles and pitches for newspapers in key markets outside of the Triangle. Contact key editors/writers in early 2012 to discuss story ideas and garner interest. Follow-up and monitor:
  - Eastern NC/Coast – March 2012 article placement
  - Greensboro-late March 2012
  - Charlotte – Late March/Early April 2012
  - Asheville/Mountains – April 2012

Thank you for the opportunity to promote the NCSA and NC strawberries.

Angela Bendorf Jamison, president/owner

Website: [www.communicopiaPR.com](http://www.communicopiaPR.com)

Phone: 919 523 5991

Email: [angela@communicopiaPR.com](mailto:angela@communicopiaPR.com)

Links:

<http://www.ncstrawberry.com/>

See especially: <http://www.ncstrawberry.org/growers.cfm>

**Easy to Use**

**Picking**  
Pick by pinching the stem of the berry between your thumb and forefinger. This will prevent damage to both the fruit and the plant. Leaving the caps on will help your strawberries last longer. Berries will not ripen after they are picked (like bananas do). Look for berries that are plump, firm, and well colored.

**Storing**  
Strawberries are best when picked and eaten in the same day! To keep them longer, store them in your refrigerator. Arrange the berries in a shallow container, separating out any damaged berries. Cover them loosely, and keep at 35 degrees for best results. Do not remove the caps or wash the berries until you are ready to use them.

**Freezing Strawberries**  
**Whole berries:** Place one layer of washed, capped berries on a cookie sheet and freeze until firm. Package in freezer bags.  
**Sliced berries:** Slice berries in halves or quarters. Add 1/2 cup sugar (or less to taste) per quart of berries. Stir and allow the mixture to stand until the sugar dissolves (about 15 minutes). Pack the fruit and juice into freezer bags or containers. Leave 1/4 inch headspace for pint containers. Sugar is not necessary for freezing but will help preserve color and texture. Frozen strawberries work well in many fresh strawberry recipes. Consider the amount of sugar used in freezing and adjust recipe accordingly.

**Strawberry Measurements**  
1 quart of strawberries equals approximately:  
5 cups whole berries  
4 cups sliced berries  
2 1/2 cups puréed berries  
1 1/2 to 1 3/4 pounds  
1 1/2 to 2 quarts are needed for a 9" pie.  
5 pounds of berries = about 1 to 4 quarts  
1 cup sliced fresh strawberries = one 10-oz. package of frozen strawberries.  
Always bring home extra, you are sure to sizzle!

**Nutritious & Healthful**  
Strawberries are a good source of:  
• high levels of vitamin C and manganese  
• a good source of dietary fiber  
A single serving size of strawberries has only 46 calories and more vitamin C than a medium orange. Strawberries are also rich in antioxidant compounds such as anthocyanin, quercetin, resveratrol, and ellagic acid. Studies indicate that these compounds found in strawberries may help reduce the risk of heart disease, cancer, hypertension, and Parkinson's disease and reduce some of the cognitive declines of aging. There is also evidence that strawberries have properties that may assist with weight loss and with diabetes control.  
Frozen strawberries retain all the nutritional benefits of fresh strawberries.  
When you choose strawberries, you enjoy great flavor and support your health!

**Fresh & Local**  
Whether you pick your own, buy at a farm stand, or find them at the store, choose locally grown NC strawberries in season. You'll know where your fruit comes from - just down the road. With their uncompromising flavor, fragrance, and freshness, nothing beats NC strawberries.

**When are local strawberries ripe?**  
Harvest generally starts in the southeastern Coastal Plain in early April, in the Piedmont mid- to late April, and in the western Mountains in May. Depending on your farm pick time is 8 weeks. Cool spring weather produces the season's best berries, especially in May. Strawberries are in season and in season in May through June.  
To find local farms that offer pick-your-own and ready-to-eat strawberries, visit [www.ncstrawberry.com](http://www.ncstrawberry.com)

This brochure is published by the NC Strawberry Association, which works to support strawberry berry and promote locally grown strawberries.  
got to be **NC AGRICULTURE**  
NORTH CAROLINA STRAWBERRIES  
Just Ripe for You  
[www.ncstrawberry.com](http://www.ncstrawberry.com)



# A Guide for Picking Strawberries



**Pick fully red, ripe berries.** Strawberries of most varieties reach their peak flavor when they are a deep red all over.



**Pinch the stem when you pick.** Don't pull or yank berries off.



**Leave the caps on.** Your berries will stay fresh longer. Remove caps only when ready to use the berries.



**Handle gently.** Try not to overfill or jostle containers.



**Wash up.** Wash your hands – and your children's hands – before picking. Wash your berries, just before you eat or prepare them.



**Be kind to the plants and fair to the farmer.** Avoid stepping on plants or rows or trying to jump over the rows. Please don't pick the flowers – they are baby strawberries! Pay for your berries before you eat them.



**Keep berries cool.** Don't leave your berries in a hot car. Refrigerate them as soon as possible.

**Enjoy delicious, nutritious, fresh-picked strawberries in many ways!**



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**Enjoy delicious, nutritious, fresh-picked**



**Project Title:** Carolina Blueberry Consumer Awareness Campaign (final Report)  
*Previously approved final report*

## **PROJECT SUMMARY**

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The marketing program, using \$45K of grant funds and matching funds of \$26K allowed the North Carolina Blueberry industry to expand its consumer reach to create the largest annual increase in blueberry sales. North Carolina has always been a leader in blueberry production in the United States, and at one time ranked number ten in the world. With growth in other states and other countries, it is important that North Carolina maintain its market share of the increase in all sales, national and international. We looked to expanded consumer targeted marketing to achieve an ambitious goal of 5% increase in sales in 2011 and 2012.

The motivation of this project was to increase the sale of blueberries, 5% per year in 2011 and 2012. The goal to increase sales by a total of \$6 million over a two-year period, the amount attained \$12.8 million. (*Noncitrus Fruits and Nuts 2012 Preliminary Summary*, January 2013, USDA, National Agricultural Statistics Service.)

## **PROJECT APPROACH**

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During the grant period, consumer blueberry demographic studies (U. S. Highbush Council) were studied and compared to marketing venue demographics to reach the appropriate market for an aggressive return on investment. In the past, this was not the approach, – the increase in competition and a relatively short season made an active consumer response critical to the success of the initiative.

Because the harvest of blueberries is relatively short in the five county production area (Bladen, Pender, Sampson, Duplin and Columbus) promotional efforts typically begin in May and continue through the first part of July. Usually this requires a plan in place with materials ready to reach the market by the first part of May – so work actually begins early in the year.

The print and broadcast funds were invested primarily in North Carolina - Public Radio, Our State Magazine (does have a national component as well, Farm Bureau Magazine, Western North Carolina Magazine and outdoor advertising which could be considered a mix of state and national exposure. On a wider scale there was promotional material on FoodNetwork.com; Food.com; RachaelRay.com; CookingChannelTV.com and OpenTable.com -- these venues would be considered a national campaign.

Our new historical video was created from grant funds. The North Carolina Blueberry Story can be viewed from our website anywhere in the world there is Internet connection. Here's the link: [www.ncblueberry.org](http://www.ncblueberry.org).

With a hosting site and a design team obtained to design and service the site, we further advanced the effort we also contracted with an experienced artist to create a brand, which appeared online, and in print publications.

Contact with colleagues created link exchanges so that entities seeking information about blueberries on any site could be pointed to more resources. For example our site did not have U-pick information but the NCDA & CS site did. Our site did not have research information but the NCSU site did and so we published links that could deepen research or consumer information.

More and more social media is being used by food groups – Facebook, a leader in 2010 is now reached as frequently through mobile devices and apps as through a PC.

At the time we submitted our end of grant report we had an active website. On February 25<sup>th</sup> our site was temporarily simplified while our new cross-platform (PC, tablet, smartphone, and multi-device) site is being built. Our target live-date is April 15, 2013. A site to view the video mentioned is <https://www.youtube.com/watch?v=XoynJFmrVyc> until the new site is up.

## **GOALS AND OUTCOMES ACHIEVED**

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Sales records were kept throughout the season and compared against the previous year's sales. The initial goal was to increase dollars five percent over two years. Unfortunately we have not received the actual numbers from the USDA for 2011 – but through the NCDA & CS we were able to ascertain results based on previous year's volume, average pricing and fresh to process ratio dollars increased. We had projected a five percent dollar increase, but came in at twelve percent, 6.5 million dollars versus a goal of 3.0 million dollars in 2011. Again, numbers are not available from USDA for the 2012 harvest but actual dollars are estimated with available data to increase 7 percent. There were fewer grant dollars used in 2012 (approx. 8 percent of the total grant) which may be attributable to the variation in available marketing funds but still exceeded the goal of five percent.

In essence the goal in the grant request was to increase dollars \$6 million over two years but actual results were \$12.5 million. The grant awarded was \$45,000 so with the addition of \$26,000 in matching funds the *ROI was more than \$175 for every one-dollar invested* in total. The estimated return on the \$45,000 grant would then be approximately \$7.8 million.

10,000 full color brochures and 100 spiral cookbooks were printed – these were coordinated through the NCDA & CS. Grantees are allowed to change 20% of plan and the blueberry character was not developed and the video created instead.

According to our marketing representatives at the NCDA & CS Shelby Publishing is the best way to reach food preparation sources (institutions, restaurants, etc.) regarding blueberry product. We coordinated with Shelby Publishing to place the advertising as stated in our plan.

The mall marketing strategy was recommended by our representative at the NCDA & CS marketing department (at the time the grant was requested) and was a venue their marketing department coordinated for all of their agricultural clients in previous years. It is something we would change; we would not do this again. Our current marketing rep agrees.

Our print materials have been used and brochures will be newly designed and printed in 2013.

Since this grant, the use of mobile devices has doubled. We are continuing our 2011 effort with a redesign in 2013.

Advertising placed as described.

Full page ad in *Our State Magazine*

Full page ad in *Farm Bureau Magazine*

Two full pages in *Western North Carolina Magazine*

National Public Radio flight schedule May 31, 2011-June 19, 2011

Online impressions increased from less than 20,000 in 2008-2010 to 454,565 on-line impressions delivered between May 25, 2011 and June 24, 2011 for advertising placed by Scripps at FoodNetwork.com, RachaelRay.com, Open Table.com and Cooking ChannelTV.com and NC Blueberry Council redesigned website created and hosted by GoDaddy.com.

Mall and Billboard advertising coordinated and placed by North Carolina Dept. of Agriculture and Consumer Services.

Full page *Sunbelt Food Services* promotion for May-June 2011.

We had a goal to increase exposure of Blueberries at 50,000 per year with a presence at the North Carolina Blueberry festival. Part of this funding was revised from the creation of a blueberry mascot/animated video to a historical video detailing the history of the industry in North Carolina as it began 75 years ago.

In the meantime, over the two-year period, blueberry sales increased \$12 million; during a two-year goal to increase 100,000 consumers, the average increase would have been \$120 per hypothetical consumer. The actual consumer increase, or increased use by existing consumers, was much higher when looking at the per capita consumption in the 2011 North American Blueberry Council (NABC) yearly statistical book. Total U.S. per capita blueberry consumption (fresh and process) reached an estimated 33.7 ounces for the 2010/2011 crop year, up from 32.1 ounces the previous year. Per capita fresh consumption has reached an estimated 17.8 ounces per person in 2010/2011 compared to 15.3 ounces per person during the 2009/2010 season. Frozen (process) blueberry consumption totaled an estimated 15.9 ounces in 2010/2011 down from 16.8 ounces per person the previous season.

## **BENEFICIARIES**

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The growers did benefit from a banner year, and it follows that there was an increase in assessments. This is a percentage of overall profits. Plenty of fruit was available for the consumer in the marketplace, which kept the blueberry demand healthy. No grant funds went directly to research -- but research received the benefits of the two consecutive years. Specific beneficiaries of the program include North Carolina State University where the North Carolina Blueberry Council Inc. supported the research department with other grant funds for research.

The benefitting departments included Plant Pathology, Entomology, Horticulture Science, Blueberry Extension Education Programs in areas of Blueberry Disease Research, Insect Management and Biology, Breeding and Propagation of New Blueberry Varieties for Eastern North Carolina, Enhancement of Blueberry Production through Micro propagations, Virus-Indexing and Field Evaluation, Blueberry Disease Research, Blueberry fertility, health components, fruit quality, mechanical harvestability and E. coli survival. Additional funds permitted the Council to fund the blueberry plant breeder position at the research station in

Castle Hayne, which will help the industry and hopefully increase productivity and varieties to the benefit of the blueberry consumer and the industry in North Carolina. Because of revenues received in the harvest of 2012 (our second goal year) have been released since our initial report by the USDA, we have been able to determine that 2012 sales increased 12.8 million over 2010. This is 22%. With other sales revenues, assessments have increased. Support to NCSU increased in one year almost 43 percent or from \$54,000 to \$127,000.

## **LESSONS LEARNED**

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Each year will require a strong marketing plan. The outcome was that projected dollar sales actually increased 14\* percent over 2010, a record-breaker. Comparatively Michigan was down

12%, California was up 9%, New Jersey was up more than 50%, Oregon was up 84% and

Georgia was up 21%. Nationally overall increase was projected to be 34%. For many years North Carolina ranked 3rd or 4th in the nation but is projected to be in 6th or 7th place in 2012. This is despite doubling projected sales in 2012 over sales in 2004. This is not due to a lack of production or pricing, but increases in acreage in other states. To be competitive North Carolina must continue a vigorous marketing program to sustain this growth. Blueberries are being researched and maintain a reputation as an outstanding source of nutrients as well as a benefit in disease prevention and management. Blueberry sales at the current level will afford growers the opportunity to increase production and bring more products to the marketplace and the consumer.

In measuring future results it is important to utilize media that can give specific demographics to justify money spent. For now we are discontinuing out-of-season advertising, out of home advertising, sponsorship type marketing, passive promotions or non-specific broadcast or online advertising. Our focus is on results not low-cost venues that do not offer complementary demographics or results with a good return on investment (ROI).

We have been able to negotiate special rates by bundling different media within a group. In 2011 and 2012 this really helped us to build marketing relationships, stretch dollars, build recognition, and most importantly, reach goals.

## **CONTACT PERSON**

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## **Project Title:** Adding Value and Marketing of Specialty Crops

*Previously approved final report*

### **PROJECT SUMMARY**

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There is strong market demand for added value products using locally grown fruit, berry, and vegetable crops in the Piedmont Region. The Piedmont Food & Agricultural Processing Center (PFAP) was created in response to that demand. The PFAP is governed by an Inter-Local Agreement among four Piedmont Counties, Alamance, Chatham, Durham, and Orange, with Orange County as the project's fiscal agent. The project has secured grant funding to renovate and partially equip the PFAP. This funding allowed for the purchase of specialized equipment that enables the center to fully serve specialty crop producers. In addition, the PFAPC also provides refrigerated and frozen storage available for pallets and shelf storage, allowing product aggregation of specialty crop products for large scale and institutional sales.

The funding also facilitates retail and wholesale marketing of specialty crop products by farmers and food entrepreneurs 1) directly to consumers through farmers markets, on-farm stands, and community supported agriculture, and 2) indirectly through grocers, caterers, chefs, and institutional food service. This project aims to provide a critical missing link in the regional food system by offering added value processing and marketing of specialty crops that in turn can provide healthier, safer, North Carolina grown specialty crop foods for all residents of the state.

### **PROJECT APPROACH**

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The two main activities performed as part of this project include 1) the purchase and installation of equipment at PFAP dedicated to added value processing and marketing of specialty crops and 2) outreach to specialty crop producers that includes an introduction to the services offered by PFAP. PFAP considers a service area of a 75-mile radius, spanning 22 counties in the Piedmont of North Carolina.

In general, there has been considerable interest in PFAP during the first months of operation. Two anchor clients both utilize specialty crops in their products. One client produces specialty honey products and the other uses specialty crops in production of their ice pops. In total, nine clients are currently using specialty crops in the products they produce at PFAP.

Initial establishment of PFAP involved guidance from a steering committee developed to fulfill an inter-local agreement between the four partner counties and day to day management by Orange County. During the summer of 2012 and as noted in the original inter-local agreement, a Piedmont Food & Ag Processing Center Corporation (PFAPCC) was established to allow PFAP to be guided by a non-profit corporation, independent of the aforementioned steering committee. PFAPCC has held meetings

since the summer of 2012 and is currently evaluating contracts between Orange County and PFAPCC for 1) facility rental and 2) various aspects of financial and general operations. An Ag Committee was formed at the first meeting of the PFAPCC Board of Directors to help continue outreach and recruitment of specialty crop producers and users.

PFAP hosted many visitors in its first year including land grant university student groups, extension service professionals from North Carolina and neighboring states, as well as a visit by a field manager for Amy's Organics. PFAP information was provided to farmers and specialty crop users at a variety of agricultural, food system, and local government meetings.

This project involved funding from seven different grant programs for a total of \$1,320,419 used to fund building renovation, equipment purchase, and first year operations.

We ensured that funds were used to solely enhance the competitiveness of specialty crops by having the equipment tagged 'specialty crop use only'. In addition, clients must be approved by staff to use any piece of equipment in PFAPC. This is recorded on our Client Data Sheets. Only Clients creating Specialty Crops end-products are approved to use specialty crops only equipment.

## **GOALS AND OUTCOMES ACHIEVED**

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The first goal was to provide access to specialized equipment for added-value specialty crop processing. The fruit and vegetable washer was installed in late spring 2012, and a juicer / UV treatment unit was fully operational in summer 2012. A sealer, reusable produce and fruit boxes, as well as racks and sinks were also installed in 2012.

While the overall publicity during PFAP's first year of operations has likely extended to specialty crop growers, focused outreach to this targeted group is scheduled to start in winter 2012-2013 to share information about the equipment and opportunities offered by PFAP. In addition, PFAP is collaborating with a regional AFRI grant on local food systems, and efforts will be made to capture value from surplus production and unmarketable fresh fruits, berries, and vegetables through added value processing. This effort will be engaging a local food retailer, Lowes, and a major institutional buyer, Fort Bragg.

As noted previously, nine PFAP clients currently use specialty crops as ingredients to their value added products. The crops include, honey, nuts, fruits, vegetables, and herbs. Since opening in October 2012, 312 hours have been logged in the specialty crops room. In addition, eight pallets of floor space, equivalent to 60% of the freezer, are used by specialty crop producers. The walk-in cooler has three pallets of floor space equivalent to 100% of the cooler space, dedicated to specialty crop users and their products.

The other general goal was to conduct two outreach events within the first year of facility operation, in conjunction with specialty crop conferences to increase awareness of opportunities to add value to specialty crops. Associated with this goal was recruitment of specialty crop producers to become clients of PFAP and 15 clients completed an initial meeting with PFAP staff. Of those, nine have become clients and eight are actively using the facility.

Efforts to attain 30 specialty crop growers was challenging given the timing for commissioning the project. We were unable to hold winter meetings and conduct equipment demonstrations in winter 2011 – 2012, given that the produce washer was completely functional until August 2012. Transitioning the facility from County managed to a newly established nonprofit further delayed grower meeting in winter 2012 – 2013. The new nonprofit Board has prioritized specialty crops and named a subcommittee to pursue outreach to specialty crop producers and processors.

Outreach events are listed below.

Year	Event	Number of Attendees
31-Jan-09	Durham Farmland Presentation	60
9-Feb-09	Ag Summit Presentation	80
1-Apr-09	UNC Local Food Presentation	70
8-Feb-10	Orange County Ag Summit Presentation	80
27-Oct-10	Groundbreaking	80
3-Dec-10	Carolina Farm Stewardship Presentation	35
19-Feb-11	Durham Farmland Presentation	55
10-Mar-11	Cabarrus County Food Policy Council Presentation	13
14-Mar-11	Piedmont Triad COG Presentation	50
15-Mar-11	Randolph CES Presentation	8
21-Mar-11	Orange County Ag Summit Presentation	130
2-Apr-11	UNC Local Food Presentation	25
21-May-11	Hog Day Table	75
11-Jun-11	Company Shoppes Opening Table	55
26-Jun-11	Farm to Fork Picnic Table	550
29-Sep-11	Sustainability in Community Colleges Presentation	65
4-Jan-12	PFAP Client Gol for meat processing meeting	2
18-Jan-12	Orange County Ag Preservation Board meeting	8
2-Feb-12	Triangle food Truck Alliance meeting	6
7-Feb-12	Eno River Farmer's Market Board Meeting	8
11-Feb-12	UNC Kenan Flagler Tour	3
13-Feb-12	Orange County Ag Summit Presentation & Tour	60
29-Feb-12	Shared Tables Panel at Duke	85
6-Mar-12	Eno River Farmer's Market Board Meeting	8
20-Mar-12	UNC Food Systems Class Presentation	35

21-Mar-12	Introduction to the UCC legal training Workshop	4
29-Mar-12	Small Farms Leadership Institute Tour	40
2-Apr-12	Food Incubator Network Meeting	14
7-May-12	Iowa Ag Leaders Tour	28
20-May-12	Farm to Fork Picnic Info Table	650
7-May-12	Student Outreach Tour	24
9-May-12	Student Outreach Tour	16
23-May-12	Student Outreach Tour	19
16-Jun-12	General Public Tour	2
18-Jun-12	NCDA Outreach Event	17
24-Jul-12	Chestnut Grower Tour	4
26-Jul-12	Orange County Government Intern Tour	11
7-Aug-12	Ag tour	8
23-Oct-12	Rowan County Tour	2
		2485

At the inaugural meeting of the PFAPCC, the new board voted unanimously to create an agriculture committee to focus on specialty crop producers and their products at PFAP. Plans for 2013 include development of a brochure targeted to farmers and specialty crop producers. Ongoing and developing collaborations with NC Department of Agriculture and Consumer Services and NC State University will also allow for strategic networking to enhance awareness of PFAP services and capabilities for specialty crop producers and buyers.

**Twenty-one PFAP clients use specialty crops in their products. Currently, 7 clients have one or more food products made at PFAP that wholly contain all or a majority of specialty crops ingredients. The estimated percent of specialty crops in the products produced by PFAP clients is noted below.**

## **BENEFICIARIES**

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The beneficiaries of this project include farmers, food entrepreneurs, and consumers. Current clients that are active users are listed below. As mentioned previously, equipment supported by this grant program is labeled 'Specialty Crop Use Only'. The facility was funded in part by specialty crops funds.

Specialty Crops clients at PFAP, 11/01/2012

YAWP

Product: Snack-Bar

Specialty Crops: Almond, Apricot, Cacao, Coconut, Date, and Pecans.

Estimated % of Specialty Crops in their product: 90+%

Vintage Bee

Product: Honey Products

Specialty Crops: Blueberries, Cacao, Strawberries, Raspberries, and Mint.

Estimated % of Specialty Crops in their product: 98+%

Loreline's

Product: Candies

Specialty Crops: Chestnuts, Cacao, Pecans, and Walnuts.

Estimated % of Specialty Crops in their product: 50+%

Boxcarr Farms

Product: Catering and Food Truck

Specialty Crops: Seasonal Produce

Estimated % of Specialty Crops in their product: 70+%

Nello's Italy

Product: Tomato Sauce

Specialty Crops: Tomatoes, Garlic, and various herbs

Estimated % of Specialty Crops in their product: 90+%

Chatham Cider Works

Product: Hard Apple Cider

Specialty Crops: Apples

Estimated % of Specialty Crops in their product: 99+%

## **LESSONS LEARNED**

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Given the large scope of the overall effort to establish a shared-use, added-value processing facility, delays were expected. Nonetheless, the facility is fully functioning and additional staff will be hired in 2013 to help manage daily operations and facilitate outreach to farmers and food entrepreneurs that purchase directly from farmers.

Given the unique scope of this facility, there has been tremendous interest from North Carolina individuals and organizations as well as those in other parts of the United States. It can be challenging to develop new clients and serve existing users while being responsive to the wide range of inquiries for a facility of this type.

## **CONTACT PERSON**

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### **ADDITIONAL INFORMATION**

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Related Websites

[www.orangecountyfarms.org](http://www.orangecountyfarms.org)

[www.pfapnc.com](http://www.pfapnc.com)

**Project Title:** The JCNMA Website: Phase II  
*Previously approved final report*

## PROJECT SUMMARY

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There are many working in the Mid-Atlantic Green Industry that do not have sufficient knowledge of nursery crops currently grown in North Carolina. Many owners and managers, whether a landscape, retail, or re-wholesale business, desire a more efficient method in which to educate their employees on plant habits and identification. The Johnston County Nursery Marketing Association (JCNMA) completed construction of the first phase of the back-end functionality of a comprehensive online plant database that is easily searchable and user-friendly in January of 2011. The database, aptly named “JocoPedia”, is targeted for Green Industry Professionals and specifically focuses on nursery crops grown in North Carolina by JCNMA member nurseries. To view the JocoPedia, please visit <http://www.jocoplants.com/plant>.

Phase I of the project did not include data entry of the plants grown by JCNMA members. Therefore, funds were requested from the Specialty Crop Block Grant Program to be appropriated towards a paid internship for up to three horticulture students to assist in the completion of plant ID research and data entry for the roughly 3,000 plants grown by JCNMA member nurseries. Although a total of 1,034 entries were completed by five interns and checked for accuracy by four JCNMA technology committee members, the goal of 3,000 completed plant entries was not attained during the grant period.

As a match to grant funds, the JCNMA provided funds to promote the JocoPedia along with [www.jocoplants.com](http://www.jocoplants.com). At five different trade shows, the JocoPedia was demonstrated to various attendees on the JCNMA computers along with distributing promotional print materials. Advertisements for the JocoPedia were also placed in industry publications and in general trade show publications.

The added JocoPedia entries, along with advertising at trade shows and in industry publications, contributed to a large increase in numbers of visitors to the website and the JocoPedia. Popularity of [www.jocoplants.com](http://www.jocoplants.com) (with the inclusion of JocoPedia) among Green Industry professionals has increased through word-of-mouth, also contributing to the 88% visit increase in 2011 and the 56% visit increase in the first two months of 2012.

## PROJECT APPROACH

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The JCNMA partnered with the North Carolina State University Career Services Department and various professors of the North Carolina State University Horticulture Department to offer a paid internship for up to three horticulture students to assist the JCNMA in completing the JocoPedia project during the 2011 spring, summer, fall, and half of the 2012 spring semesters. Members of the JCNMA internship and Technology Committee members were responsible for all aspects of the JocoPedia project. JCNMA member nurseries were also responsible for helping to promote the JocoPedia to their customers and at trade shows. Internship members are as follows: Chair Ruth Currin Holcomb (Currin's Nursery; JCNMA Vice-President) and Co-Chair Hunter Casey (Casey Nursery). Members of the Technology Committee are as follows: Chair Heather Rollins (Smith's Nursery; JCNMA President), Co-Chair Ruth Currin Holcomb (Currin's Nursery; JCNMA Vice-President), Danielle Stephenson (Stephenson's Nursery; JCNMA Treasurer), and Amie Newsome (Johnston County Extension Agent and advisor to Technology Committee).

To begin the project, the Technology Committee and Internship Committee met and decided on criteria and rules for the internship (please see attachment "JCNMA intern description"). As the project went on and lessons were learned, these criteria and rules were changed accordingly. Definitions within the JocoPedia were created as a guide for interns (please see attachment "JocoPedia Definitions and Rules"). Applicants were then interviewed and selected. For the spring and summer semesters, two interns were selected. For the fall semester, three interns were selected. One of the fall interns, however, had to quit the internship citing time conflicts with her course load. In all, there have been five interns hired to complete plant entries. In July 2011, a request for extension was requested and granted in order for two of the fall interns to continue their plant ID research and data entry through Feb. 24, 2012.

Each week, interns completed at least 10 entries. One member of the internship and technology committee (aka "the checker") per intern then checked the entries for accuracy and completeness the following week. If the entries were complete and accurate, it was published by the checker. If entries were incomplete or inaccurate, the checker then asked the intern to complete the entry or gave comments as to how to fix the entry (please see attachments "AliciaB-comments" and "Wendy-JocoPlants Corrections"). Presently, there are 1,034 plant entries completed by the interns and published by the Internship and Technology committees. Although this does not meet the funds request for 3,000 entries, another extension was not requested due to personal reasons of members of the Technology Committee.

In order to get the most commonly grown plants by JCNMA member nurseries published, members of the Technology Committee agreed upon a list of plants at the start of the spring semester gathered from the Master List that must be completed by the end of the grant period by the interns. Therefore, these entries will have the most impact and be the most helpful to Green Industry professionals. The Technology Committee will continue to make plant entries of the remaining plants on the Master List when more time becomes available. The JoCoPedia, however, will always be a work in progress in order to accommodate the ever growing and ever changing list of plants grown within the JCNMA.

Using matching funds, the JCNMA promoted the JocoPedia through booths at five trade shows and advertisements in industry publications (please see attachment "joco\_ad\_v4-jocopedia"):

Summer Green Show: Aug. 17-19, 2011. Raleigh, NC. 1,300 attendees.  
Representatives: Amie Newsome, Ruth Currin Holcomb, Heather Rollins, Danielle Stephenson

Mid-Atlantic Nursery Trade Show: Jan.11-13, 2012. Baltimore, MD. 10,940 attendees. Representatives: Ruth Currin Holcomb and Danielle Stephenson.

Green & Growin': Jan. 19-20, 2012. Greensboro, NC. 4,400 attendees.  
Representatives: Amie Newsome, Ruth Currin Holcomb, Heather Rollins, Danielle Stephenson. In addition to the booth at the trade show, JCNMA sponsored a day of educational sessions and set up a booth outside of the classrooms. In between classes, attendees were invited to browse the JocoPedia to become familiar with it in addition to taking promotional print materials explaining the JocoPedia further.

South Carolina Horticulture Industry Trade Show: Feb. 2-4, 2012. Myrtle Beach, SC. 1,536 attendees. Representatives: Ruth Currin Holcomb, Amie Newsome.

Eastern NC Landscape Conference: Feb. 21, 2012. Wilson, NC. Attendance has yet to be determined. Representative: Heather Rollins.

The above tradeshow are for Green Industry professionals in which Green Industry plants, products, equipment, and services, etc. are showcased in a pre-determined

booth space. Visitors to the JocoPlants Booth were able to browse the JocoPedia and were also encouraged to register on the website to receive updated news regarding JocoPlants and the JocoPedia. Promotional print materials were also handed out to attendees both at the JocoPlants booth and member nurseries' booths, which explain the benefits of the JocoPedia (please see attachment "brochure-jocopedia"). Representatives at the 24 member nurseries' booths also directed attendees to the JocoPlants booth in order to increase attendee exposure. The JCNMA representatives at the booths potentially impacted up to 95% of attendees at each show. The number of registrations on jocoplants.com increased during and after each trade show as well as the number of visitors to the site.

## **GOALS AND OUTCOMES ACHIEVED**

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**Goal:** The goal of this project is to educate Green Industry Professionals on North Carolina grown nursery crops through the completion of 3,000 accurately completed JocoPedia plant entries.

**Outcome:** A total of 1,034 entries were completed by five interns and checked for accuracy by four JCNMA technology committee members. The following examples are the end result of a typical JocoPedia entry:

The first tab is the “description” tab, in which the basic information about the plant is summarized in a paragraph.

The screenshot shows the JOCOPANTS website interface. At the top, there is a navigation bar with links for Home, Plants, Nurseries, News, About, Sponsor, Contact, Jocopedia, My Lists, and Profile. The main content area features a large image of Gold Mop Falsecypress trees on the left and a description box on the right. The description box has three tabs: Description (selected), Specs, and Inventory. The description text reads: "The Gold Mop Falsecypress is an evergreen tree with a pyramidal habit, red bark, and yellow foliage. It does well in full or partial sun. Although it grows to a maximum height of ten feet tall, it can be easily maintained at a smaller size. In production, it can be found as a full-to-the-ground small tree/large pyramidal shrub or as a multi or single-stem small tree." Below the main image is a row of four smaller images and a copyright notice: "Some images copyright JC Raulston Arboretum, Curm's Nursery". The footer contains copyright information for 2009-2012 and links for about, Privacy, Terms of Service, and Contact.

The second tab is the “specs” tab, in which more specific information about the plant is given in a quick, concise, and easy to follow form.

This screenshot shows the 'Specs' tab for the Gold Mop Falsecypress. The 'Specs' tab is selected, and the information is presented in a table format. The table includes the following details:

Description	Specs	Inventory
Type	Tree, Shrub, Evergreen	
Sun Requirements	Full, Partial	
Minimum Height	8 feet	
Maximum Height	10 feet	
Minimum Spread	5 feet	
Maximum Spread	6 feet	
Zone range	Zones 4 to 8	
Flowers	Inconspicuous	
Bloom time	N/A	
Bloom color	N/A	
Fall color	Unremarkable	
Fruit	Yes, Inconspicuous	
Fruit season	Spring, Summer, Fall, Winter	
Uses	Specimen, Screen, Foundation	
Features	Evergreen, yellow foliage, red bark, prefers moist, well-drained soils, can be used in the landscape alone, in a mass, in a screen, or beside a home's foundation	
Substitutes	<a href="#">Chamaecyparis pisifera 'Filifera Aurea'</a> Chamaecyparis pisifera filifera 'Sungold' <a href="#">Chamaecyparis pisifera 'King's Gold'</a> Chamaecyparis pisifera 'Lemon Thread' Chamaecyparis pisifera 'Plumosa Aurea'	

The page also includes a large image of the plant, a row of four smaller images, and a copyright notice: "Some images copyright JC Raulston Arboretum, Curm's Nursery". The 'got to be NC AGRICULTURE' logo is visible in the top right corner.

The third tab is the “inventory” tab, which shows what JCNMA nurseries have that

The screenshot shows the JOCOPLANTS website interface. At the top, there is a navigation menu with links for Home, Plants, Nurseries, News, About, Sponsor, Contact, Jocopedia, My Lists, and Profile. The main header features the JOCOPLANTS logo and a 'Sponsorship Opportunities' button. On the right, there are links for 'Admin area' and 'Jocopedia area'. The central content area displays the title 'Gold Mop Falsecypress (Chamaecyparis pisifera 'Golden Mops')' and a large photograph of the plant. Below the photo is a smaller image strip with the caption 'Some images copyright JC Raulston Arboretum, Cumins Nursery'. To the right of the photo is a table with three tabs: 'Description', 'Specs', and 'Inventory'. The 'Inventory' tab is active, showing a table with columns for 'Nursery', 'Available', and 'Size'. Below the table is a link to 'View more detailed inventory information'.

Description	Specs	Inventory
Nursery	Available	Size
Cumins Nursery	100	3
Cumins Nursery	2	15
Cumins Nursery	3	25
Hinnant's Nursery	860	1
Hinnant's Nursery	133	3
Panther Creek	39	5
Panther Creek	20	7
Panther Creek	8	15
Eowler's	7849	#3
Swift Creek Nursery	2	15
Swift Creek Nursery	10	15
Swift Creek Nursery	-2	7
Swift Creek Nursery	-1	10
Swift Creek Nursery	17	3
Stephenson's Nursery	50	10
Stephenson's Nursery	220	6
Stephenson's Nursery	100	3
Sampson Nursery	150	3
Powell's Nursery	500	1
Pender Nursery	773	3

plant available.

To gauge progress quantitatively, the JCNMA Technology Committee used Google Analytics to determine the number of visits, both unique and returning; along with the geographical location of each visitor to ensure that the correct audience is targeted (please see attachment “Analytics www.jocoplants.com”).

Goal: As of June 1<sup>st</sup>, 2010, there was an average of 45 unique visits and 67 returning visits (total of 112) to the website per month. The target of a 20% increase in number of visits to educational pages will apply for 2011 and a 25% increase in number of visits to educational pages in 2012.

Outcome: Success: In 2011, there was an average of 1,081 monthly visits, which is an 865% increase. In January and February of 2012, there was an average of 1,538 monthly visits, which is a 42% increase in number of monthly visits. These large increases are mainly due to an increase in advertising at trade shows and in industry publications as well as the website gaining popularity among Green Industry professionals after the JocoPedia was added.

Goal: As of June 1<sup>st</sup>, 2010, Google Analytics' statistics showed that 97% of visitors are from the Mid-Atlantic United States. For each year, a target of 75% of educational page visitors will be from the mid-Atlantic United States.

Outcome: Success: In 2011, 88% of visitors were from the Mid-Atlantic United States. In 2012, 84% of visitors were from the Mid-Atlantic United States. It is believed that this goal continues to be met because advertising at trade shows and in industry publications are only targeted to the Mid-Atlantic US region. However, this number decreased in 2012 due to the fact that the website was visited by people in other regions in the United States and other countries. It is assumed that this is because the Google search engine now searches the JocoPedia when people search for different plant varieties, many of which are grown outside of the Mid-Atlantic United States. These large increases are mainly due to an increase in advertising at trade shows and in industry publications as well as the website gaining popularity among Green Industry professionals after the JocoPedia was added.

Goal: In addition, there were 108 Green Industry professional registered on the website as of June 1<sup>st</sup>, 2010. A goal of a 10% increase per year to the number of registrations was set.

Outcome: As of March 01, 2012, there are 400 customers registered. In 2011, registrations exceeded the goal with the addition of 203 registrants, which is an 88% increase. From January 1<sup>st</sup>, 2012 to March 01, 2012, an additional 89 registrants, which is already a 56% increase.

## **BENEFICIARIES**

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The JocoPedia has directly impacted the economy of the 24 JCNMA member nurseries as well as their customers, other North Carolina nurseries, industry suppliers, and other Mid-Atlantic Green Industry Professionals. Although there are no hard numbers to use for comparison at this time, many JCNMA members believe that it has helped to increase sales to customers and in turn industry suppliers. Most importantly, the JocoPedia and its use by industry consumers will continue to allow the JCNMA and its member nurseries to have a significant impact on horticulture crops as an agricultural commodity in North Carolina now and into the future.

The JocoPedia meets the Green Industry demand for a more efficient method to gain knowledge of North Carolina grown plants. It is now a useful resource for industry professionals who wish to acquire a North Carolina Landscape Contractors License, which was required by law for those wishing to use the title of "landscape

contractor” or to advertise as such as of January 1<sup>st</sup>, 2010. The plant database will be a useful tool when studying for the required exam, which includes a plant identification section.

Furthermore, the student interns from North Carolina State University have benefitted from assisting with the JocoPedia project. They were further educated in plant identification, which will help them both in completing their related degrees and when entering the Green Industry upon graduation. They also gained important contacts to help further their knowledge of the Green Industry in general and to make connections for future employment.

## LESSONS LEARNED

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### Problem:

Although a total of 1,034 entries were completed by five interns and checked for accuracy by four JCNMA technology committee members, the goal of completed entries for almost 3,000 plants grown by JCNMA members was not realized. The number of quality student interns available to complete the JocoPedia project was much less than expected. Therefore, the goal of up to three student interns per semester could not be realized. In turn, the number of entries was dramatically decreased when compared to the entry goal set for each semester. Since the number of entries was decreased, the cost of the project is not what was expected by the end of the grant period.

### Lessons Learned:

When planning for the JocoPedia internship project, the small population size of the North Carolina State Horticulture Department was not taken into account. Each semester, there were only two to three students interested in the project due to the fact that many students were already involved with other internships or simply were not interested in adding an internship on top of their course load. If a project like this were to be done in the future, the timeline should be longer in order to accommodate for one to two interns per semester as opposed to three interns per semester.

Although an extension was requested and granted in July 2011 due to the above issue, another extension was not requested due to lack of personnel for reasons beyond the control of the JCNMA. All JCNMA committees operate on a non-paid volunteer basis above and beyond their responsibilities at their own nurseries. Both the Internship and Technology Committee members lack sufficient extra time to manage interns due to recent life-changing events. Therefore, the JocoPedia entries will not be able to be completed on a predictable timeline in the future.

#### Future Action:

In order to accomplish the goal of 3,000 plant entries, members of the JCNMA Technology Committee, along with continued help from the NCSU Department of Horticulture, will continue to add and complete accurate entries to the JocoPedia on a non-paid volunteer basis over the course of time. JCNMA general members may also be asked to participate in completing accurate JocoPedia plant entries in an effort to continually increase the number of entries available to the industry audience as new plants are introduced. The goal to complete entries for the remaining roughly 2,000 plants is by January 2014. The JoCoPedia, however, will always be a work in progress to accommodate the ever growing and ever changing list of plants grown within the JCNMA.

#### **CONTACT PERSON**

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Cell: (919) 880-8732  
[johnstoncountynurserymen@gmail.com](mailto:johnstoncountynurserymen@gmail.com) or [info@currinsnursery.com](mailto:info@currinsnursery.com)

#### **ADDITIONAL INFORMATION**

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Following Attachments:

- JocoPedia Definitions & Rules
- Joco\_ad\_v4-jocopedia
- Brochure-jocopedia

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### **JocoPedia Definitions and Rules**

- **Description:** A brief description of the plant's most distinguishing characters (i.e.: flower color, length of bloom time, bark, habit, etc.). This category should be written in full sentences with correct grammar and spelling.
- **Type:** Please check the type of this plant. In regards to trees and shrubs, there will always be two types to check: tree, shrub, vine, or groundcover *and* evergreen, deciduous, or semi-evergreen. Please check what is appropriate for NC.
  - If a plant can be a tree or shrub, please check both "tree" and "shrub" (i.e.: crape myrtles, vitex, etc.)
  - A Vine is anything that is vining and needs a structure such as a tripod, trellis, or similar structure to hold its habit. (i.e.: gelsemium, jasminum, etc.)
  - A groundcover is anything that covers the ground and gets less than 18" tall (i.e.: Blue Rug Juniper, Cotoneaster, Jasminum nudiflorum, etc.)
- **Sun Requirements:** Please check the amount of sunlight that the plant requires. If it can be grown in more than one different sunlight situation, please check all that apply. For example, the Encore Azaleas can be grown in sun, partial, or shade. "Best in Sun" means that the plant can be grown in partial or shade, but that it requires full sunlight to bring out the best traits in that plant (i.e.: Firepower Nandina can flourish in full shade, but it does not turn red in the fall and winter if it does not receive full sun.). "Best in Shade" means that the plant can be grown sun or partial, but the shade brings out the best characteristics of that plant (i.e.: Mahonia can be grown in partial sunlight, but the leaves yellow and turn brown whereas in the shade the leaf color is a nice medium green).
- **Flower:** Please check "yes" if the flowers are showy (i.e.: azalea, camellia), "no" if there are no flowers (i.e.: junipers, conifers), and "inconspicuous" if there are flowers, but those flowers can only be seen upon very close inspection of the plant (i.e. some varieties of hollies, some maples) . Check "N/A" if there are either no flowers or the flowers are too inconspicuous to note (i.e.: some varieties of hollies, some varieties of ligustrum)
- **Bloom Time:** Please check when the plant blooms. If it blooms more than one season, please check all applicable seasons. (i.e.: some cultivars of hydrangea bloom summer through fall)
- **Bloom Color:** Please check all colors that apply to the bloom of the plant. If there are multiple colors in one bloom, check "multi" and describe the colors in the bloom in the Description and/or Features categories. (i.e.: check "multi" for Autumn Twist Encore Azalea and write "Autumn Twist blooms are white with a lavender stripe and sometimes will be completely lavender" in Description and "white with lavender stripe flowers with occasional all lavender flowers" in Features.

- **Fall Color:** Please check the appropriate description of the plants fall foliage color. “N/A” means that the plant’s foliage does not change color at all (i.e.: Soft Touch Holly). “Vibrant” means that the plant’s foliage turns a different color that is much brighter than its summer color (i.e.: Japanese Maple cultivars, some Crape Myrtle cultivars). “Moderate” means that the plant’s foliage turns a different color than its summer color, but that it is not bright or striking (i.e.: some cultivars of Quercus, Salix cultivars). “Unremarkable” means that the plant’s fall foliage only changes color slightly from it’s summer color and is not very noticeable.
- **Fruit:** Please check the appropriate statement of whether the plant has fruit or not. “N/A” and “No” mean that the plant does not have any fruiting structure (i.e.: Carissa Holly). “Yes” means that the fruiting structure is evident and very visible (i.e.: Ficus carica (fig), Vaccinium (blueberry), etc.). “Inconspicuous” means that the plant produces a fruiting structure, but that is hidden or not readily seen (i.e.: some varieties of holly, Barberry).
- **Fruit Season:** Please check the appropriate season in which the plant produces a fruiting structure. If it fruits in more than one season, please check all accurate seasons.
- **Uses:** Please check the appropriate use or uses for the plant.
  - **Specimen:** the plant can stand alone or in mass and make an impact in the landscape (i.e.: any shade tree, acer palmatum cultivars, Vitex cultivars, etc.).
  - **Screen:** The plant, when more than one planted together, can grow at least 5’ tall and provide privacy of occupants in the landscape on either side (i.e.: Thuja ‘Green Giant’, Myrica cerifera, Callitropsis glabra, Ligustrum japonicum varieties). This plant can make a “living” fence and is usually evergreen.
  - **Foundation:** The plant is evergreen and is appropriate against a home’s foundation. (i.e.: many varieties of holly, raphiolesis varieties, Ligustrum jap. ‘East Bay’, some Chamacyparis varieties, etc.)
  - **Formal Hedge:** The plant, when more than one is planted together, can be pruned and sheared to make a border that gives definition to a space (i.e. Buxus varieties).
  - **Erosion Control:** A plant that has an extensive root system and/or covers the ground in a way that prevents soil washing away from the area. (i.e.: Ivy, Vinca, some varieties of Juniper, Wax Myrtle, Ophiogon, some varieties of Grasses, etc.)
  - **Wet Soils:** A plant that can tolerate wetter than normal soils or soils that drain poorly (i.e.: wax myrtle, itea, Ilex vomitoria, Taxodium, Metasequoia, Betula, Salix, etc.). These plants can sometimes be found in swampy areas or next to bodies of water.
  - **Groundcover:** Any plant that spreads more than grows tall (usually less than 18” tall) and covers an extensive area of the ground (i.e.: Blue Pacific Juniper, some varieties of Cotoneaster, Liriope, Drift Roses, etc.)

- Seasonal Color: A plant, usually an annual or perennial, that provides color in different seasons (i.e.: Canna Lilly, Lantana, etc.)
- Understory: Any plant that does well under the canopy of a forest or many trees (i.e.: cornus varieties, cercis varieties, some acer palmatum varieties, hosta, etc.)
- Vining: Any plant that either automatically or can be trained to climb a structure (i.e.: climbing hydrangea, climbing rose, gelsemium, etc.)
- Features: A brief listing of the plants characteristics (bloom color, bloom length, bark characteristics, habit, etc.)
- Substitutes: A brief listing of plants that can be used in the place of the described plant in case the described plant is not available or not in production at the time.
- Pictures: Please upload pictures of the plant either in the landscape (most preferred), in the nursery, a close-up of the plant's flowers, foliage, or bark.

### **Rules for Data Entry:**

- Must have at least one picture attached to each plant. If no picture can be found, please submit it into writing to [johnstoncountynurserymen@gmail.com](mailto:johnstoncountynurserymen@gmail.com).
- Mature size category MUST match search parameters. The search parameters are as follows: extra small (1"-36"), small (3'-10'), medium (10'-25'), large (25'-45'), and extra large (45'+). For example, when entering the mature height and size of an extra small plant, the intern must enter in terms of inches. CORRECT: 12 inches. Incorrect: 1 foot.
- In regards to patented plants, all symbols must be attached along with patent numbers. For example, when writing about Encore Azaleas, the correct way to convey patents are: Autumn Embers (TM) Encore (R) Azalea PP10581. For example, Double Pink Knockout Roses will be: Double Pink Knockout (R) Rose PP#18507.
- In regards to patented plants, include a link to the webpage of that plant in the description if one exists. For example, for Encore Azaleas, give link to [encoreazalea.com](http://encoreazalea.com). Please see the Autumn Angel (TM) Encore (R) Azalea plant entry for a full example.
- Absolutely no plagiarizing! Descriptions of plants must be your own original words!
- In regards to substitutes, please list the botanical name of that substitute found within the Master List provided to intern with the common name in parentheses separated by a comma. For example, Rhododendron 'Hardy Gardenia', (Hardy Gardenia Azalea). This will ensure that it will provide a link to that plant within the JocoPedia.



## Shop Thousands of Plants on One Website

Browse the complete inventories of 26 nurseries on [JocoPlants.com](http://JocoPlants.com).  
Registered users can build lists, compare prices and get a quote.

### Introducing: JocoPedia

Get the right plant for any situation. JocoPedia is an interactive guide to plants grown by premier nurseries in the heart of NC. Easy to research the plants you need. Perfect for planting across the Mid-Atlantic.

[www.jocoplants.com](http://www.jocoplants.com)

JOHNSTON COUNTY NURSERY MARKETING ASSOCIATION



## A History of Innovation

Since our inception in 1979, the Johnston County Nursery Marketing Association has been a leader in the Green Industry. From modern growing techniques like pot-in-pot technology to earlier customer-oriented efforts including Plant Fax and the Plant Fax Live Trade Show, the JCNMA has continued to develop better products and service.

We focus on providing quality, diversity and knowledge for our customers. We work closely with the JC Raulston Arboretum and North Carolina State University to research new plant species and horticultural practices. The JCNMA takes great pride in working together to provide our customers with cutting edge scientific information and new plant introductions.

## People Who Care

We're not some big multi-national corporation.

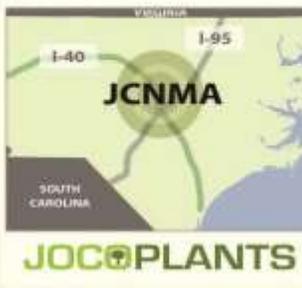


We're 24 family nurseries working together to provide excellent customer service and quality plant material.

## NURSERIES

Adcock's Nursery	919-552-8286
Carroll's Plant Center	919-894-2630
Casey Nursery, Inc.	800-891-1801
Currin's Nursery, Inc.	919-552-4521
Fair View Nursery, Inc.	800-743-3656
Fowler's Nursery	919-889-9000
Green Biz Nursery	910-323-8811
Hinnant's Nursery	919-838-9761
Jericho Farms	919-242-8297
Lee and Sons Nursery	919-963-3177
McLamb Nursery	919-894-3708
Neuse Plant & Bark, Inc.	919-934-0428
Old Courthouse Nursery	910-293-9374
Panther Creek Nursery	919-552-8353
Pender Nursery, Inc.	919-772-7255
Powell's Nursery, LLC	919-427-3960
Rhodes Nursery	919-820-2221
Sampson Nursery, Inc.	800-567-2909
Smith's Nursery, Inc.	919-934-1700
Stephenson's Nursery	919-894-2700
Swift Creek Nursery	919-934-7794
Taylor's Nursery	919-231-6161
Watson's Nursery	919-778-3590
Worthington Farms, Inc.	252-756-3827

**PLANT FAX**  
**1-866-404-5533**



JoCoPlantShow — July 18, 2012  
Kerr Scott Building - NC State Fairgrounds

**JOCOPLANTS**  
JOHNSTON COUNTY NURSERY MARKETING ASSOCIATION

# JOCOPLANTS

JOHNSTON COUNTY NURSERY MARKETING ASSOCIATION



## The Finest Plants in the Mid-Atlantic

We're the **Johnston County Nursery Marketing Association**, located in the heart of North Carolina. Our 24 member nurseries grow trees, shrubs, ground covers, perennials and annuals for wholesale customers across the Mid-Atlantic.

Our mild weather, advanced growing techniques and caring, experienced people all contribute to our reputation as the finest growers in the region.

## Shop 24 Nurseries with One Click of the Mouse

JoCoPlants brings together thousands of trees, shrubs and ground cover plants from the 24 nurseries of the Johnston County Nursery Marketing Association.



Landscapers, retail garden centers and developers can shop the full inventory of each nursery, search by type, size and price, build a list and send it off for a quote.



From Abelia to Zelkova, we have the finest container and field grown plants for developers, landscapers and retail nurseries.



## The Encyclopedia of Plants

Jocopedia is a one-of-a-kind resource for technical information and specs for over 2000 plants grown in our region and common across the Mid-Atlantic. Look up any plant we sell to find exact specs, or search for the right plant that matches your needs. Includes photos and currently available inventories.



*This project received support from the NCDAA&CS as part of the Specialty Crop Block Grant Program.*

[www.jocoplants.com](http://www.jocoplants.com)

## **Project Title:** North Carolina Watermelon Consumer Awareness Campaign

*Previously approved final report*

### **PROJECT SUMMARY**

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The North Carolina Watermelon Growers Association (NCWGA) was responsible for implementing a statewide media campaign to promote the Specialty Crop Program. This project was implemented from June 2010 – September 2011. The marketing committee was assembled and developed the media campaign. The NCWGA developed a request for proposal (RFP) and distributed it to advertising and media relations firms serving the State. The RFP included plans for television and print media, production schedule, information on demographics for targeted audience, and costs associated with production and delivery. The media campaign consisted of television, radio, printed ads and promotional materials. The advertisements promoted the NC Watermelon Industry, educated consumers on why they should “Buy Local”. The advertisements were placed in key markets of the state during the months of July through August 2010 and 2011. The NCWGA also measured the expected outcomes of the project. Expected outcomes were measured from certified audited reports from the various media outlets.

This new project teamed up the North Carolina Watermelon Growers’ Association with the NCDA Marketing Division to promote the NC industry thereby changing the purchasing behavior of consumers and retailers to buy North Carolina watermelons. Increasing consumer purchases were increased and as a result the economic vitality of the watermelon industry in NC became stronger.

**The economic downturn coupled with higher fuel costs had severe consequences of negatively affecting the income of these producers. A promotional campaign helped to stabilize this industry and increase the sales of locally grown fruits and vegetables .This campaign built upon recent US domestic consumer trends and growing interest in sourcing local food industry.The NCWA developed a request for proposal (RFP) and distributed it to advertising and media relations firms serving the State. The RFP included plans for television and print media, production schedule, information on demographics for targeted audience, and costs associated with production and delivery. The media campaign consisted of television, radio, printed ads and promotional materials. The advertisements promoted the NC Watermelon Industry, educated consumers on why they should “Buy Local”. The advertisements were placed in key markets of the state during the months of July through August 2010 and 2011.**

### **PROJECT APPROACH**

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The North Carolina watermelon industry generated in 2006 an estimated \$11.5 million in farm income according to the Agricultural Statistics from the NCDA&CS. The economic downturn coupled with higher fuel costs had severe consequences of negatively affecting the income of these producers. A promotional campaign helped to stabilize this industry and increase the sales of locally grown fruits and vegetables .This campaign built upon recent US domestic consumer trends and growing interest in sourcing local food industry.

This project did not build upon a previously funded project.

The requested funds of \$20,000.00 was used for a target mixed media marketing program that included radio, television and print media promotion, along with development of promotional materials. The funds were used during the months of July through August in 2010 and an equivalent amount of funding was applied for use during the same time frame in 2011. Program funds were utilized for creative development, purchase of media, execution of the promotional program elements and related agency fees.

### Television Spots

Watermelon advertising spots were developed and run during June, July and August on North Carolina's public broadcasting system. This station's demographics seem to be a genuine audience who would search for North Carolina grown produce. The UNC-TV broadcast system covers the entire state and parts of Virginia. Below are the total number of viewers that have seen the ads run on this station.

<u>Program</u>	<u>Average # of HHs/week</u>	<u>Weeks Run</u>	<u>Total # of HHs/Show</u>
<b>How-To/Weekend Programming</b>	4,700,000	8	37,600,000
<b>Children's Programming</b>	4,700,000	8	37,600,000
<b>Online Sponsorship</b>	75,000	12	<u>900,000</u>
<b>Totals Households:</b>			76,100,000

### Radio Advertising

Summer watermelon advertising spots were developed and run during June, July and August on North Carolina radio stations WWQQ-FM, and WRCQ-FM.. The demographics of these station are a combination of NC residents and tourists that visit North Carolina beaches. These ads promoted watermelons as a delicious, nutritious and refreshing summer treat.

Radio Audience

<u>Station</u>	<u>Total # of Impression</u>
<b>WWQQ-FM</b>	<b>793,800</b>
<b>WRCQ-FM</b>	<b>353,920</b>
<b>Total # of Impressions</b>	<b>1,381,072</b>

### Ad Copy

NC Watermelons

- Female voice; upbeat and energetic tone
- Format appropriate music bed

Nothing makes me think of summertime more than a big, juicy watermelon, and this year, North Carolina farmers produced over 155 million pounds. No matter the size or type, you'll find it right here in North Carolina. Virtually fat free, watermelons are a tasty and healthy treat. So supply your summertime with juicy North Carolina watermelons. Find them locally at retail stores or search NC Farm Fresh dot com.

Serve them in ice-cold slices, mix them up in a refreshing smoothie, or put them on top of a salad. Either way, North Carolina watermelons are a nutritious and delicious treat. They're naturally low in fat, which makes them heart-healthy; and they're an excellent source of Vitamins A, B, and C. Watermelons are also rich in the anti-oxidant, lycopene. Find locally grown, North Carolina watermelons at farmers markets, roadside stands, and retail locations today or Search NC Farm Fresh dot com.

When you want the best, it's got to be NC watermelons ...

### Billboards

During the summer of 2011, because of a mix up, the NCWA rented 3 billboards and advertised watermelons on major interstates and key roadways crisscrossing the state with an emphasis on roads leading to the beach. The billboards ran in July and August. The following table shows the total direct exposure count (DEC) for each billboard. DEC's are the number of people per day, ages 18-56, that have the opportunity to view them.

#### **North Carolina Watermelon Association 2010 Billboard Advertising**

**(July 1, 2010-August 31, 2010)**

Board Placement	DEC	Days Run	Total DEC/Board
<b>1-95 Roanoke Rapids</b>	<b>18,050</b>	<b>62</b>	<b>1,119,100</b>
<b>1-85 Warren Co., NC</b>	<b>18,590</b>	<b>62</b>	<b>1,152,580</b>
<b>1-0 exit 116</b>	<b>29269</b>	<b>62</b>	<b>1,814,678</b>
<b>Total DEC's</b>			<b>4,086,358</b>

### Magazine Advertising

Magazine ads were run in the Sunbelt Foodservice Magazine. The Sunbelt Magazine is a monthly publication. The NCWA ran ads in the June and July issues of the magazine. Sunbelt is a business publication dedicated to the service of the food distribution industry and all its varied elements. This year the association also ran a display ad in Our State Magazine.

### Sunbelt Foodservice Magazine

<u>Distribution</u>	<u>Months</u>	<u>Total Distribution</u>
<u>27,829</u>	<u>2</u>	<u>55,658</u>

### Our State

<u>Estimated readership</u>	<u>Months</u>	<u>Total Readership</u>
<u>720,000/month</u>	<u>1</u>	<u>720,000</u>

### Promotional Items

Miscellaneous promotional items were purchased during the year to be given away to produce buyers, legislators, tourists and convention attendees. Among these items were NCWA shirts, tee-shirts, hats, bumper stickers, brochures, magnetic car decals, window decals, 8.5 x 11 & 11 x 17 posters and fans.

2011 Advertisements had the possibility of reaching 82,342,088 people.

North Carolina Watermelon Farm Income for 2011 was \$29.07 million. Representing a \$5.02 million increase over 2010.

Website hits: 15% increase

Mrs. Bonnie Holloman, Executive Director, of the North Carolina Vegetable Growers Association, worked directly with Nick Augostini of the North Carolina Department of Agriculture and Consumer Services Marketing Division on this project. Mrs. Holloman coordinated the execution of marketing agreements and monitored programs throughout the grant period. She along with Nick Augostini worked together to make sure that the projects were on track.

### GOALS AND OUTCOMES ACHIEVED

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The fund of \$20,000.00 was used for a targeted marketing program of radio, television, and print media promotion. The funds were used during the months of July through August in 2010 and 2011. Program funds were used for creative development, purchase of media, executive of promotional program elements and related agency fees.

Consumer impressions were measured through audited media results from the contracted advertising agency. NC Farm income from watermelon sales were tracked through use of the NCDA/USDA Statistical Reporting Service. The benchmark for comparison is an increase in consumer exposure to the prior campaign (2008) 42,376,896 with a North Carolina Watermelon Farm Income (2007) of \$12.40 million.

The Consumer exposure to SCBG funded campaign in 2010 was 110,707,890 and 82,342,088 for 2011 with North Carolina Watermelon Farm Income for 2010 \$24.05 million and North Carolina Watermelon Farm Income 2011 of \$29.07 million.

The goal was an increase in consumer exposure to the campaign (2010) of 45,000,000

The Consumer exposure to SCBG funded campaign in 2010 was 110,707,890 and 82,342,088 for 2011 with North Carolina Watermelon Farm Income for 2010 \$24.05 million and North Carolina Watermelon Farm Income 2011 of \$29.07 million.

The North Carolina watermelon industry generated in 2007 an estimated \$12.4 million in farm income according to the Agricultural Statistics from the NCDA&CS. This project was directly responsible for an increase in sales to NC growers. For the 2011 year NC Ag Statistics reported an estimated an \$29.07 million in farm income. The promotional campaign helped stabilize this industry and increase the sales of locally grown fruits and vegetables. An estimated 192,000,000 views on the advertising campaign was generated according to the reports from the media outlets.

## **BENEFICIARIES**

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This project benefitted growers throughout North Carolina. There are approximately 200 farms in North Carolina that have watermelons or vegetable production and all have been affected by this project in terms of potential increase in sales and a definite awareness of NC's relevancy in agriculture.

The North Carolina watermelons industry generated in 2007 an estimated \$12.4 million in farm income according to the Agricultural Statistics from the NCDA&CS. This project was directly responsible for an increase in sales to NC growers. For the 2010 year NC Ag Statistics reported an estimated \$24.05 million in farm income. For the 2011 year NC Ag Statistics reported an estimated \$29.07 million in farm income The promotional campaign helped stabilize this industry and increase the sales of locally grown watermelons.

The project allowed the staff to examine the close relationship of supply and demand and "demand creation" through the awareness campaign and resulting success of the project as a whole. The increase in sales was a dramatic experience for all involved including growers, shippers and brokers. The close relationship between the NCDA&CS and the NCWGA allowed for strong communication and hence a successful project.

## **LESSONS LEARNED**

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The unexpected result was a sharp increase in demand for local foods even stronger than previous years. This demand help drove the success of the project and expanding sales.

## **CONTACT PERSON**

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Bonnie Holloman, Executive Director  
Telephone Number: 919-334-0099  
Email Address: bonnie.holloman@yahoo.com

## **PROJECT SUMMARY**

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The North Carolina Vegetable Growers Association (NCVGA) was responsible for implementing a statewide media campaign to promote the Specialty Crop Program. This project was implemented from June 2010 –September 2011. The marketing committee was assembled and developed the media campaign. The NCVGA developed a request for proposal (RFP) and distributed it to advertising and media relations firms serving the State. The RFP included plans for television and print media, production schedule, information on demographics for targeted audience, and costs associated with production and delivery. The media campaign consisted of television, radio, printed ads and promotional materials. The advertisements promoted the Fruit and Vegetable Industry, educated consumers on why they should “Buy Local”. The advertisements were placed in key markets of the state during the months of June through September 2010 and 2011. The NCVGA also measured the expected outcomes of the project. Expected outcomes were measured from certified audited reports from the various media outlets.

Fruit and vegetable growers are largely spread throughout the entire state of NC. The NC fruit and vegetable growers are the 3<sup>rd</sup> most diversified growers in the country, producing everything from berries and apples in the western part of the state to muscadine and sprite melons down east. Their target markets include retail outlets, food service establishments, roadside stands and farmers markets. Because of North Carolina’s ideal location we are within twenty-four hours of two-thirds of the nation’s population. This is why NC produce can be found in many states during the peak growing season. North Carolina grown produce competes locally and nationally with produce from many other states and countries.

This project helped build awareness of North Carolina grown produce through a mixed media consumer awareness campaign. Through a variety of promotions the campaign built an awareness of the variety and freshness of local produce available here in North Carolina. It helped to drive traffic to the NC Farm Fresh website, [www.ncfarmfresh.com](http://www.ncfarmfresh.com) and the North Carolina Vegetable Growers Association (NCVGA) [ncvga.com](http://ncvga.com) where consumers learned more about North Carolina produce and where to buy it.

## **PROJECT APPROACH**

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This new project teamed up the North Carolina Vegetable Growers’ Association with the North Carolina Department of Agriculture’s (NCDA) Marketing Division to promote NC fruit and vegetable crops thereby influencing and changing the purchasing behavior of consumers and retailers in order that they recognized and bought North Carolina fruits and vegetables over produce from other states/countries. Increasing consumer purchases were increased and as a result the economic vitality of the fruit and vegetable industry in NC became stronger. Increasing awareness of local producers

helped to sustain them into the future by building on national trends in which consumers like to buy food products from local sources

The North Carolina fruit and vegetable industry in 2008 generated an estimated \$450 million in farm income on 138,900 acres according to NCDA agricultural statistics reports. The recent economic downturn has had severe consequences on the industry and negatively impacted the income of most of these producers. A “Buy Local NC Produce” promotional campaign should help stabilize this industry and increase the sales of locally grown fruits and vegetables. It should also help to build awareness of and loyalty to North Carolina produced fruits and vegetables.

This campaign built upon recent US domestic consumer trends and growing interest in sourcing food locally.

This project built upon the cycle 1 SCBG grant (North Carolina Vegetable Growers Consumer Awareness Campaign) by increasing the awareness of fruits and vegetables throughout the state of NC. It enhanced the program by using different media and targeted a more varied consumer base.

The requested funds of \$20,000.00 was used for a target mixed media marketing program that included radio, television and print media promotion, along with development of promotional materials and a new shipper directory. The funds were used during the months of June 2011 through September 2012. Program funds were utilized for creative development, purchase of media, execution of the promotional program elements and related agency fees.

**Magazine Ads:** Placed in SunBelt Magazine during June & July and in Our State Magazine during June.

**Print Media Promotion:**

Magazine ads were run in the Sunbelt Foodservice Magazine. The Sunbelt Magazine is a monthly publication. The Association ran the ad in June, July and August issues of the magazine. Sunbelt is a monthly business publication dedicated to the service of the food distribution industry and all its varied elements. It is a totally independent publication, completely free of any connection whatsoever with any particular segment or group within the industry or without. This magazine is distributed to chefs in Alabama, Arkansas, Colorado, Florida, Georgia, Louisiana, Mississippi, New Mexico, North Carolina, Oklahoma, South Carolina, Tennessee, Texas and Virginia.

The association also ran a display ad in Our State Magazine. Their mission is to reflect the beauty of North Carolina, to tell the stories of its amazing people and its remarkable history, and to suggest wonderful places to visit.

**Radio Ads:** WWQQ-FM for 93 spots. -- The audience was the general population of North Carolina with an emphasis on Eastern NC to target tourist visiting the state beaches.

Summer is back! And that means locally grown fresh fruits and vegetables are back too! Did you know there are almost 140,000 acres of fruits and veggies grown right here in North Carolina? That means lots of locally grown produce is available right now just for you. Look for them at your local roadside stand, farmers market and retail store today. Log on to NC Farm Fresh dot com to find some near you and remember when you want the best, it's got to be NC produce...

Looking for a great way to freshen up your diet this summer? Try North Carolina fruits and vegetables. North Carolina is the third-most diversified agricultural production state. That means you've got a lot to choose from. From arugula to zucchini and everything in between, you'll find it all right here. Visit your local roadside stand, farmers market, or retail center today. Log on to NC Farm Fresh dot com to find some near you. Remember, when you want the best, it's got to be NC produce....

**UNC-TV:** Total of 35 credits (approximately 4 per week) aired during the period from June 12 through September 15. We had a three month online sponsorship banner with UNC-TV.

Fruit & Vegetable advertising spots were developed and ran during June, July and August on North Carolina's public broadcasting system. This station's demographics seem to be a genuine audience who would search for North Carolina grown produce. The UNC-TV broadcast system covers the entire state and parts of VA.

The ads ran from June 12-September 15, 2011 – 3 Month Flight. We picked two types of programming. We used the How To Programming on week-end and also used Children's Programming.

**Website:** Design & Maintenance for 2011

We had over 95,050,000 impressions through UNC-TV advertisement.

Sunbelt Magazine ad – total distribution of 55,658

Radio Advertisement: 793,800 impressions

Total readership for Our State Magazine was 720,000

Mrs. Bonnie Holloman, Executive Director, of the North Carolina Vegetable Growers Association, worked directly with Nick Augostini of the North Carolina Department of Agriculture and Consumer Services Marketing Division on this project. Mrs. Holloman coordinated the execution of marketing agreements and monitored programs throughout the grant period. She along with Nick Augostini worked together to make sure that the projects were on track.

## **GOALS AND OUTCOMES ACHIEVED**

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We had over 95,050,000 impressions through UNC-TV advertisement.  
Sunbelt Magazine ad – total distribution of 55,658  
Radio Advertisement: 793,800 impressions  
Total readership for Our State Magazine was 720,000

The ad campaigns had a total of 96,619,458 impressions.

Also, could you discuss the completion of the target to increase sales by 2% over 2008 totals of \$450 million?

The total sales for the 2011 season were \$521,000,000 far exceeding the 2% targeted increase in sales. In fact the increase for 2011 was actually an increase of 14.77%.

The fund of \$20,000.00 was used for a targeted marketing program of radio, television, and print media promotion. The funds were used during the months of June through September in 2010 and 2011. Program funds were used for creative development, purchase of media, executive of promotional program elements and related agency fees.

We increased consumer exposure to add campaigns of 3 million plus impressions. Through this media campaign there was a potential of reaching 124,947,094 people who could have seen these advertisements. To increase sales by 2% over 456 million. The campaign also included the NC Farm fresh website which brought over 175,000 visits during the 2 years of promotion.

The goal was an increase in visits to the NC Farm Fresh Website ([www.ncfarmfresh.com](http://www.ncfarmfresh.com)) of 25% over the number of visits during the months of June through September of 2010 (61,843) with reference to the number of hits in June through September 2009 (58,813) this represents a total of a 5% increase between the 2 years.

The North Carolina fruit and vegetable industry generated in 2007 an estimated \$316 million in farm income according to the Agricultural Statistics from the NCDA&CS. This project was directly responsible for an increase in sales to NC growers. For the 2009 year NC Ag Statistics reported an estimated an \$410 million in farm income. The promotional campaign helped stabilize this industry and increase the sales of locally grown fruits and vegetables.

An estimated 124, 000,000 views on the advertising campaign was generated according to the reports from the media outlets.

The 5% increase in hits on [www.ncfarmfresh.com](http://www.ncfarmfresh.com) (Google Analytics) was also a result of the campaign.

## **BENEFICIARIES**

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This project benefitted growers throughout North Carolina. There are approximately 30,000 farms in North Carolina that have fruits or vegetable production and all have been affected by this project in terms of potential increase in sales and a definite awareness of NC's relevancy in agriculture.

The North Carolina fruit and vegetable industry generated in 2007 an estimated \$316 million in farm income according to the Agricultural Statistics from the NCDA&CS. This project was directly responsible for an increase in sales to NC growers. For the 2009 year NC Ag Statistics reported an estimated an \$410 million in farm income. The promotional campaign helped stabilize this industry and increase the sales of locally grown fruits and vegetables.

## **LESSONS LEARNED**

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The project allowed the staff to examine the close relationship of supply and demand and "demand creation" through the awareness campaign and resulting success of the project as a whole. The increase in sales was a dramatic experience for all involved including growers, shippers and brokers. The close relationship between the NCDA&CS and the NCVGA allowed for strong communication and hence a successful project.

The unexpected result was a sharp increase in demand for local foods even stronger than previous years. This demand help drove the success of the project and expanding sales.

## **CONTACT PERSON**

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Bonnie Holloman, Executive Director

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Email Address: [bonnie.holloman@yahoo.com](mailto:bonnie.holloman@yahoo.com)

**Project Title:** North Carolina Floriculture Consumer Awareness Campaign and Industry Promotion

*Previously approved final report*

## **PROJECT SUMMARY**

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The North Carolina Commercial Flower Growers' Association (NCCFGA) was responsible for implementing a statewide media campaign to promote NC grown flowers. This project was implemented from November 2010 until November 2011. The marketing committee was assembled and developed the media campaign. The NCCFGA developed a request for proposal (RFP) and distributed to advertising and media relations firms serving the State. The RFP included plans for television and print media, production schedule, information on demographics for targeted audience, and costs associated with production and delivery.

The media campaign consisted of television, billboards, print advertisements, and promotional materials. The advertisements promoted the Floriculture Industry, educated consumers on why they should "Buy Local" when selecting plants and flowers to plant on their properties and encouraged consumers to consult with Local Nurseries when purchasing these plants. In addition, the NCCFGA promoted plants that were exceptional performers in the landscape industry. The advertisements were placed in key markets of the state during the spring and fall of 2011 and during certain holiday seasons when consumers were purchasing plants (Mother's Day, Valentine's Day, Thanksgiving, Christmas, Easter).

The NCCFGA measured the expected outcomes of the project; the NCCFGA surveyed grower members through the use of its quarterly newsletter to see how sales of plant material were affected during the period the advertising occurred versus the sales of plants that were sold the previous year. The NCCFGA developed all surveys for use in evaluating promotional activities along with the assistance of NCDA.

This new project teamed up the North Carolina Commercial Flower Growers' Association with the NCDA Marketing Division to promote the NC industry thereby changing the purchasing behavior of consumers and retailers to buy North Carolina plants. Consumer purchases were increased; therefore the economic vitality of the floriculture industry in NC became stronger.

The North Carolina floriculture industry generated in 2008 an estimated \$217.2 million in farm income according to the USDA Agricultural Statistics Floriculture Crops Summary. The continued economic downturn coupled with higher fuel costs had severe consequences of negatively affecting the income of these producers. A promotional campaign helped to stabilize this industry and increase the sales of locally grown plants.

This campaign built upon recent US domestic consumer trends and growing interest in sourcing local plants for landscape and gardens. At the time of this report there is no available NC Floriculture economic information from USDA.

This project built upon the SCBGP “North Carolina Floriculture Consumer Awareness Campaign that was implemented from November 2009 until May 2010 in not only educating consumers on buying local but promoted plants that were exceptional performers in the landscape.

## **PROJECT APPROACH**

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The requested fund of \$20,050.00 was used for a target mixed media marketing program that included television and print media promotion, along with development of promotional materials. A specific retailer branding promotion program ‘NC Select Plants’ was created and implemented. The program was designed to identify proven varieties, grown locally, for gardening success so that consumers would know that these specific plants would provide consistent, reliable performance. The production and design of a logo for this branding program and retailer point of purchase materials were developed with a professional graphic designer. Production of these ‘NC Select’ plant tags (with QR codes), vinyl plant bench wrap, and point of purchase materials were printed & distributed to retail growers that were members of the NC Commercial Flower Growers Association, who were willing to participate in the program. An associated consumer website ([www.ncselectplants.com](http://www.ncselectplants.com)) was also developed to further enhance this program’s consumer educational factor, as well as the creation and participation on the NC Select program Facebook page. Consumers can use this website and Facebook page for information about each of the NC Select plants, including the attributes that led to their selection. The site also offers videos of basic gardening information and a map of association members for ease in locating local greenhouse or garden center businesses. The Facebook page allows the consumer to ask questions and share this information with their friends, as well as for the association to promote the selected proven varieties.

The NCCFGA held their first ever ‘Home Landscape Color Day’ on June 28, 2011, with great consumer attendance. Multiple educational seminars were given by well know garden speakers and specialists. Press releases were sent out to the media advertising the event and the new NC Select plants program. Tours of the NC Select planted trial beds were given by board members of the NC Commercial Flower Growers Association, and consumers were allowed to select and flag their favorite annuals from the NC Select collection of plants in the trial gardens. Lime green staff shirts were provided to Board members as well as some staff from NC State University that were stationed on the grounds throughout the day to answer consumer questions on any of the selected varieties, as well as general gardening questions.

The NC Commercial Flower Growers Association also promoted the NC Select program in an educational/promotional booth at the 2010 Green N’ Growin show. This show is put on by the NC Association of Nurserymen, and focuses on growers, and garden center retailers.

The funds were used during the months of November 2010 until November 2011. The marketing committee was assembled and developed the media campaign. The NCCFGA developed a request for proposal (RFP) and distributed to advertising and media relations firms serving the State. The RFP included plans for television and print media, production schedule, information on demographics for targeted audience, and costs associated with production and delivery. The program promoted plants that were exceptional performers in NC landscapes. Print ads were placed in local gardening publications to promote the new NC Select program as well as the Consumer Field Day. These ads directed readers to the newly developed website for further education on the program.

Mrs. Bonnie Holloman, Executive Director, of the North Carolina Commercial Flower Growers Association, worked directly with John Aydlett of the North Carolina Department of Agriculture and Consumer Services Marketing Division on this project. Mrs. Holloman coordinated the execution of marketing agreements and monitored programs throughout the grant period. She along with John Aydlett worked together to make sure that the projects were on track.

## **GOALS AND OUTCOMES ACHIEVED**

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Our new NC Select branding program, to promote plants that perform in NC conditions, grown and sold by NCCFGA members to NC consumers rolled out just in time for spring sales. They were trialed in six retail garden centers, in the Raleigh and Charlotte markets. The NC Select program was utilized and incorporated at the Trial Gardens at NCSU, JC Raulston Arboretum. We experienced good consumer response from these NC Select displays. This program will be expanded to all members across the state in 2012. Landscape Color Field Day held in June 2011 attendance grew by 10%. The first ever Field Day for consumers was a success. Excellent topics, speakers, trial beds, NC Select display contributed to this success of this Field Day.

Floriculture value went up from \$217.2 million in 2008 to \$249.7 million in 2010, and has continued its growth in 2011. Consumer impressions were measured through audited media results from the contracted advertising agency. Through this media campaign, there was a potential of reaching over 84,005,913 persons who could have seen these advertisements and promotions. All projects and accomplishments pertaining to this grant were reported the NCCFGA membership through its association newsletter and website.

The North Carolina floriculture industry generated in 2008 an estimated \$217.2 million in farm income according to the USDA Agricultural Statistics Floriculture Crops Summary. This project was directly responsible for an increase in sales to NC growers. For the 2010 year USDA Agricultural Statistics Floriculture Crops Summary reported an estimated \$249.7 million in farm income. The promotional campaign helped stabilize

this industry and increase the sales of locally grown floriculture products. An estimated 84,005,913 views on the advertising campaign was generated according to the reports from the media outlets.

There was an approximate 25% increase in visits to the website during the project timeframe. The increase in site visits went from 3,984 to 4,970. There were 106 Likes reported on the new Facebook page.

## **BENEFICIARIES**

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This project benefitted growers throughout North Carolina. In 2009 there were approximately 298 Commercial Greenhouse operations in North Carolina and all have been affected by this project in terms of potential increase in sales and a definite awareness of NC's relevancy in agriculture.

The North Carolina floriculture industry generated in 2008 an estimated \$217.2 million in farm income according to the USDA Agricultural Statistics Floriculture Crops Summary. This project was directly responsible for an increase in sales to NC growers. For the 2010 year USDA Agricultural Statistics Floriculture Crops Summary reported an estimated \$249.7 million in farm income. The promotional campaign helped stabilize this industry and increase the sales of locally grown floriculture products.

The project allowed the staff to examine the close relationship of supply and demand and "demand creation" through the awareness campaign and resulting success of the project as a whole. The close relationship between the NCDA&CS and the NCCFGA allowed for strong communication and hence a successful project.

The unexpected result was an increase in demand for local products even stronger than previous years. This demand help drove the success of the project and expanded sales.

## **LESSONS LEARNED**

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The project allowed the staff to examine the close relationship of supply and demand and "demand creation" through the branding and awareness campaign and resulting success of the project as a whole. There were some issues in making sure that a few of the participating retailers actually used the branding materials in a proper display, but those that did, saw positive results and benefited from the project. The need for more committed retailers for the NC Select Program will be addressed in future years.

The unexpected result was an increase in demand for local products even stronger than previous years. This demand help drive the success of the project and expanding sales.

### **CONTACT PERSON**

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## **Project Title:** Enhancing the Competitiveness of Turfgrass Sod

### **PROJECT SUMMARY**

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Media reports in North Carolina had increasingly portrayed turfgrass sod as a less “green” alternative to synthetic turf and other non-turf alternatives. Those reports threatened the viability and sustainability of North Carolina’s turfgrass sod industry in measurable ways. In response, a mass media consumer education campaign was produced to correct consumer misperceptions about the role turfgrass sod plays in maintaining a healthful environment.

Using unbiased, research based information and various communication tools, this project proactively promoted the benefits of natural turfgrass grown and sold by the members of the North Carolina Sod Producers Association (NC SPA) compared to using synthetic turf. In addition, information was generated and the reach of messages expanded for end users of sod. The existing website ([www.ncsod.org](http://www.ncsod.org)) was revised and expanded. Emphasis was placed on the health, safety, environmental and aesthetic benefits of sod to targeted purchasers in an effort to increase demand.

### **PROJECT APPROACH**

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The focus of this project’s efforts concentrated on meeting the growers demand for electronic media and printed marketing messaging. Website redesign, incorporation of social media messaging and new marketing/branding efforts re-invigorated the NC SPA’s message to the consumer. A commitment to quality, local economy and the environment were strongly relayed in all NC SPA marketing messages.

Using facts about natural turfgrass sod, the NC SPA is working to educate consumers about the realities of cost, environmental benefits, health & safety issues, and longevity of North Carolina Sod-especially compared to artificial turf.

The project simultaneously enhanced consumer awareness of the significant environmental, economic and aesthetic advantages of professionally-grown North Carolina turfgrass sod through a communications campaign that included print advertising, direct mailings, social media, and information placed on the NC SPA website ([www.ncsod.org](http://www.ncsod.org)).

An initial assessment of distribution strategies focused on targeting trade publications, industry events, and online efforts. Direct correspondence with turfgrass (and related)

industry and organizational media specialists were further leveraged to disseminate the GO GREEN BUY LOCAL media kits at events, and in printed publications. All kits presented a “call to action” to visit [www.ncsod.org](http://www.ncsod.org) to “learn more”. Evaluation of the initial efforts revealed the online campaign was enhanced in conjunction with the print publication tie-ins. Review of the process suggested a slight snowball effect – web impressions grew as more media kits were distributed. An expected surge in online hits occurred in the spring and fall.

Targeted audiences for these messages included homeowners, homebuilders, landscape professionals, athletic field managers, golf course superintendents and others who are key purchasers of sod. Where possible, listings of North Carolina sod growers were included along with educational information detailing the benefits of natural turfgrass sod to include comparisons to popular synthetic alternatives. A NC Sod Producers Association Membership Directory (printed and electronic versions) was produced that informed end users of available grasses developed specifically for their region along with corresponding North Carolina sod farms.

## **GOALS AND OUTCOMES ACHIEVED**

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1. Purchased marketing display stands and developed banners designed to promote the following ongoing print and web media messages:
  - i. “Our Sod is Out of this World” / NC SPA
  - ii. “GO GREEN. BUY LOCAL” / NC SPA
  
2. Totally recreated [www.NCSOD.org](http://www.NCSOD.org) and all content to make it more consumer and user friendly. The emphasis is on sod promotion and efforts are now geared to market sod to the consumer on behalf of the NC SPA Growers. Previously, the site was merely an administrative message board for NC SPA.

Google Analytics tracking program was created and embedded into the ncsod.org website. Social media sites and content initiated were:

[www.Facebook.com/NCPA](http://www.Facebook.com/NCPA)

[www.youtube.com/NCSodProducers/](http://www.youtube.com/NCSodProducers/)

[www.Twitter.com/NCSod](http://www.Twitter.com/NCSod)

3. Publicity kits featuring two campaigns and associated consumer information was developed and released.

### **GO GREEN BUY LOCAL Campaign**

<http://ncsod.org/GoGREENBuyLOCAL.aspx>

A commitment to quality, local economy and the environment were strongly relayed in all NC SPA marketing messages.

Developed and distributed NC SPA Membership Directories (2000+) containing turf facts. Some of these were distributed in polybag mailers along with a 'Go Green Buy Local' full page advertisement. (NC Parks & Rec magazine: Spring 2012 Quarterly issue).

FACEBOOK 'GO GREEN BUY LOCAL' AD with Click-through to NCSOD.org was designed and placed on Facebook. The April through Dec 31, 2012 ad produced 5,579,432 Impressions and 20,125 Social Impressions with 945 clicks.

**DON'T FALL FOR ARTIFICIAL TURF Campaign:**

<http://ncsod.org/AboutArtificialTurf.aspx>

Using facts about natural turfgrass sod, the NC SPA is working to educate consumers about the realities of cost, environmental benefits, health & safety issues, and longevity of North Carolina Sod.....especially compared to artificial turf. Associated print ads were placed in several issues of a major NC turfgrass magazine (NC Turfgrass) which is distributed to all segments of the turfgrass industry.

**CONSUMER INFORMATION**

<http://ncsod.org/ConsumerInformation.aspx>

Educating consumers is an essential step to producing a safe and environmentally friendly turf surface.

**ESTABLISHING A SODDED LAWN**

<http://ncsod.org/EstablishingSOD.aspx>

**CARING FOR A NEWLY SODDED LAWN**

<http://ncsod.org/CaringforNewSod.aspx>

**MAINTAINING AN ESTABLISHED SODDED LAWN**

<http://ncsod.org/MaintainingSOD.aspx>

**FIND A GROWER**

<http://ncsod.org/Growers.aspx>

**NCSOD.org Google Analytic Results since publicity kit's launch date**

**Jan 1, 2012- Dec 16, 2012**

**Google Analytics: [www.NCSOD.org](http://www.NCSOD.org)**

**Overview**

4149 unique visitors

5634 visits with 24,749 Page views

72.75% new visitor increase

**Search Traffic Results**

Direct Traffic: 23.78%  
Referral Traffic: 25.15%  
Search Traffic: 51.06%

4. A survey was developed and sent to growers to determine current and projected sod acreage, percent increase and /or decrease in sales and to receive feedback regarding the current marketing effort. This survey provided insight into the effectiveness of NC SPA's marketing campaign and its impact on the industry. Twenty two farms responded for both 2011 and 2012 surveys. Growers reported a dramatic improvement in the website, conference programs and marketing efforts. The survey further indicated 11 growers (50%) had increased sales, 10 growers (45%) had no change, with only one grower reporting a loss in sales in 2011. In 2012, 17 respondents (77%) indicated an increase in sales, with 3 growers (13%) reporting no change.

## **BENEFICIARIES**

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Beneficiaries of this proposal include all North Carolina turfgrass sod producers (40+) and their employees; consumers, residential and commercial property owners and builders; users and designers of parks, athletic fields and golf courses; cemeteries; landscape professionals; designers and maintenance personnel of public spaces supported aesthetically with turf (e.g. highways, airports).

Impacts to beneficiaries include a heightened awareness of the health and environmental benefits of turfgrass sod compared to synthetic and non-turf alternatives, increased usage and sales of turfgrass sod, and continued operation of turfgrass sod farms in North Carolina.

## **LESSONS LEARNED**

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While promotions of North Carolina turfgrass sod were more prevalent than ever before, they did not prevent the closure of two sod farms during the course of the project. The closures were due in part to marketplace conditions; but indicate that enhancing production efficiencies and marketing opportunities is critical for sod production in North Carolina going forward.

Sod grower survey responses indicated the efforts from this grant created a positive impact with sod sales. Overall survey results demonstrated a holding steady or increased sales performance with NC SPA grower members. Given the current economic conditions and housing market slump, the efforts put forth from the GO GREEN BUY LOCAL print and online campaign has impacted sod sales at the

consumer level. We feel this approach is the right direction and look forward to enhancing existing efforts further.

## **CONTACT PERSON**

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Dr. Art Bruneau

North Carolina Sod Producers Association  
NCSU, 2415 Williams Hall  
Raleigh, NC 27695-7620  
Phone: (919) 302-7971

## **ADDITIONAL INFORMATION**

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### 2010 Specialty Crop Block Grant Program Advertising/Consumer Education Summary

**NC Parks and Recreation Magazine.** Quarterly statewide publication reaching park administrators and decision-makers, athletic field supervisors and other decision-makers.

- One full page, full color ad
- Three 50-word ads
- Over 2,200 2012 Grower Member directories inserted in the Spring issue.

**Nursery Notes.** Magazine published by the NC Nursery and Landscape Association six times annually.

- Six full page ads, both black/white and color

**NC Turfgrass Magazine.** Published by the Turfgrass Council of North Carolina six times annually. Readers include lawn care and landscape professionals, golf course superintendents, city/state/municipal turfgrass professionals, sports and athletic turf managers roadside personnel and others.

- 6 full page color ads

### **Turfgrass Council of North Carolina Membership Directory**

- One full page, full color ad

**Website ([www.ncsod.org](http://www.ncsod.org))**

- Much of the printed information was put on the North Carolina Sod Producers website ([www.ncsod.org](http://www.ncsod.org)) in addition to the complete overhaul of the sites architecture and content.

AllAboutPins  
Your Pin Source

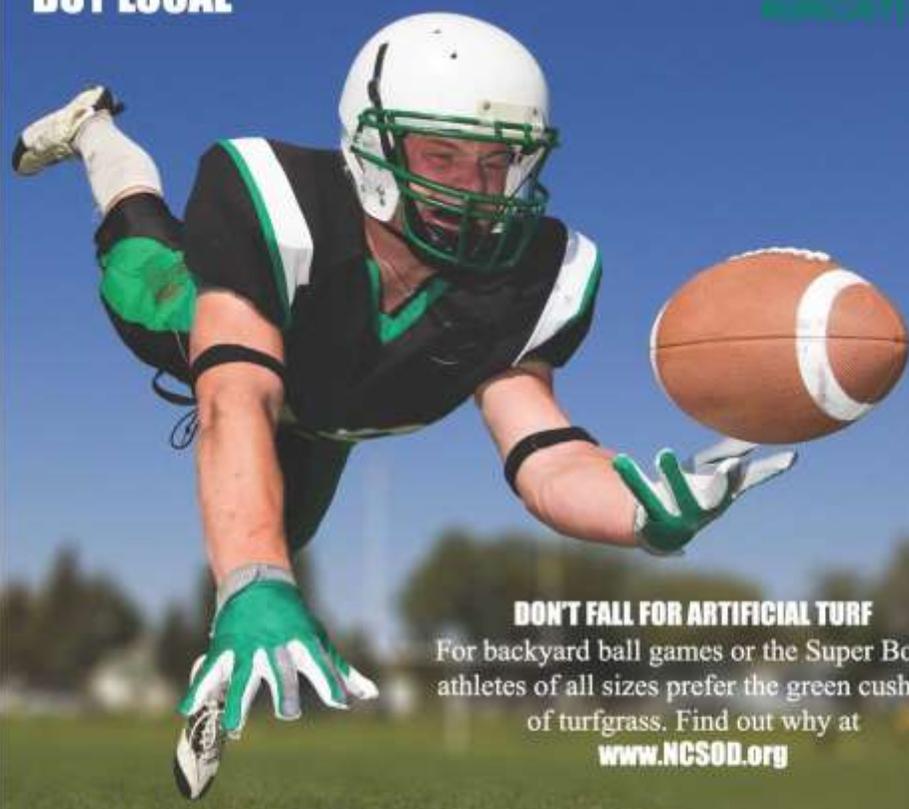
Toll Free: 1-866-604-9462



[www.AllAboutPins.com](http://www.AllAboutPins.com)

ARTWORK NOT TO SCALE. To ensure proper color matching, please consult a PANTONE (PMS) Color Chart. Artist conception not for use without authorization.

**GO GREEN  
BUY LOCAL**



**DON'T FALL FOR ARTIFICIAL TURF**

For backyard ball games or the Super Bowl, athletes of all sizes prefer the green cushion of turfgrass. Find out why at [www.NCSOD.org](http://www.NCSOD.org)



**NORTH CAROLINA SOD PRODUCERS ASSOCIATION**

The next time you buy sod, ask if it's from a North Carolina Sod Producer Association Member. Find out more at [www.NCSOD.org](http://www.NCSOD.org)

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**GO GREEN  
BUY LOCAL**

**The next time you buy sod, ask if it's from a North Carolina Sod Producer Association Member.**

CAMPUS BOX 7620  
101 DERBUEX PLACE  
RALEIGH, NC 27685

(919) 302-7971 PHONE  
(919) 515-5315 FAX

Dear Neighbor,

As you plan your spring turfgrass projects, we would like you to consider purchasing sod from a North Carolina Sod Producers Association member. Keeping your money in the local economy helps support the North Carolina communities we live and work in. More importantly to YOU, your customers receive a product that is FRESH, locally grown and adapted to North Carolina conditions.

Using locally grown varieties adapted to North Carolina conditions ensures a healthy, dense, vigorous turf that is less susceptible to pests and environmental stress. Purchasing locally grown, healthy sod or sprigs from a NC SPA member can also result in less shipping costs and carbon emissions.

If you haven't asked if your sod farm is an NC SPA member you should because NC SPA members care about being the best. For a list of growers near you visit [www.NCSOD.org](http://www.NCSOD.org).

We would like to thank you for your commitment to quality and excellence and look forward to working with you.

Yours in Turf,

Dr. Art Bruneau  
Executive Director  
NC Sod Producers Association

[www.NCSOD.org](http://www.NCSOD.org)



**Project Title:** Increasing Sweet Potato Consumption through Nutritional Marketing Programs:

## **PROJECT SUMMARY**

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The project rationale was that consumers and those involved in foodservice sales of produce items often buy products based on reasons such as taste, ease of preparation, tradition, etc., while not always aware of the nutritional aspects of a particular food item. While sweet potatoes are part of the culinary tradition of North Carolina the nutritional content of the product is poorly understood. In particular, as consumers are becoming more aware of local produce and of the nutritional aspects of the food items they purchase, this seemed like an appropriate time to build upon their growing acceptance of locally grown North Carolina sweet potatoes as a nutritional powerhouse in their menu preparation.

This important project helped the North Carolina Sweet Potato industry partially address the issue of static per capita consumption through nutritional education. While overall sweet potato consumption grows it would appear to be a function of an increasing population rather than increased per capita consumption.

### US Domestic Per Capita Consumption of Sweet Potatoes by Year in Pounds:

- 2010 6.3
- 2011 6.4
- 2012 6.3

The timeliness of the project addressed the need of educating consumers and foodservice staff about the nutritional aspects of sweet potatoes while occurring at such a time as to take advantage the North Carolina Department of Agriculture's broader efforts on behalf of local NC food products. This allowed the sweet potato industry to leverage critical support dollars and conduct a state wide nutritional educational project that might not otherwise have been possible.

While the project built on previous NC SweetPotato Commission activities, none of those were funded partially or in whole by Specialty Crop Block Grant Program funds.

The North Carolina SweetPotato Commission, through participation in coordinated activities conducted by the North Carolina Department of Agriculture (NCDA) and with various foodservice distributors in the state of North Carolina, pursued a course of collaborative nutritional educational activities targeted both at consumers who buy sweet potatoes and foodservice sales staff who actively promote and sell sweet potatoes to

foodservice clients. Nutritional education will help educate consumers and give them more reasons to purchase more potatoes with added confidence as to their nutritional content.

## **PROJECT APPROACH**

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### *Retail, Wholesale & Consumer Promotions:*

In order to reach large numbers of consumers the Commission participated in a broad based NCDA promotional campaign aimed at raising awareness of local North Carolina produce items available state wide at retail outlets and at other activities across the state. Nutritional information and recipe cards were distributed at the promotions, along with prepared samples for consumption at some of the activities. NCDA utilized a donated RV and attended promotional events around the state, including the state fair, festivals, retail outlet openings, and other, similar events. A looped video played constantly at all events promoting the healthful attributes of North Carolina sweet potatoes and other produce items.

While the activity was slow to develop due to unforeseen delays within NCDA, all tours and activities associated with the Ag Tour Bus tour were completed within the scheduled time frame as outlined in the grant application.

NCDA provided the venues and vehicle for the promotions, while NCSPC supplied recipe cards for all promotional events, and personnel, samples and a professional chef at some venues, and assisted with the production costs of the professionally produced video that featured the nutritional aspects of North Carolina produce, including sweet potatoes.

### *Foodservice Sales Staff Training and Related Activities:*

Commission staff and consultants met with the management of leading foodservice distributors within the state of North Carolina in order to discuss and lay out plans for working with their sales staff in order to further educate them as to the nutritional and culinary properties of sweet potatoes. The objective was to give them additional information and reasons to further promote and sell sweet potatoes to their various clients. Specific conversations were held with Fresh Point, Sysco, and J.R. Nichols. Some food service sales managers were reluctant to hold training sessions in a time frame as what they viewed as out of season, even though this was one of the objectives of the program. Accordingly, the program was extended until the end of September, 2013, allowing us to schedule a couple of training sessions actually in the sweet potato harvest season. At least two mailings (both email and traditional) were

sent to produce distribution companies within the state asking for their participation in the training program.

Eventually, two training sessions were conducted in September, 2013, in Charlotte and Morrisville, NC. Both sessions were held with Fresh Point sales staffs at their respective locations. Fresh Point provides a wide variety of specialty produce items to a broad list of wholesale clients, including restaurants, resorts and retirement centers.

A professional chef prepared a variety of sweet and savory dishes for sampling by the sales staff. In addition a general presentation on the healthful benefits of sweet potatoes and was given by the chef and by Commission staff. The sales staff sampled the dishes prepared by the chef and asked a number of questions related to how different varieties of sweet potatoes differ in preparation, etc.

## **GOALS AND OUTCOMES ACHIEVED**

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### Goal # 1:

To identify and develop a strategic individualized nutritional promotion plan based upon the merchandising requirements of 5 participating firms from NC based retail, wholesale and foodservice outlets.

### Outcomes for Goal #1

Consumer: 88 promotional RV tour events were held across the state of North Carolina, with an estimated 2.4 million attendees, according to NCDA evaluation information. Included were 6 retail food chains, one retail food distributor, at least half a dozen festivals, the state fair, and various other consumer related promotional events. 3,000 notepads and 6,000 recipe cards were distributed. Healthy recipes were sampled containing sweet potatoes. Commission personnel attended and participated in 10 of these key activities. At some events samples containing sweet potatoes were prepared in advance and given out to customers. In addition to the recipe brochures and samples the NC Sweet Potato Commission logo was on the RV at all times and a composite video was shown highlighting local NC foods, including North Carolina sweet potatoes.

Foodservice Sales Staff Training: Commission representatives met with management of three leading food service distributors in the Triangle and Charlotte areas of North Carolina. All of the companies contacted expressed interest in providing their sales staff with nutritional training regarding sweet potatoes but we were only able to set up training sessions with two different sales staffs of Fresh Point. All companies contacted the importance of promoting the nutritional characteristics of sweet potatoes in their quest to expand sales, but some were reluctant to include educational programs in their staff development either due to timing or the belief that they already were fully aware of

the variety of uses for sweet potatoes. Approximately 12 sales representatives attended both training sessions.

#### Goal # 2:

Increase consumption of North Carolina sweet potatoes.

#### Outcomes for Goal #2

Several activities occurred at special events or grand openings where no previous baseline was established. It was determined during the grant cycle that obtaining specific store scan data was not possible. Individual managers were interviewed as to the relative success of the promotion.

The majority of category managers (85%) felt that the promotional activities were a tremendous success and welcome future similar activities. According to category managers retail sales of sweet potatoes during the 2012 retail promotional period increased by 20% over the non-promotional time frame. Store category managers appreciated the relatively simple to make recipes that were sampled outside their stores that drove traffic inside in order to purchase the product to make the dish at home.

### **BENEFICIARIES**

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- 2.4 M Consumers: increased nutritional knowledge surrounding a traditional food product
- 40 Retail Grocery Stores: increased sales due to increased nutritional knowledge among their customers
- 2 Foodservice Distribution Companies; potential for increased sales due to additional selling points for sales staff to use with existing and new customers
- 400 North Carolina Sweet Potato Growers, Producers and Packers: additional sales to points of distribution

### **LESSONS LEARNED**

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The Commission learned that even though sweet potatoes are a traditional food in North Carolina, there is much to be gained by educating consumers about the nutritional aspects of sweet potatoes:

- a) Consumers are very interested in locally grown, nutritional food products.

- b) Positive nutritional information gives consumers confidence in consuming traditional foods as many traditional southern foods are often not as healthy as might be recommended. Future training and recommendations might involve instructing consumers as to how to make traditional recipes including sweet potatoes more nutritional complete and healthy.
- c) Food service sales staffs find more reasons through nutritional education to push sweet potatoes to their clients. They prefer to push them more during harvest season, although sweet potatoes are available year round due to climate controlled storage. This will be the challenge and the opportunity for the sweet potato industry as they continue to move forward in learning to market sweet potatoes on a year around basis due to availability.
- d) Foodservice sales managers, in some cases, felt that their staffs were already fully aware of the benefits associated with sweet potatoes, and unless there was a unique or somewhat different type of promotional event or contest it would be difficult to motivate sales staff beyond what they were already doing. This is another continuing challenge for the industry: that sweet potatoes can be used in a variety of sweet and savory applications and on a year around basis.
- e) Despite repeated requests from both the grantee and NCDA&CS personnel obtaining specific retail store scan data was not possible. Investigations were also made to ascertain the availability of this data by category/product code from an independent third party but no such data source was located. Scan data is proprietary to each retail chain and is not released; therefore, goal #2 was scaled back to utilize the information that could be collected.

## **CONTACT PERSON**

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John Kimber/Kimber & Co.  
919-697-5352  
johnwkimber@aol.com

## **ADDITIONAL INFORMATION**

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Foodservice sales personnel did report sweet potatoes being sold and used in a variety of interesting and new ways, such as a mix of small purple, white, and orange fleshed sweet potatoes in a steamer bag.

The same personnel reported that chefs who really like sweet potatoes tend to use them year around, while those less familiar tend to fall back on seasonal promotions and approaches to using the product.