



Iowa Department of Agriculture and Land Stewardship

State Point of Contact:

Mike Bevins, State Horticulturist

Iowa Department of Agriculture and Land Stewardship

Phone: (515) 242-5043

Email: mike.bevins@iowaagriculture.gov

Specialty Crop Block Grant Program – Farm Bill

12-25-B-1068

Final Performance Report

December 26th, 2013

- Iowa State Horticultural Society– *Promoting and Encouraging Horticulture in Iowa – The All-Iowa Horticultural Exposition*.....Final Report.....3
- Iowa State University – *Budgets for Vegetable Crop Production in High Tunnels*..... Final Report.....20
- Iowa Valley Resource Conservation and Development – *Iowa Valley Food Cooperative for East Central Iowa*..... Final Report.....38
- Iowa Lakes Resource Conservation & Development – *Iowa Great Lakes Specialty Crop Promotion and Education*.....Final Report.....61
- Iowa Fruit and Vegetable Growers Association – *Optimizing the Cropping Potential and Profitability for Growing Scab-resistant Apple Cultivars in Conventional and Organic Systems*.....Final Report...78
- Iowa Christmas Tree Growers Association – *Assisting Growers in the Production of Iowa Fresh Christmas Trees*..... Final Report.....109
- Mississippi Valley Growers’ Association (MVGA) – *MVGA Marketing Campaign*..... Final Report.....111

- Iowa Department of Agriculture and Land Stewardship – *Expanding Markets for Specialty Crop Producers through the Farm to School Program*..... Amended Final Report.....113
- Winneshiek County Agricultural Extension District on Behalf of the Northeast Iowa Food and Farm Coalition – *Training Professionals to Provide Technical Assistance for Fruit and Vegetable Farmers in Food Safety Practices and GAP Certification*..... Final Report.....119
- Practical Farmers of Iowa – *Enhancing the Competitiveness of Specialty Crops Marketed through Community Supported Agriculture* Final Report.....126
- Iowa State University – *Farm to ISU: Increasing purchases of Iowa Specialty Crops at Iowa State University*..... Final Report.....132
- Iowa Nursery and Landscape Association – *Expanding Educational Programming and Professional Development for Iowa’s Green Industry*..... Final Report.....136
- Geode Resource Conservation and Development – *Expanding the Local Foods Market in the Great River Region*..... Final Report.....139
- Southern Iowa Resource Conservation and Development – *Aronia Berry Marker Identification for Aronia Berry Food and Beverage Products*..... Final Report.....151
- Pathfinders Resource Conservation and Development – *High Tunnel Production, Business Development and Marketing Workshop for Fruit and Vegetable Producers in Southwest Iowa*..... Final Report.....173



Iowa State Horticultural Society

4225 Fleur Drive, #135
Des Moines, Iowa 50321
www.iowahort.org

Final Performance Report

Submitted 12-19-2011

Project Title: Promoting and Encouraging Horticulture in Iowa – The All-Iowa Horticultural Exposition

Contact: Kelly D. Norris, Co-Chairman, kellydn@iastate.edu, 712-621-5399
Gary Twedt, Co-Chairman, gtwedt@lisco.net, 641-777-0455

Project Summary

The Iowa State Horticulture Society (ISHS) was founded in 1866 for the purpose of promoting and encouraging horticulture and its related interests in Iowa through the collection and dissemination of information concerning production, marketing, and utilization of horticultural crops. Throughout its 154 years, ISHS has worked with over two dozen affiliate associations, the Iowa Department of Agriculture, and Iowa State University to meet this mission. It is a non-profit organization that receives no funding from the State of Iowa and is governed by a Board made up of Directors from the affiliate organizations, including the Iowa Nut Growers Association, the Iowa Nursery and Landscape Association, the Iowa Fruit and Vegetable Growers Association, the Iowa Honey Bee Producers Association, the Iowa Christmas Tree Growers Association, the Iowa Florists Association, and the Iowa Wine Growers Association. Other horticultural interest or environmental groups constitute the remainder of the affiliate associations. The mission of the All-Iowa Horticulture Exposition (AIHE) is to provide educational opportunities that will enhance the competitiveness of specialty crops grown in Iowa.

Two years ago, the society held its first All-Iowa Horticulture Exposition bringing consumers, home gardeners, growers, suppliers, and horticultural educators together in a two-day event including educational sessions, demonstrations, and a trade show. ISHS took on the challenge of building a premier horticultural exposition in recognition of the need to promote its message in a

more visible and more consumer-oriented means. Programming efforts in 2011 drew heavily on Iowa personnel, primarily to emphasize the ISHS's commitment to developing horticulture within the state and showcasing the knowledge resources available through the affiliate organizations and Iowa State University Extension. Two nationally known keynote speakers filled out the roster of educational events designed to promote and encourage horticultural activities from all levels of experience—novice to professional.

Project Approach

The All-Iowa Horticulture Exposition committee followed the timeline below when managing and directing activities leading up to the event:

April 2010 – Assessed strengths and weaknesses of the 2010 All-Iowa Horticulture Exposition, met with the local arrangements committee to evaluate future programming and marketing objectives, and made tentative plans to return to the Bridge View Center for the 2011 event. Gauged future local support of the event and encouraged more participation from local businesses and tourism entities.

October 2010 – Established roster of events and finalized scheduling of major programming initiatives. Contracted speakers for the 2011 educational sessions and delegated responsibilities for the newly conceived Children's Garden to an ISU graduate student as part of an ongoing research project into children's perceptions of gardening and nature that she began in 2010.

November 2010 – Secured commitments from two nationally recognized keynote speakers to headline the conference. Formal press announcement of the All-Iowa Horticulture Exposition and the receipt of the the AMS/USDA Specialty Crop Block Grant. Registrations and exhibit information mailed out or sent by email to a database of individuals, businesses, and organizations, including vendors and partners from the 2010 Exposition. Held first local arrangements committee meeting on-site in Ottumwa.

December 2010 – Coordinated design and development of flyers with ISU Extension design professionals for distribution at horticultural events leading up to the Exposition. Paid advertisements sent to publications for February-early March editions.

January 2011 – Marketing efforts in full-swing. Press releases distributed twice monthly to a pre-screened list of media outlets including radio, TV, newspaper, ISU Extension-related venues, and garden communication professionals statewide with a different promotional

emphasis on each deployment. Additional registration materials were sent to prospective exhibitors. Arranged for ISHS Boutique to be managed by the Iowa Arboretum. The Boutique featured books and plants promoted by various speakers on our education roster. Prepared a local tourism package that offered consumers a combination hotel, meal, and ticket offer for the two-day Expo in conjunction with local volunteers.

February 2011– Fine-tuning of local arrangements underway. A detailed, aggressive plan for logistics, registration, and details of the event was developed with the help of ISU Extension personnel and local volunteers. City and State Bureaus of Tourism were also involved with local promotional efforts. Radio advertisements and interview packages were contracted. Continued solicitation of local vendors to fill out the trade show.

March 2011 – Final planning, held event, reviewed and evaluated success of the 2011 All-Iowa Horticulture Exposition.

Summer/Fall 2011 – Prepare reports for 2011 event. Held recap meeting to review evaluation forms, review suggestions, and considering future ISHS programming options.

In all, the committee feels that the three All-Iowa Horticulture Expositions have positively benefited horticulture in Iowa. Further planning and relationship building, particularly with local partners would continue to enhance the performance of the event, particularly if the location changed every few years as has been suggested by various partner organizations. Future programming by the ISHS and any future All-Iowa Horticulture Expositions should continue to embrace the core philosophies of the past three events—promoting the interests of specialty crops, expanding the awareness of horticultural commodities, and encouraging nascent niche industries within the small business agricultural community.

Despite the increases in advertising and marketing, attendance was similar in 2011 as in 2010. Historically, attendance in 2009 was 720; in 2010 attendance was 400 (primarily due to a winter weather event on day 2); in 2011 attendance was 500. The committee had originally anticipated attendance numbers near 2,000 by year 3, spurred by the success of a local home show that takes place in the same facility earlier in the winter. Several factors could've contributed to our lower attendance including 1) multiple overlapping events drawing on the same audience in March (even though we opted for a later date this year to attempt to mitigate such conflicts), 2) competition for tradeshow vendors among competing events, and 3) location of the event in a

smaller, less geographically centered media market than other competing events. As in 2010, attendees in 2011 came from just under 1/3 of Iowa counties as well as surrounding counties in nearby Missouri. Educational sessions were well attended and audience evaluations of speakers were highly favorable, suggesting that the educational offerings were superior to other conferences and well-programmed.

Goals & Outcomes Achieved

The All-Iowa Horticulture Exposition fits perfectly with the purpose and organization of the Iowa State Horticultural Society. The ISHS was founded in 1866 for the purpose of promoting and encouraging horticulture and its related interests in Iowa through the collection and dissemination of information concerning production, marketing, and utilization of horticultural crops. The educational program and marketing for 2011 was intended to have the following long-term impacts:

- 1) Iowa citizens attending the exposition will have more opportunities to learn about consumer and commercial horticulture ventures in the state of Iowa.
- 2) ISHS affiliate organizations and their individual members will benefit from the All-Iowa Horticulture Exposition and improved ISHS website by making the public aware of the many varied horticultural and specialty crop associations at work in Iowa.
- 3) Educational presentations and publications will enhance the competitiveness of specialty crops in Iowa by increasing public awareness of locally produced crops, products, and services.
- 4) Increased interest in consumer and commercial horticulture will benefit those Iowa businesses that provide horticultural products and services or grow and sell specialty crops.

Regarding items 1 and 2, conference evaluations are the primary means of feedback from both attendees and exhibitors. One hundred percent (100%) of respondents answered yes when asked “Would you attend this event next year?” and “Would you recommend this even to others?” These exceptionally high satisfaction rates validate the quality and quantity of learning opportunities presented at the All-Iowa Horticulture Exposition.

Qualitatively, many affiliate organizations that chose to participate in the Exposition were satisfied with their interaction with attendees. The evaluations used for exhibitors asked the

question “Were you satisfied with the amount of traffic around your booth?” to which 88% responded “yes,” an increase of 24% over last year. Sixty eight percent (68%) of exhibitors rated the Exposition “excellent” or better on a 5-point scale ranging from “poor” to “outstanding.” These solidly positive ratings lend support to the ways in which the ISHS manages the AIHE, but suggest room for improvement as addressed in the section “Lessons Learned.” Interestingly, hours were rescheduled this year, per exhibitor feedback in previous seasons that trade show hours were too long. Comments this year suggested that exhibitors would like longer trade shower hours to engage with the public.

The ISHS is also considering additional ways in which to quantitatively measure long-term goals (items 3-5) across time so as to effectively pursue its mission of supporting and promoting horticulture in the state of Iowa.

Expected Measurable Outcomes

The core funding proposal for the 2011 Exposition focused on investing funds in marketing and education to benefit consumer and exhibitor attendance. Regarding marketing, we continued to build on our broad network of contacts and deployment options built from 2009 and 2010. For 2010 the Exposition was marketed by direct mail to members of affiliate organizations, to members of statewide associations such as Master Gardeners (each of the 99 counties in Iowa has a Master Gardener program), and to garden clubs, arboretums, and public and private garden members, efforts that we continued and expanded in 2011. In addition, horticulture professionals and supporting businesses from across the state were invited to participate as exhibitors. Utilizing a previous exhibitor database, we were able to reach out initially to previous exhibitors as we began to assemble our trade show. Faculty and students of Iowa State University and community colleges that have horticulture and landscape design programs were invited to participate and exhibit. Print and radio/TV advertising was purchased where affordable, targeting the southeast and central Iowa media markets, and community calendars and public service announcements were utilized through the distribution of press releases. For 2011, the Exposition featured two nationally known keynote speakers and a diverse roster of regional experts that presented topics across a wide range of horticultural topics pertinent to home gardeners and small business horticultural professionals.

In light of that overarching intent, we expected the following outcomes from the 2011

Exposition:

- Increased attendance at the 2011 All-Iowa Horticulture Exposition to 2000 attendees as documented by registrations at the door.

***Failed.** Unfortunately, we didn't achieve our top priority of increasing attendance. Given the overwhelmingly positive feedback, it seems that our challenges aren't in cultivating a loyal fan base, but in recruiting a fan base of sufficient size to sustain the event well into the future at the current location. Given other challenges, moving the event to a larger media market would probably facilitate short-term and long-term improvements in consumer attendance.*

- Greater geographic distribution of attendees from registration surveys administered at the door.

***No progress.** While we maintained the same level of attendee geographic representation as 2010, we did not expand it sufficiently to consider this objective a success. Given the de-centralized location of this event, drawing from a larger geographic area than we currently do could prove challenging.*

- Greater participation from vendors in all areas of horticulture supplies and services as measured by registrations and square footage of vendor booth space.

***Achieved.** Though the number of exhibitor registrations was down slightly from 2010 (35) to 2011 (29), exhibitor satisfaction was markedly increased along with general positive remarks about the event, improvements from last year to this year in the registration and development of the trade show, and on the facilities themselves. Vendor evaluation forms reflected a greater willingness to be involved in future events as measured by contact requests at the bottom of each form.*

- Increased solicitation of no-cost advertising via radio and print as indicated by news releases submitted with results demonstrated by citations in radio and print.

***Achieved.** More board members and local volunteers were featured in press coverage this year than in previous years. Local radio and print news outlets covered the planning meetings and the Exposition itself. Marketing coverage was at its highest in 2011, suggesting that our underlying objective of promoting horticulture succeeded in reaching more households this year than in previous years, even if that didn't result in a significant increase in attendance. Future Expositions would do well to capitalize on this*

greater awareness in the design and implementations of marketing campaigns. Many attendees qualitatively reported hearing about the event for the first time this year as a result of citations in radio and print, lending evidence to the impact of our message reach.

- Strong educational program as indicated by evaluations from participants.

***Achieved.** Though the evaluation instrument return rate was down this year, attendees still overwhelmingly voiced support and gratification at the quality and quantity of educational programs offered at the Exposition, underscoring the significance of our programming. We feel quite confident that the educational programming we offer is among the best offered in the state and the region in terms of diversity of content and topics and attendees agree. Select testimonial statements include:*

- “This is the best Expo yet! Speaker series was great; trade fair excellent! Keep them coming!”
- “This was the first time I’ve been to the Expo, and I’ve really enjoyed it. The speakers were very good, and I’ve learned some new things and ideas. I bought lots of things at the trade show too!”
- “This was my first time, and I will be back. Thank you to all of you who planned, supported, and put on this wonderful event.”
- “It is a wonderful opportunity to get new ideas for all types of yards and outdoor spaces!”

Beneficiaries

The 2011 Exposition benefited horticultural consumers and producers. The educational sessions directly benefited ISU Extension Master Gardeners (who were able to count the sessions towards continuing education credits). A total of 29 horticulturally related vendors participated in the trade show with either informational or sales booths. The following ISHS affiliate and partner organizations participated in the trade show: Wapello County Master Gardeners, ISU Extension, Iowa Woodland Owners Association, Iowa Nut Growers Association, Iowa Regional Lily Association, Indian Hills Community College, Nebraska Statewide Arboretum GreatPlants program, and Reiman Gardens.

Lessons Learned

Despite successes and accomplishments, the 2011 Exposition fell short of a few goals and expected outcomes that should be addressed in the planning of future events. Primarily, our biggest failure was the inability to generate additional attendance, which at this point appears related to the geography of the event, despite resistance to moving it from current attendees and exhibitors. However, overwhelmingly positive feedback from attendees reinforced that the tactical approach to the Exposition — providing exceptional educational opportunities through concurrent and keynote sessions and interactions with exhibitors — resonates with our target audience. The objective for future Expositions will be to continue resonating with that target audience while increasing its size and soliciting greater numbers of exhibitors for the trade show.

Structural Changes

As in 2010, the committee co-chairmen in concert with the ISHS Executive Board and the Local Steering Committee cite the following changes as necessary for improving the quality of the Exposition in the years ahead:

- Reconsider the event location while gauging how much local support is available and necessary in a new location to put on an effective event. While the event may grow with increased attendance in a new venue, it might come at the cost and erosion of local support cultivated in the Ottumwa/Southeast Iowa region in the last three years.
- More local involvement, regardless of location. The ISHS Executive Board would like to enhance the involvement of the Local Steering Committee dramatically to improve on-ground relations with potential vendors, attendees, and event sponsors. Though significant strides were made in partnering with local groups and volunteers in 2011, as witnessed by a record 310 volunteer hours, additional rapport would almost certainly generate greater sponsorship and vendor support. These partnerships would greatly enhance the impact of the Exposition at both the local and statewide levels.

Additional Information

Please reference attached documents for samples from our marketing campaign and evaluation instruments utilized during the 2011 Exposition.

1:30 p.m.

Planning a Kitchen Garden or Potager

Even a tiny yard can grow herbs, vegetables, fruit, and flowers for cutting. Former Better Homes & Gardens editor **Susan Appleget Hurst** will show you how you can enjoy the pleasures of your own garden next summer with creative tips and insights. *Speaker back by popular demand!*

Overlooked Trees and Shrubs

Woody plant expert **Bob Henrickson** will highlight overlooked woody plants that have performed well here in the Great Plains. He will emphasize woody plants that have thrived at affiliated arboretum sites of the Nebraska State-wide Arboretum. *Speaker back by popular demand!*

3:00 p.m.

Lilies: Bulb to Bloom Basics

Iowa lily expert and judge **Sue Williams** will share her many years of experience growing lilies in the garden. Learn how to grow beautiful specimens of the genus *Lilium* in this seminar!

Managing Turf in the Midwest

Learn about management strategies for creating healthy, attractive, sustainable home lawns from ISU PhD student and turf expert **Marcus Jones**. This presentation will cover mowing, fertilizing, weed control, watering, disease and insect control, and renovation.

Special Appearance by the ISU Insect Zoo

Saturday from 11:00-2:45 p.m.
Bring the family and explore the creepy, crawly, and fascinating world of insects!

Trade Show and Children's Garden

Open daily from 11:00 to 4:00 p.m.

How to Buy Pre-Tickets (on sale through March 5)

Pre-ticket prices:

1-day pass: \$12
(regularly \$15 after March 5)
2-day pass: \$20
(regularly \$25 after March 5)
Trade Show Only Pass: \$5



Premium Package for the All-Iowa Horticulture Exposition III

This package includes:

- Two day admission to the Exposition for all programs and the trade show
- Lunch both days at the Exposition
- Friday night reception followed by dinner and a special presentation by keynote speaker Rita Randolph
- Friday overnight stay at the Quality Inn & Suites, Ottumwa, IA (newly renovated 2010)
- Free Deluxe Continental Breakfast Saturday at the Quality Inn & Suites

Price for the package is \$99.00 (double occupancy) and \$149.00 (single occupancy) and available to only the first 40 people.

Official Hotels:
AmericInn of Ottumwa;
Quality Inn and Suites



For more information visit www.iowahort.org or call 641-683-6260.

To purchase Pre-Tickets or the Premium Package send your check with this stub to:
Wapello County Extension Office
Attn: Sue Wasson
213 E. Main
Ottumwa, IA 52501

Name _____

Address _____

Phone _____

Email _____



www.iowahort.org

It's a green place to be!



All-Iowa Horticulture Exposition III

March 25-26, 2011
Bridge View Center
Ottumwa, Iowa

Trade Show and Children's Garden Hours
11 to 4 p.m. Daily

IOWA STATE UNIVERSITY
University Extension

... and justice for all
The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Many materials can be made available in alternative formats for ADA clients. To file a complaint of discrimination, write USDA, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964. Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914 in cooperation with the U.S. Department of Agriculture. Gerald A. Miller, interim director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa. SP 377c Revised 1/2011

All-Iowa Horticulture Exposition Educational Seminars

Supported by over 20 Iowa horticulture associations and organizations, the Expo offers diverse, multi-dimensional activities for the novice gardener as well as the professional.

Friday, March 25

10:00 a.m.

Growing Veggies and Herbs in Recycled Containers

Keynote speaker and Slow Gardening® founder **Felder Rushing** will teach you how to grow all your favorite veggies and herbs in the greenest way possible—using recycled containers.

Weather, Crops, and Gardens

Weather is both your best friend and worst enemy. ISU climatologist **Dr. Elwynn Taylor's** world of weather will increase your appreciation of the plants that must adapt while lesser forms of life run for shelter.

11:30 a.m.

Biomass Crops for Iowa

ISU biomass expert **Dr. Emily Heaton** will discuss the need for biomass crops in Iowa, which crops to use where, and how to grow them. Learn about this developing sector of agriculture in this information-packed lecture.

The "It" Garden

Learn about injecting some new spark into your garden from **Lisa Orgler**, artist, landscape architect, and associate director of Reiman Gardens. Lisa's knack for creativity will surely leave you inspired to create your own "it" garden.

12:30 p.m. Lunch Break on the Trade Show Floor

1:30 p.m.

ISHS Awards Ceremony and Keynote Presentation: Slow Gardening®



Join the Iowa State Horticultural Society in recognizing its volunteers and award winners for 2011. Following the brief awards presentation, 10th generation gardener **Felder Rushing**, a former Mississippi State Extension horticulture specialist and award-winning author of 15 books, will introduce lowans to the Slow Gardening® movement. Join Felder for an entertaining and informative adventure about savoring the gardening experience.

3:00 p.m.

Floral Arranging

If you stress about cutting and arranging your own flowers, bring your questions to this informative session that will cover the how-tos. Extension horticulturist **Dr. Cindy Haynes** will share her experiences and offer tips on creating the perfect bouquet.

Garden Gadgets and Gimmicks for 2011

Garden writer and magazine editor **Susan Applegat Hurst** sees all the newest garden tools and products at national trade shows every year. Using a Master Gardener's sensibilities with her knowledge of industry trends, Susan will show you her top picks for 2011. *Speaker back by popular demand!*

www.iowahort.org

Funds for this project were provided by the USDA Specialty Crops Block Grant Program through the Iowa Department of Agriculture and Land Stewardship.



Saturday, March 26

10:00 a.m.

Keynote Presentation: Creating Outdoor Rooms



Nationally acclaimed container gardening expert **Rita Randolph** will offer garden design ideas for creating any type of useful, entertaining outdoor space. Designs featured range from the least expensive DIY projects to the extreme makeovers of some extravagant estates. Rita will share a lifetime of experience and clue you in to her favorite plants and containers, while demonstrating how to creatively use pavers, hardscapes and partitions.

11:00 a.m. Lunch Break on the Trade Show Floor

Special Appearance by the ISU Insect Zoo in the Children's Garden

12:00 p.m.

Growing Green Roofs in Iowa

Growing plants on the rooftops of buildings provides both environmental benefits and beauty for our managed landscapes. Join ISU master gardener coordinator **Dr. Jennifer Boussetot** in exploring the basics of green roof design and implementation and learn about several green roof projects from around Iowa.

Wonderful Wild Mushrooms

Mushroom enthusiast **Dave Layton** will discuss the basics of mushroom identification. He'll describe several easy-to-identify and delicious species and offer a taste of one of his favorites—Hen-of-the-Woods pan fried.

Diverse Trade Show Exhibitors | Expert Speakers | Hands-on Demonstrations

All-Iowa Horticulture Exposition III

March 25-26, 2011

Bridge View Center
Ottumwa, Iowa
Trade Show Open 11-4 Daily

*It's a green
place to be!*

Join us for the third annual All-Iowa Horticulture Exposition, supported by over 20 Iowa horticulture associations and organizations. The Expo offers diverse, multi-dimensional activities, geared to the novice gardener, as well as the professional.

EXHIBIT HALL HOURS

Friday, March 25—11:00 a.m. to 4:00 p.m.

Saturday, March 26—9:00 a.m. to 2:00 p.m.

KEYNOTE SPEAKERS

Award-winning author and sustainable horticulture expert,

Felder Rushing

America's queen of container gardening, **Rita Randolph**

EDUCATIONAL PRESENTATION TOPICS

Bob Henrickson – *Overlooked Trees and Shrubs*

Cindy Haynes – *Flower Arranging*

Dave Layton – *Cooking with Wild Mushrooms*

Dr. Emily Heaton – *Biomass Crops for Iowa*

Elwynn Taylor – *Weather, Crops, and Gardens*

Jennifer Boussetot – *Green Roofs in the Home Garden*

Lisa Orgler – *The "It" Garden: Garden Design Ideas for Every Garden*

Marcus Jones – *Managing Turf in the Midwest*

Sue Williams – *Lilies: Bulb to Bloom Basics*

Susan Applegate-Hurst – *Planning a Kitchen Garden, Garden*

Gimmicks/Gadgets for 2011

Plant Boutique featuring unusual plants grown by the Indian Hills Community College Horticulture students

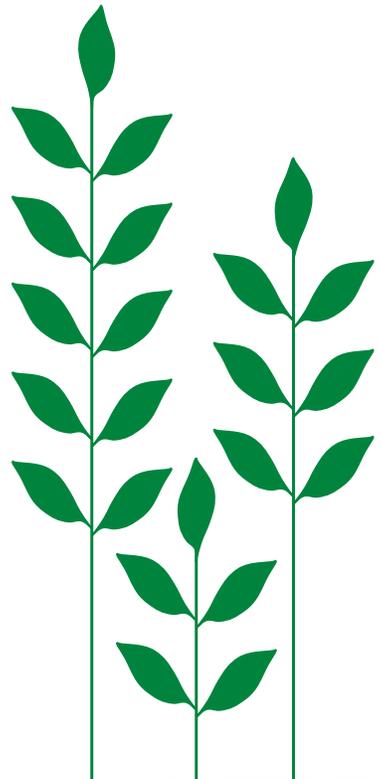
www.iowahort.org

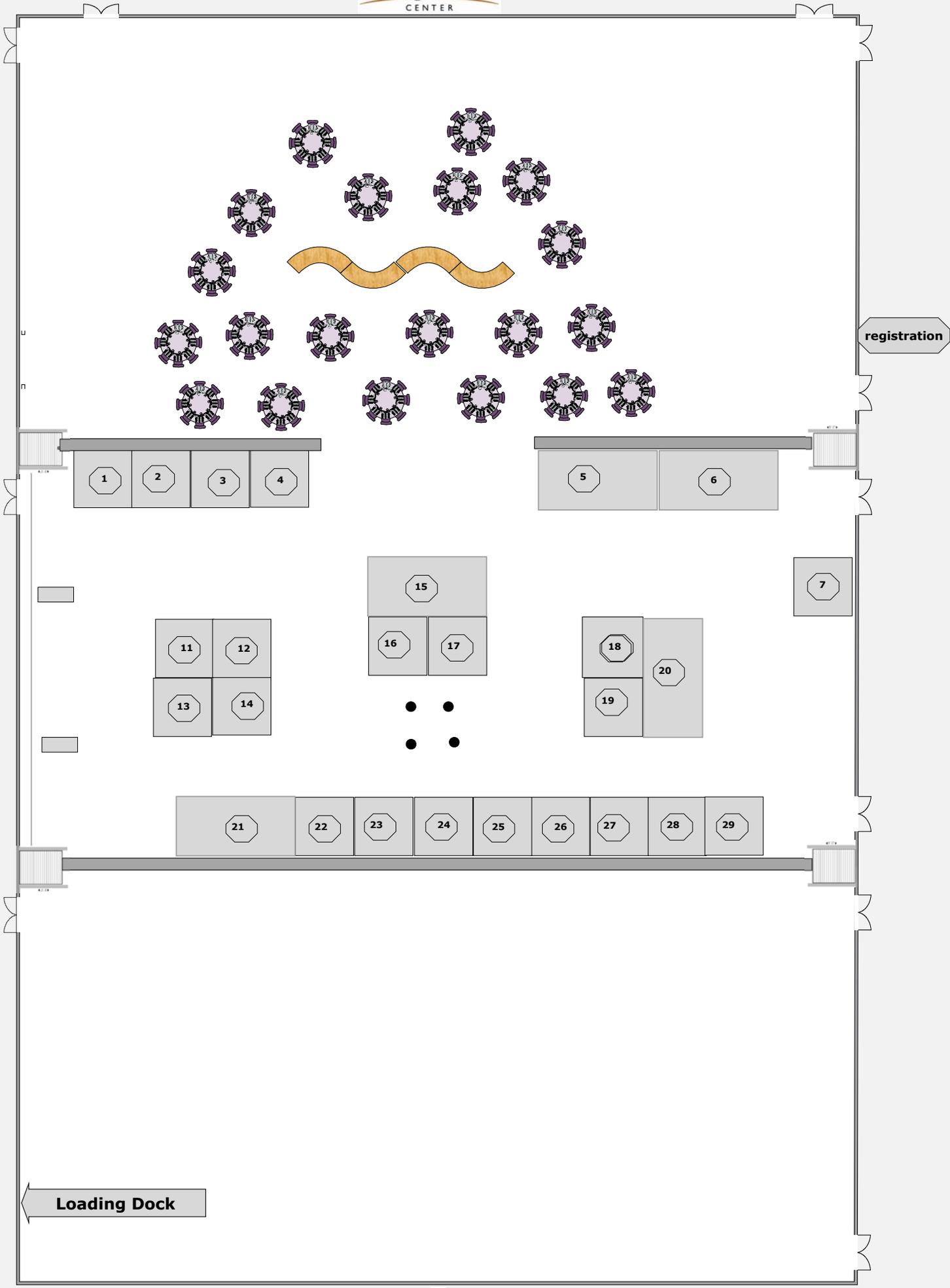
PRESENTED BY



IOWA STATE
UNIVERSITY
University Extension

Funds for this project were provided by the USDA Specialty Crops Block Grant Program through the Iowa Department of Agriculture and Land Stewardship.





registration

1

2

3

4

5

6

15

7

11

12

16

17

18

20

13

14

19

21

22

23

24

25

26

27

28

29

← Loading Dock



Iowa State Horticultural Society

IOWA STATE UNIVERSITY
University Extension

2011 All-Iowa Horticulture Exposition

March 25-26, 2011



Sponsors

| Gold | Silver | Bronze |
|---|--|--|
| KLEE/TOM-FM Ottumwa Radio (KRKN, KBIZ) | Ajinomoto Leopold Center for Sustainable Agriculture <i>(underwriting Felder Rushing's Keynote Session)</i> OnMedia Cable TV Advertising, Jon Pedersen Pace Supply | AmericInn of Ottumwa Quality Inn & Suites |



FRIDAY

- 9:30 a.m. Doors open
- 10:00 a.m.-11:00 a.m. Breakout Sessions (*Rooms 1, 2*)
- 11:00 a.m.-4:00 p.m. Trade Show (*Exhibit Hall B*)
Iowa Arboretum Bookstore
- 11:30 a.m.-12:30 p.m. Breakout Sessions (*Rooms 1, 2*)
- 12:30 p.m.-1:30 p.m. Lunch Break and Exhibits (*Exhibit Hall A & B*)
- 1:30 p.m.-3:00 p.m. ISHS Awards Ceremony and Friday Keynote Session (*Auditorium*)
- 3:00 p.m.-4:00 p.m. Breakout Sessions (*Rooms 1, 2*)

SATURDAY

- 9:30 a.m. Doors open
- 10:00 a.m.-11:00 a.m. Saturday Keynote Session (*Auditorium*)
- 10:45 a.m.-2:45 p.m. Special Appearance by the ISU Insect Zoo (*Exhibit Hall B*)
- 11:00 a.m.-4:00 p.m. Trade Show (*Exhibit Hall B*)
Iowa Arboretum Bookstore
- 12:00 p.m.-1:00 p.m. Breakout Sessions (*Rooms 1, 2*)
- 1:30 p.m.-2:30 p.m. Breakout Sessions (*Rooms 1, 2*)
- 3:00 p.m.-4:00 p.m. Breakout Sessions (*Rooms 1, 2*)

Friday, March 25, 2011

10:00 a.m.

Growing Veggies and Herbs in Recycled Containers

Keynote speaker and Slow Gardening® founder, **Felder Rushing** will teach you how to grow all your favorite veggies and herbs in the greenest way possible—using recycled containers.

Weather, Crops, and Gardens

Weather is both your best friend and worst enemy. ISU climatologist, **Dr. Elwynn Taylor's** world of weather will increase your appreciation of the plants that must adapt while lesser forms of life run for shelter.

11:30 a.m.

Biomass Crops for Iowa

ISU biomass expert, **Dr. Emily Heaton** will discuss the need for biomass crops in Iowa, which crops to use where, and how to grow them. Learn about this developing sector of agriculture in this information-packed lecture.

The “It” Garden

Learn about injecting some new spark into your garden from **Lisa Orgler**, artist, landscape architect, and associate director of Reiman Gardens. Lisa's knack for creativity will surely leave you inspired to create your own “it” garden.

12:30 p.m. Lunch Break on the Trade Floor

1:30 p.m.

ISHS Awards Ceremony and Keynote Presentation:

Slow Gardening®

Join the Iowa State Horticultural Society in recognizing its volunteers and award winners for 2010. Following the brief awards presentation, 10th generation gardener, **Felder Rushing**, a former Mississippi State Extension horticulture specialist and award-winning author of 15 books, will introduce Iowans to the Slow Gardening® movement. Join Felder for an entertaining and informative adventure about savoring the gardening experience.

3:00 p.m.

Floral Arranging

If you stress about cutting and arranging your own flowers, bring your questions to this informative session that will cover the how-tos. Extension horticulturist, **Dr. Cindy Haynes** will share her experiences and offer tips on creating the perfect bouquet.

Garden Gadgets and Gimmicks for 2011

Garden writer and magazine editor, **Susan Appleget Hurst** sees all the newest garden tools and products at national trade shows every year. Using a Master Gardener's sensibilities with her knowledge of industry trends, Susan will show you her top picks for 2011. *Speaker back by popular demand!*

Acknowledgements

The Iowa State Horticultural Society would like to thank its many local volunteers, including Master Gardeners, and its network of statewide affiliates for their generous gifts of time and effort to the 2011 All-Iowa Horticulture Exposition.

Saturday, March 26

10:00 a.m.

Keynote Presentation: Creating Outdoor Rooms

Nationally acclaimed container gardening expert, **Rita Randolph** will offer garden design ideas for creating any type of useful, entertaining outdoor space. Designs featured range from the least expensive DIY projects to the extreme makeovers of some extravagant estates. Rita will share a lifetime of experience and clue you in to her favorite plants and containers, while demonstrating how to creatively use pavers, hardscapes and partitions.

11:00 a.m. Lunch Break on the Trade Show Floor

Special Appearance by the ISU Insect Zoo in the Children's Garden

12:00 p.m.

Growing Green Roofs in Iowa

Growing plants on the rooftops of buildings provides both environmental benefits and beauty for our managed landscapes. Join ISU master gardener coordinator, **Dr. Jennifer Boussetot** in exploring the basics of green roof design and implementation and learn about several green roof projects from around Iowa.

Wonderful Wild Mushrooms

Mushroom enthusiast, **Dave Layton** will discuss the basics of mushroom identification. He'll describe several easy-to-identify and delicious species and offer a taste of one of his favorites—Hen-of-the-Woods pan fried.

1:30 p.m.

Planning a Kitchen Garden or Potager

Even a tiny yard can grow herbs, vegetables, fruit, and flowers for cutting. Former Better Homes & Gardens editor, **Susan Appleget Hurst** will show you how you can enjoy the pleasures of your own garden next summer with creative tips and insights. *Speaker back by popular demand!*

Overlooked Trees and Shrubs

Woody plant expert, **Bob Henrickson** will highlight overlooked woody plants that have performed well here in the Great Plains. He will emphasize woody plants that have thrived at affiliated arboretum sites of the Nebraska Statewide Arboretum. *Speaker back by popular demand!*

3:00 p.m.

Lilies: Bulb to Bloom Basics

Iowa lily expert and judge, **Sue Williams** will share her many years of experience growing lilies in the garden. Learn how to grow beautiful specimens of the genus *Lilium* in this seminar!

Managing Turf in the Midwest

Learn about management strategies for creating healthy, attractive, sustainable home lawns from ISU PhD student and turf expert, **Marcus Jones**. This presentation will cover mowing, fertilizing, weed control, watering, disease and insect control, and renovation.



All-Iowa Horticulture Exposition III

March 25-26, 2011

**Bridge View Center
Ottumwa, Iowa**

It's a green place to be!

Supported by over 20 Iowa horticulture associations and organizations, the Expo offers diverse, multi-dimensional activities for the novice gardener as well as the professional.

Trade Show and Children's Garden Hours

Open 11 to 4 p.m. Daily

Keynote Speakers

Award-winning author and sustainable horticulture expert,

Felder Rushing

America's queen of container gardening, **Rita Randolph**

Friday

Felder Rushing: Growing Veggies and Herbs in Recycled Containers and Slow Gardening (*Keynote Presentation*)

Dr. Elwynn Taylor: Weather, Crops, and Gardens

Dr. Emily Heaton: Biomass Crops for Iowa

Lisa Orgler: The "It" Garden

Dr. Cindy Haynes: Floral Arranging

Susan Appleget Hurst: Garden Gadgets and Gimmicks for 2011

Saturday

Rita Randolph: Creating Outdoor Rooms (*Keynote Presentation*)

Dr. Jennifer Busselot: Growing Green Roofs in Iowa

Dave Layton: Wonderful Wild Mushrooms

Susan Appleget Hurst: Planning a Kitchen Garden or Potager

Bob Henrickson: Overlooked Trees and Shrubs

Sue Williams: Lilies: Bulb to Bloom Basics

Marcus Jones: Managing Turf in the Midwest

Pre-Tickets (on sale through March 5)

Pre-ticket prices:

1-day pass: \$12 (regularly \$15 after March 5)

2-day pass: \$20 (regularly \$25 after March 5)

Trade Show Only Pass: \$5



Expert Speakers



Diverse Trade Show Exhibitors



SP 377b Revised 1/2011

www.iowahort.org

Presented by



IOWA STATE UNIVERSITY
University Extension

**For more information visit
www.iowahort.org or
call 641-683-6260.**

Funds for this project were provided by the USDA Specialty Crops Block Grant Program through the Iowa Department of Agriculture and Land Stewardship.

Iowa State University Extension programs are available to all without regard to race, color, national origin, religion, sex, age, or disability.

**All-Iowa Horticulture Exposition
Ottumwa, Iowa ▪ March 25 & 26, 2011**

Exhibitor Satisfaction Survey

Please take the time to fill out this brief evaluation of your experience at the All-Iowa Horticulture Exposition. Your thoughts and comments are very important in planning future conferences.

- Overall how would you rate your experience at the Expo (please check):

| | |
|--------------------------------------|----|
| <input type="checkbox"/> Outstanding | 1 |
| <input type="checkbox"/> Excellent | 12 |
| <input type="checkbox"/> Good | 6 |
| <input type="checkbox"/> Fair | |
| <input type="checkbox"/> Poor | |

- Were you satisfied with the amount of traffic around your booth?

| | |
|---|-----------------------------------|
| <input checked="" type="checkbox"/> Yes | 14 (88% satisfaction rate) |
| <input type="checkbox"/> No | |
| <input type="checkbox"/> Undecided | 2 |

- Were you satisfied with the look and cleanliness of the facilities?

| | |
|------------------------------------|----|
| <input type="checkbox"/> Yes | 19 |
| <input type="checkbox"/> No | |
| <input type="checkbox"/> Undecided | |

- Were you satisfied with the booth check-in/check-out process?

| | |
|------------------------------------|----|
| <input type="checkbox"/> Yes | 19 |
| <input type="checkbox"/> No | |
| <input type="checkbox"/> Undecided | |

- Would you like to see the Expo located in other cities in Iowa?

| | |
|------------------------------------|---|
| <input type="checkbox"/> Yes | 3 |
| <input type="checkbox"/> No | 6 |
| <input type="checkbox"/> Undecided | 9 |

- If so, where:

| | |
|--|---|
| <input type="radio"/> Des Moines | 2 |
| <input type="radio"/> Iowa City/Cedar Rapids | 3 |
| <input type="radio"/> Quad Cities | 1 |

- Please share any positive feedback about the 2011 Expo:

| | |
|-------------------------------|---|
| General positive remarks | 8 |
| Trade show diversity | 5 |
| Facilities | 4 |
| Improvements from past events | 4 |

Staff was helpful 3

• Please suggest how we can improve the Expo in the future:

Longer show hours 5

More advertising of exhibitors 4

More vendors 2

Provide cloth shopping bags 2

More local involvement needed 1

Iowa State University Extension and Outreach

BUDGETS FOR VEGETABLE CROP PRODUCTION IN HIGH TUNNELS

IDALS SPECIALTY CROP BLOCK GRANT PROGRAM

JUNE, 2012/revised September 2013

FINAL PROJECT REPORT

TO THE IOWA DEPARTMENT OF AGRICULTURE AND LAND STEWARSHIP

Compiled by

Craig Chase, Linda Naeve, Arlene Enderton, and Corry Bregendahl

Project Title: BUDGETS FOR VEGETABLE CROP PRODUCTION IN HIGH TUNNELS

Project Summary

High tunnels are becoming an important tool in specialty crop production. They are simple, plastic-covered, greenhouse-like structures that are passively ventilated and heated and the crops are grown directly in the soil. Over the last 15 years, an increasing number of fruit, vegetable, and flower growers throughout the country have added high tunnels or are considering adding to their farming operation to significantly extend the season in the spring and fall. In the past six months, the interest in high tunnel production spiked when the USDA announced a new 3-year pilot study in December, 2009 under the “Know Your Farmer, Know Your Food” Initiative in which local Natural Resource Conservation Service (NRCS) offices were assigned to oversee the Environmental Quality Incentive Program (EQIP) grant applications and distribution of funds to support high tunnel construction on fruit and vegetable farms. Between 2010 and 2013, 240 high tunnels have been constructed in Iowa with this funding support.

By lengthening the season an additional 10 weeks or more through high tunnel production, growers can add additional crop rotations into their operation, increasing production and profitability. Research at Iowa State has shown that increased production of specific horticulture crops in high tunnels can be very profitable. A 30 ft. × 96 ft. high tunnel has the potential to produce approximately 5,200 pounds of tomatoes or 1,440 pounds of red raspberries in a growing season (Taber, et al, and Domoto et al). With an average retail price of \$1.50 per pound for tomatoes and \$6 for red raspberries, growers have to potential to gross \$7,800 and \$8,640, respectively, in 2,880 square feet. The income potential may be greater with multi-crop systems.

Although high tunnels are relatively inexpensive structures compared to greenhouses, they are still a large investment for most small-scale specialty crop farmers. A typical manufactured, manually ventilated, 30 × 96 foot high tunnel costs between \$5,600 and \$6,000, not including the labor costs for construction. In addition to the structure, irrigation systems, pest monitoring, and other crop management add to the inputs of the crop production system. Financial lenders and small-scale farmers need to know the realistic costs and economic returns along with potential yields and profit to determine whether a high tunnel is a good investment for a particular farming operation. Market growers are requesting realistic budget models as they seek financing, consider expanding or diversifying production and/or hiring additional employees.

This project addressed the need for cost and production data for vegetable growers by creating an enterprise budgeting tool that estimates the costs and returns associated with producing specific crops in a high tunnel, either as a single crop or multi-crop system. Iowa State University Extension and Outreach specialists developed a record keeping system that five experienced high tunnel growers maintained throughout the growing season. They collected input costs, labor and production data. The information recorded by the growers was compared to and combined with

the data collected from a multi-crop system planted in the high tunnel at the ISU Horticulture Research Station. The outcome was an 8-page publication, PM-3025, *Vegetable Production Budgets for a High Tunnel*, which can be downloaded free at www.extension.iastate.edu/store. The enterprise budgets illustrated in the publication are intended to help growers allocate valuable high tunnel space, labor and capital to the most appropriate use, such as maximize profits, meet customers' needs or any other goal defined by the grower. 250 copies of the publication were printed and all have been distributed at field days, 6 high tunnel workshops, the 2012 Farm Progress Show exhibit and through individual requests. The availability of the publication was publicized through ISU Extension and Outreach and Leopold Center press releases, newsletters (www.iowaproduce.org – June, 2012), and featured on the Extension Value Added Agriculture website. The publication has been downloaded over 500 times from the Leopold Center website and the Iowa State University Extension online store, Iowa Natural Resources Conservation Service (NRCS) staff made this resource available online to assist the growers who contracted with the NRCS for high tunnels and individuals interest in high tunnel production. It will serve as a useful training tool in future high tunnel production workshops, individual consultations with growers, and will be included as a chapter in the revised *High Tunnel Fruit and Vegetable Production Manual*.

The impact of the publication on farmer decision making was assessed through an on-line survey sent to 127 people who participated in a high tunnel workshop and received an electronic or paper copy of the publication. 69% of respondents with a high tunnel (18 out of 26) indicated that they read the publication, *PM-3025 Vegetable Production Budgets for a High Tunnel*. Of the 8 producers in the survey who indicated the profitability of their high tunnel production rose from 2012 to 2013, 7 (88%) indicated the decisions made as a result of reading the publication had some impact on the increase in profitability. Total increase in profitability for these seven producers was between \$3,150 and \$4,700.

Project Approach

The project was conducted in three parts: record-keeping by participating farmers, data analysis, and publication development.

Record-keeping. Vegetable growers were notified of the opportunity to participate in this project through newsletters and mailing lists from high tunnel trainings held throughout the state. Six applicants were selected based on their experience in high tunnel production. A production record book was developed and provided to the growers to collect the type of data required for this project. All participants were trained on the use of the record book. The growers were contracted to record input costs, hourly labor needs, and the harvested area, yield, and price for each crop grown in the high tunnel between March 1 and October 1, 2012. One farmer failed to complete the project.

A student intern was hired to plant, maintain, harvest and keep similar production records of a multi-crop planting system used to maximize the space available in a 30' x 90' high tunnel at the Iowa State University Horticulture Research Station. This project was used as a demonstration planting for educational purposes at field days held at the research station. A student intern recorded the inputs (supplies and labor) and outputs (yields and market value) from the high tunnel.

Data analysis. The estimated costs and returns were based on farm data received for six high tunnels from March through September in a single growing season. The information from the farms was analyzed to develop a publication that contains accurate budgets for three crops in high tunnels and multi-crop systems. The original farm-derived budgets were adjusted slightly to make them more uniform regarding ownership costs, fertilizer costs, and other inputs and expenses. Because the high tunnels in the study varied in size, the budgets were developed on a per square foot basis. The various planting and cropping systems in a high tunnel, planting seasons, and management strategies used by the growers, also resulted in a wide range of profit potential.

For consistency and comparison, the size of the high tunnel for all budgets was set at 30 ft. x 72 ft. (2,160 square feet) with an average original cost of \$7,000. The cost of the high tunnel did not take into consideration any rebates or cost-share programs. The percent utilization represents the amount of square footage that was planted and harvested as a percentage of the total square footage of the high tunnel. When multiple crops are planted and harvested within a single season (March – September) on the same square footage area, it is possible to incur a utilization percentage greater than 100 percent. The 84 percent utilization for the multiple crop budget was close to the average of the five farms. It is assumed that a single crop enterprise would utilize all available space other than alleyways. For that reason, single crop enterprises were assumed to have a 94 percent utilization.

Annual returns over total costs varied substantially by farm and enterprise. The differences in annual returns were influenced by a variety of factors. The annual return over total cost differed substantially by individual crop. Tomatoes, lettuce, herbs, and eggplant resulted in a much higher return than cucumbers (high value, thin-skinned, seedless varieties) and bell peppers.

Second, the annual return over total cost varied among producers. Yields received by producers varied based upon experience with certain crops and the varieties chosen. The overall profitability of a high tunnel varied substantially by the percent utilization. Overall, the potential annual returns for a high tunnel (excluding marketing costs) based on the findings of the five farms showed that a multi-crop or tomato high tunnel enterprise could be approximately \$3.00 per square foot or \$6,480 for a 2,160 square foot tunnel. Assuming an initial investment of

around \$7,000, this level of return would indicate about a 1-yr payback, which is unusual in agriculture.

When data from fixed and moveable high tunnels were analyzed, this study found that a moveable high tunnel was able to multiply the available covered production space throughout the season as compared to fixed tunnels, resulting in increased profitability.

Publication. The results of the project were written and published in an 8-page Iowa State University Extension and Outreach (ISUEO) publication, PM-3025, *Vegetable Production Budgets for a High Tunnel*, which can be downloaded free at www.extension.iastate.edu/store. 250 copies of the publication were printed and all have been distributed at field days, 6 high tunnel workshops, 2012 Farm Progress Show exhibit and through individual requests. The availability of the publication has been publicized through ISU Extension and Outreach and Leopold Center press releases, newsletters (iowaproduce.org – June, 2012), and featured on the Extension Value Added Agriculture website. Natural Resources Conservation Service (NRCS) staff will also use the publication to assist growers who contract with the NRCS for a high tunnel through the Environmental Quality Incentive Program. It will be a useful training tool in future high tunnel production workshops and individual consultations with growers.

The enterprise budgets illustrated in this publication were developed to be used as examples to help vegetable growers estimate the costs and returns to produce a crop or crops in their high tunnel. These enterprise budgets for a high tunnel can help growers allocate valuable space, labor and capital to the most appropriate use, such as maximize profits, meet customers' needs or any other goal defined by the grower. The examples given show a profit potential if the entire marketable crop is sold. It does not reflect loss due to unsold product. Also, all products were sold at the average price listed. Four enterprise budgets were developed for the publication: three single crop budgets (tomatoes, cucumbers, and bell peppers) and one multiple crop budget.

Each enterprise budget is divided into six sections. The first section indicates the crop or crops budgeted, the size of the high tunnel, the approximate original cost, and the percent of the high tunnel utilized. The second section illustrates the total receipts the high tunnel enterprise provides on a set unit(s). We determined that records should be kept on both sales unit and land unit (square foot) basis. Prices for single crop budgets are assumed to reflect institutional or larger buyer prices (non-retail). The use of a single crop would indicate a larger supply available over a designated number of weeks. Prices for the multiple-crop budget were more reflective of a retail (direct-to-consumer) price. Yields were estimated based on what occurred on the five farms over an 8-12 week harvest period. The length of harvest was dependent upon the crop and variety. Not all crops were grown on all farms.

The third section covers the cost of planting and growing the product. These costs are segmented for two reasons. First, these costs are incurred whether a product is sold or not. Once the seed is

planted or watering is completed, it is a sunk cost and needs to be covered from some source. The second purpose is there is a time delay between pre-harvest expenses and the time the product is sold. These expenses may have to be covered by borrowing or saving or some other source. Estimated transplant and seed needs were based on the cost for seed or transplants for each crop. Fertilizer expense averaged over five farms came to \$0.05 per square foot. Miscellaneous supplies were averaged over the five farms. An additional \$50 was charged to the all-tunnel tomato enterprise to reflect additional costs for stakes and twine. Miscellaneous supplies did not take into account the initial costs of stakes trellises, header lines, fitting, etc. Rather, they reflected a replacement value for those supplies. Water was charged at \$0.04 per square foot and a water test was \$17. Water estimates do not include any water usage fees charged by rural water companies or others. Irrigation supplies averaged \$50 for the five farms. An additional charge of \$72 was made to cover 6 hours of labor at \$12 per hour to replace and/or fix any of the drip irrigation lines.

The fourth section is the labor component. Labor is divided into five activities: bed preparation, general maintenance (weeding, staking, pruning, etc.), planting, pest management, and harvest. Bed preparation time was less for single-crop enterprises. General maintenance, planting, and harvesting varied by the needs of the crop and were estimated based on what information was available from the five farms and experience. Labor wage rate was assumed to be \$12 per hour. The wage rate does not include employment taxes, insurance or other employee benefits.

The fifth section relates to the ownership costs. Each producer owns or controls assets that they use to produce the income, such as land, high tunnel, machinery, irrigation equipment, and other items. Ownership costs are an allocation to realize some return for the use of those assets. It is assumed that the high tunnel has an 8-year and the plastic covering a 4-year life span. The total ownership costs are estimated at approximately \$0.46/square foot based on an approximate total high tunnel construction cost of \$7,000 and a plastic cover replacement cost of \$0.21 per square foot of tunnel (\$454 for a 30 ft. x 72 ft. high tunnel). Land rental and depreciation on machinery and equipment (tiller, plastic mulch layer, tractor, etc.) are not included.

The last section is the summary of total costs and returns. Total costs are annual, labor and ownership costs combined. Annual returns can be analyzed as an overall number or by the square foot. Because space is a constraint in a high tunnel (there is only so much room), it made sense to review annual returns using both units.

The budgets in the publication include receipts but not the costs associated with handling and marketing. Post-harvest handling of high tunnel crops is often done at the same time as field-harvested crops and thus the cost can not accurately be traced. Also, marketing costs vary tremendously based on whether products are distributed through a CSA, wholesaler, or direct through a farmers' market or other outlet. For this reason, they were not included in the budgets.

Goals, Outputs and Outcomes Achieved

The activities were completed toward achieving the project performance goals:

1. Input and production records were kept on high tunnel production by five commercial vegetable growers and a student intern at the ISU Horticulture Research Station.
2. Data from the production records were analyzed for the development of enterprise budgets for three single-crop and one multi-crop production system in high tunnels.
3. The ISUEO publication, PM-3025, *Vegetable Production Budgets for a High Tunnel*, was written and published in May, 2012.,
 - 250 copies PM-3025, *Vegetable Production Budgets for a High Tunnel*, were printed and distributed through individual requests and at:
 - Practical Farmers of Iowa Field Day, June 25, 2012. Approximately 75 participants attended. This project and results were the focus of the field day.
 - 2012 Farm Progress Show NRCS high tunnel display
 - Three Introduction to High Tunnels workshops attended by 99 people
 - Two Advanced High tunnel workshops attended by 54 people
 - The publication and study have been publicized through media outlets and downloadable files are available through the online resources listed below. ISUEO press release: *New High Tunnel Publication Describes Budgeting Strategies for Farmers* (June 20, 2012) <http://www.extension.iastate.edu/article/new-high-tunnel-publication-describes-budgeting-strategies-farmers>
 - The publication was described in the online newsletter to fruit and vegetable growers, www.iowaproduce.org. (June 11, 2012) Nearly 300 people subscribe to this newsletter.
 - Since May, 2012, PM-3025 is available as a downloadable document on several websites and has been downloaded over 500 times from the following websites:
 - The Leopold Center for Sustainable Agriculture: http://www.leopold.iastate.edu/cool_tools
 - The Extension Value Added Agriculture: www.extension.iastate.edu/valueaddedag/
 - The Iowa NRCS website <http://www.ia.nrcs.usda.gov/programs/HighTunnelInitiative.html>

An excel budget spreadsheet was developed by Joe Hannan, Extension horticulture field specialist, from the data collected from the project. This production tool was programmed with specific calculation formulas which will enable growers to input and calculate their expenses, yield and sales data directly on the spreadsheet. The use of this tool was taught to 32 participants at a workshop at the 2013 Iowa Fruit and Vegetable Growers' Conference. The bulletin and spreadsheet were also made available to participants through a webinar presented by Practical Farmers' of Iowa in January, 2013. This valuable tool is available to download on the Agriculture Marketing Resource Center website: www.agmrc.org.

Impact and long term measurable outcomes:

The impact of the publication on farmer decision making was assessed through an on-line survey sent to 127 people who participated in a high tunnel workshop and received an electronic or paper copy of the publication. Below is a summary of the evaluation survey results. The complete evaluation report can be found beginning on page 11.

The survey had a response rate of 35%, with a total of 45 usable responses.

- Of the 45 respondents, 57.8% (26) have a high tunnel in production.
- 83% of respondents (15 out of 18) identified which markets they would supply before planning and planting their high tunnel crop.
- 69% of respondents with a high tunnel (18 out of 26) indicated that they read the publication, *PM-3025 Vegetable Production Budgets for a High Tunnel*.
- Those who read the publication (n=18) were asked to rank the usefulness of the information presented in the publication on a scale from 1 to 5, where 1= not at all useful and 5= extremely useful. On average, respondents rated the publication at 3.2.
- Those who read the publication were also asked to rate the extent to which they agree that the publication prompted them to plant crops that would maximize profitability, where 1= strongly disagree and 5= strongly agree. The average score resulting from this question was 3.1.
- Comparing production years before and after the high tunnel publication and training, results showed that the majority of respondents increased production, sales, and profitability, with 73%, 91%, and 82% of respondents doing so, respectively. This indicates that farmers are improving their operations over time to improve efficiency, reduce costs, and increase profitability.
- Of the 8 producers who indicated the profitability of their high tunnel production rose from 2012 to 2013, 7 (88%) indicated the decisions made as a result of reading the publication had some impact on the increase in profitability. Total increase in profitability for these seven producers was between \$3,150 and \$4,700.
- 50% of producers (4 out of 8) indicated that tomatoes were the most profitable crop they grew in a high tunnel.
- The publication *PM-3025 Vegetable Production Budgets for a High Tunnel* drew people in to read it, and they rated the information as moderately useful. Those involved in this project are encouraged to continue to offer tools and information that are relevant in helping high tunnel producers increase profitability.

Beneficiaries

The beneficiaries of this project are new and veteran vegetable producers who are looking for ways to measure and increase profitability and efficiency in a high tunnel. The enterprise budgets will help them determine what is profitable for their market.

Lessons learned

This project involved on-farm data collected by farmers in their facilities and growing the crops needed to supply their markets. This type of data is valuable because it educates and involves growers, results in “real life” data, and can produce good generalizations for applied projects. The growers participating in this project learned the importance of record-keeping to obtain a clear understanding of the profitability of crops based not only on the value of the crop, but also including the labor and time/space occupied in the high tunnel. However, there are limitations associated with on-farm research. All the farmers in this study were given record-keeping workbooks to enter their data in the format which would give continuity, consistency to the data and make it easier to compile. Several of the growers collected the information requested on computer-generated spreadsheets and through their existing record-keeping systems. This made analysis difficult and time consuming. Also, data was missing from a few farm reports and one contracted grower failed to submit his records at the end of the season. For those reasons, it was wise that we contracted with more than two or three growers to participate in the project so that we had more data to work with that resulted in more accurate enterprise budgets.

Contact Persons:

Dr. Craig Chase
Telephone: 515-294-3711
E-mail: cchase@iastate.edu

Linda Naeve
Telephone: 515-294-8946
E-mail: lnaeve@iastate.edu

Participating Farmers and their High Tunnels



Scott Wilbur
Wilbur's Northside Market
Boone, IA



Susan Jutz
ZJ Farm
Solon, IA



Cathy and Terry Lesh
Lesh Pumpkin Patch
Westboro, MO

Evaluation of Extension Publication *PM-3025 Vegetable Production Budgets for a High Tunnel*

Funded by the Iowa Department of Agriculture and Land Stewardship Specialty Crop Block Grant

With additional funding from the Leopold Center for Sustainable Agriculture

Arlene Enderton and Corry Bregendahl
Leopold Center for Sustainable Agriculture
September, 2013

Report Highlights

- A publication was created to increase the profitability of growing vegetables in high tunnels. *PM 3025 Vegetable Production Budgets for High Tunnels* provides four sample budgets to demonstrate the potential profitability of various crops commonly grown in high tunnels.
- The impact of the publication on farmer decision making was assessed through an on-line survey sent to 127 people who participated in a high tunnel workshop and received an electronic or paper copy of the publication.
- The survey had a response rate of 35%, with a total of 45 usable responses.
- Of the 45 respondents, 57.8% (26) have a high tunnel in production.
- 83% of respondents (15 out of 18) identified which markets they would supply before planning and planting their high tunnel crop.
- 69% of respondents with a high tunnel (18 out of 26) indicated that they read the publication, *PM-3025 Vegetable Production Budgets for a High Tunnel*.
- Those who read the publication (n=18) were asked to rank the usefulness of the information presented in the publication on a scale from 1 to 5, where 1= not at all useful and 5= extremely useful. On average, respondents rated the publication at 3.2.
- Those who read the publication were also asked to rate the extent to which they agree that the publication prompted them to plant crops that would maximize profitability, where 1= strongly disagree and 5= strongly agree. The average score resulting from this question was 3.1.
- Comparing production years before and after the high tunnel publication and training, results showed that the majority of respondents increased production, sales, and profitability, with 73%, 91%, and 82% of respondents doing so, respectively. This indicates that farmers are improving their operations over time to improve efficiency, reduce costs, and increase profitability.
- Of the 8 producers who indicated the profitability of their high tunnel production rose from 2012 to 2013, 7 (88%) indicated the decisions made as a result of reading the publication had some impact on the increase in profitability. Total increase in profitability for these seven producers was between \$3,150 and \$4,700.
- 50% of producers (4 out of 8) indicated that tomatoes were the most profitable crop they grew in a high tunnel.
- The publication *PM-3025 Vegetable Production Budgets for a High Tunnel* drew people in to read it, and they rated the information as moderately useful. Those involved in this project are encouraged to continue to offer tools and information that are relevant in helping high tunnel producers increase profitability.

Introduction

A publication was created to increase the profitability of growing vegetables in high tunnels. *PM 3025 Vegetable Production Budgets for High Tunnels* provides four sample budgets to demonstrate the potential profitability of various crops commonly grown in high tunnels. This tool is designed to help

farmers analyze which crops and cropping systems can be most profitable for them. The publication was distributed at high tunnel workshop, field days, and a 2012 Farm Progress Show exhibit. It is also available free as a download from the Leopold Center for Sustainable Agriculture website and the Extension Value Added Agriculture Website.

The impact of the publication on farmer decision making was assessed through an on-line survey sent to 127 people who participated in a high tunnel workshop and received an electronic or paper copy of the publication. The survey was conducted from September 9-24, 2013, after much of the harvest to capture impacts that publication may have had during the 2013 growing season.

The survey had a response rate of 35%, with a total of 45 usable responses.

Characteristics of survey respondents and their high tunnels

Of the 45 respondents, 57.8% (26) have a high tunnel in production. This is reasonable, given that of the 127 people receiving the survey approximately 30% were ISU staff, NRCS staff, or homeowners who had attended high tunnel workshops for informational purposes only, rather than for the purpose of erecting a high tunnel.

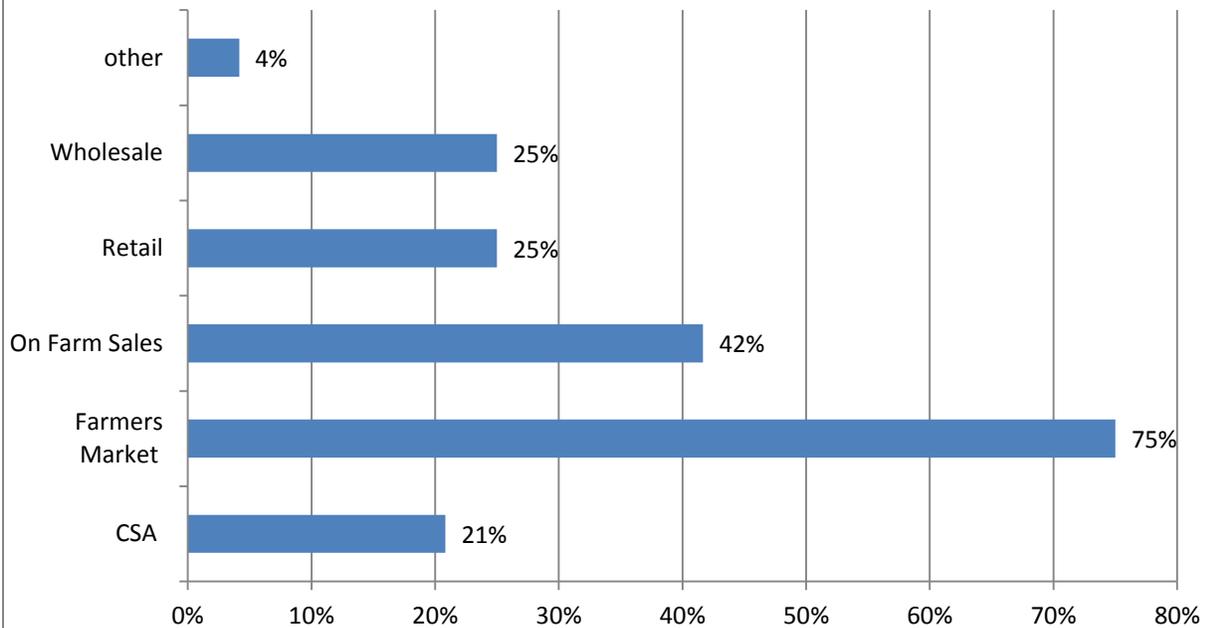
High Tunnel Size

Of the 26 respondents who had a high tunnel, four had a small high tunnel of less than 30 x 72 feet (15%). Nine respondents had a high tunnel of 30 x 72 feet (35%); 13 had a 30 x 96 foot high tunnel or larger or had multiple high tunnels (50%). Therefore, the high tunnels used by survey participants were evenly split between smaller and larger units.

Marketing Channels

Participants were asked through which marketing channels they sell high tunnel products. 8% (2) indicated they have not yet sold products from their high tunnel. Responses from the remaining 24 producers are summarized in figure 1.

Figure 1- Marketing Channels Used by High Tunnel Producers



Note: percentages do not add to 100%, because some producers use more than one marketing channel.

Of those respondents selling products from their high tunnel (n=24), 96% (23) sell high tunnel products through direct marketing, such as community supported agriculture, farmers markets, or on-farm retail.

The most common marketing channel used by respondents was farmers markets, with 18 out of 24 (75%) indicating they sell their products there, followed by on-farm sales, such as a farm stand, with 42% of respondents (10). 21% of respondents (5) sell high tunnel products through a CSA.

25% of respondents (6) wholesale high tunnel products and 25% (6) sell to retailers, indicating that each method of indirect sales is just as common as the other.

Only 4% of respondents (1) sell exclusively through wholesale, while 54% (13) use direct marketing exclusively and 42% (10) utilize both indirect and direct sales methods.

Planning Ahead

83% of respondents (n=18) who had a high tunnel and had read the publication identified which markets they would supply before planning and planting their high tunnel crop. This indicates that the majority of respondents had a plan before they planted crops in their high tunnel, showing a high level of purpose and organization.

Beginning High Tunnel Users

In a question presented only to those who had read the high tunnel publication (n=18), it was found that 59% of respondents (10) with a high tunnel had been operating their high tunnel for two seasons or more. Therefore, 40% had produced in a high tunnel for only one season or less. This indicates that many of the farmers reached by the high tunnel publication were in the beginning stages of using a high tunnel. Therefore, ISU Extension is reaching beginning high tunnel users, which is of particular interest to them.

Results

Percent reading the publication

69% of respondents with a high tunnel (18 out of 26) indicated that they read the publication, *PM-3025 Vegetable Production Budgets for a High Tunnel*. Given the many resources that producers can choose from to inform their decisions, this high rate indicates that the topic of this publication was unique and relevant, thus drawing producers to read it.

Usefulness of information in the publication

Those who read the publication (n=18) were asked to rank the usefulness of the information presented in the publication on a scale from 1 to 5, where 1= not at all useful and 5= extremely useful. On average, respondents rated the publication at 3.2. One in three respondents (6) ranked the publication as useful or extremely useful (a ranking of 4 or 5). This indicates that while the publication drew respondents in to read it, respondents were somewhat neutral when rating the usefulness of the information.

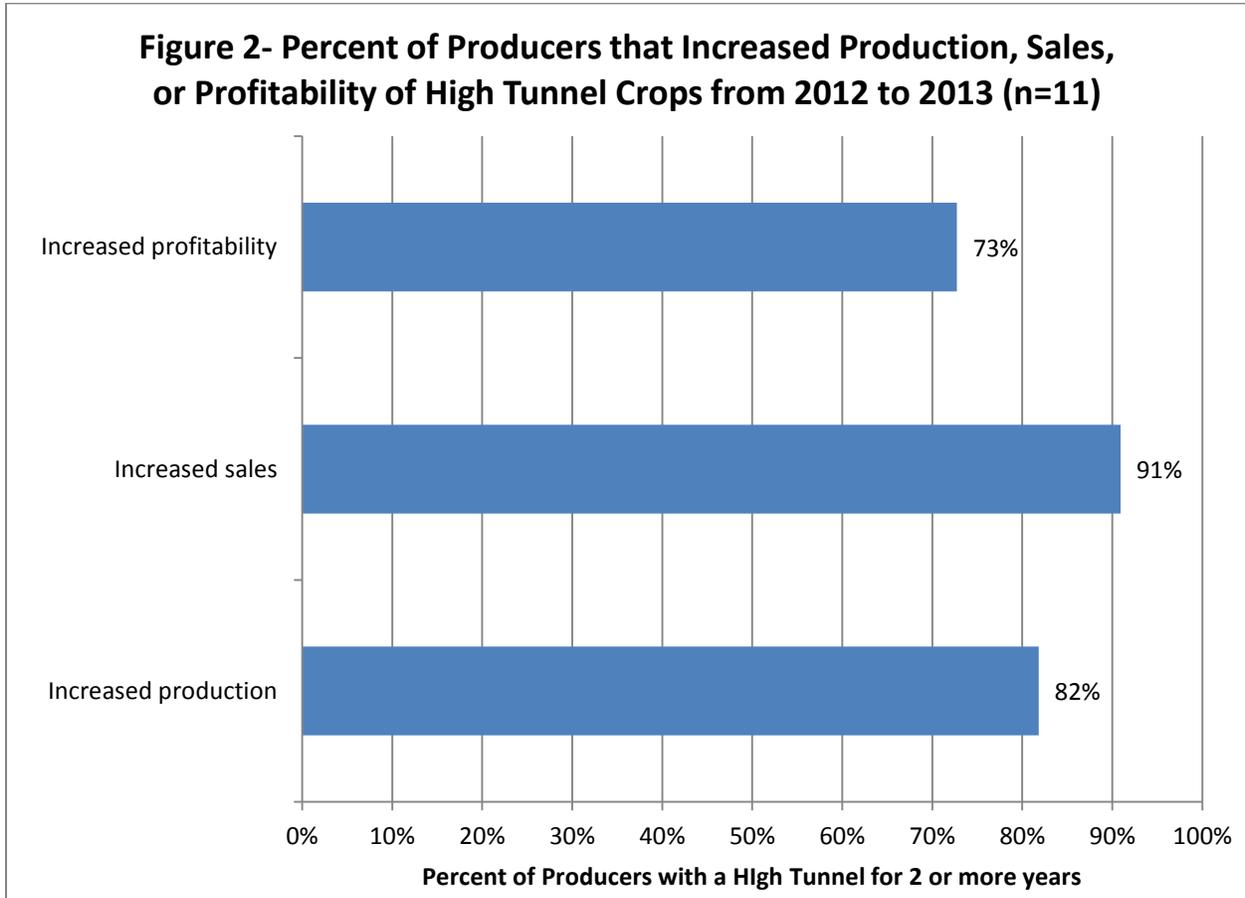
Those who read the publication were also asked to rank the extent to which they agree that the publication prompted them to plant crops that would maximize profitability. A similar scale was used, where 1= strongly disagree and 5= strongly agree. The average score resulting from this question was 3.1. Similar to the previous question, 5 respondents (28%) agreed or strongly agreed the publication prompted them to plant crops that would maximize profit.

These results indicate that while using budgets to increase profitability of high tunnels is of interest to producers, one in three respondents who both read the publication and had a high tunnel said information presented in the publication was highly useful. To improve this ratio, publication authors might be prompted to speak with producers to identify which types of information in the publication might be improved to become more relevant and/or useful.

High tunnel production, sales, and profitability

Questions about high tunnel production, sales, and profitability were presented to those who had been producing using a high tunnel for two seasons or more or who had not indicated the number of seasons for which they had been producing in a high tunnel (n=11).

Results show that the majority of these 11 respondents increased production, sales, and profitability, with 73%, 91%, and 82% of respondents doing so, respectively. This indicates that farmers are improving their operations over time to improve efficiency, reduce costs, and increase profitability. Data from these questions is presented in Figure 2.



Five respondents increased in all three areas: production, sales, and profitability.

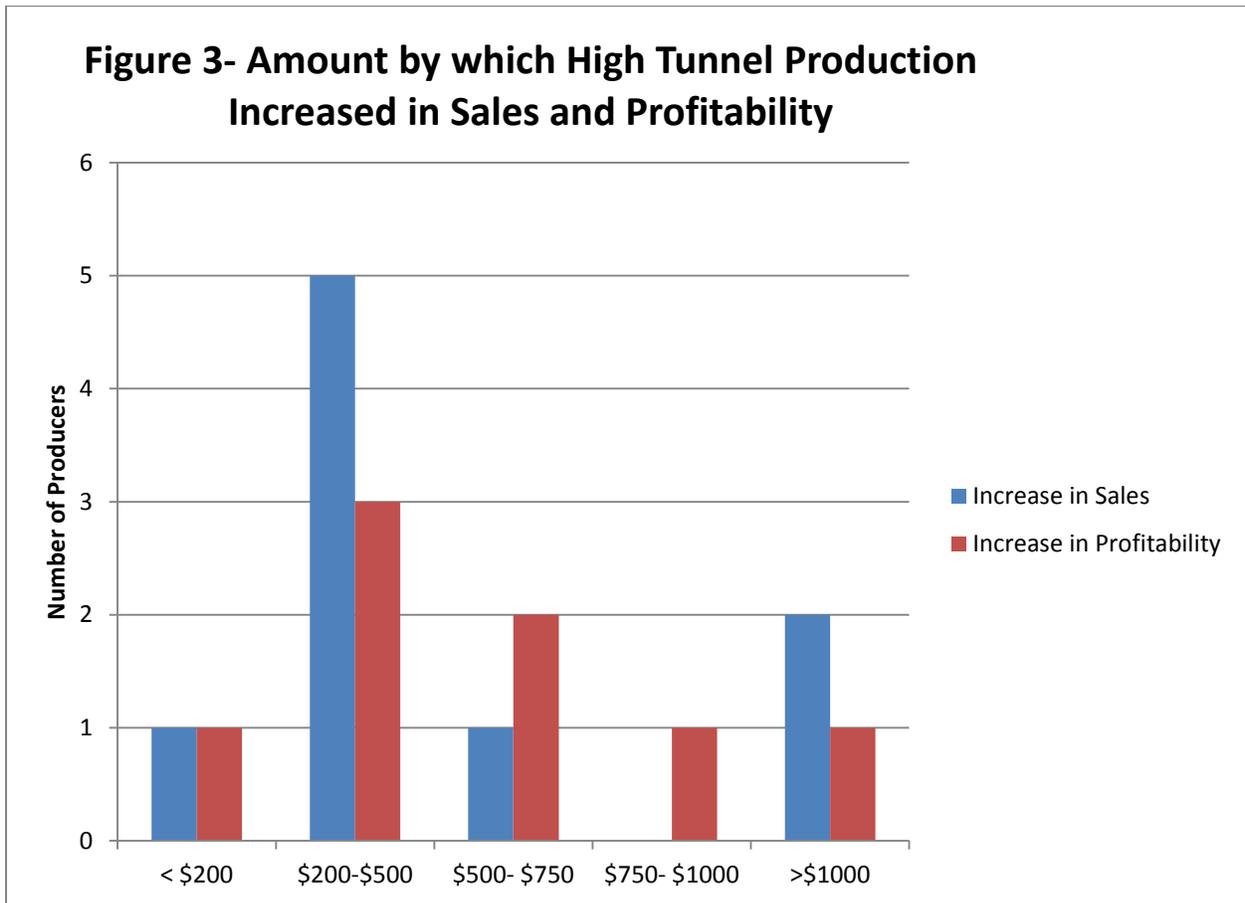
Three respondents indicated he/she had increased production, but did not see an increase in sales and/or profitability. This indicates that increasing production does not always associate with increased sales or profitability.

However, two respondents did not increase production, but did increase sales and profitability. Again, this shows that profitability can increase in ways other than by increasing production.

Respondents also indicated the amount by which sales and profits from high tunnel production had increased. The categories from which farmers could choose were:

- Less than \$200
- \$200 to \$500
- \$500 to \$750
- \$750 to \$1,000
- More than \$1,000

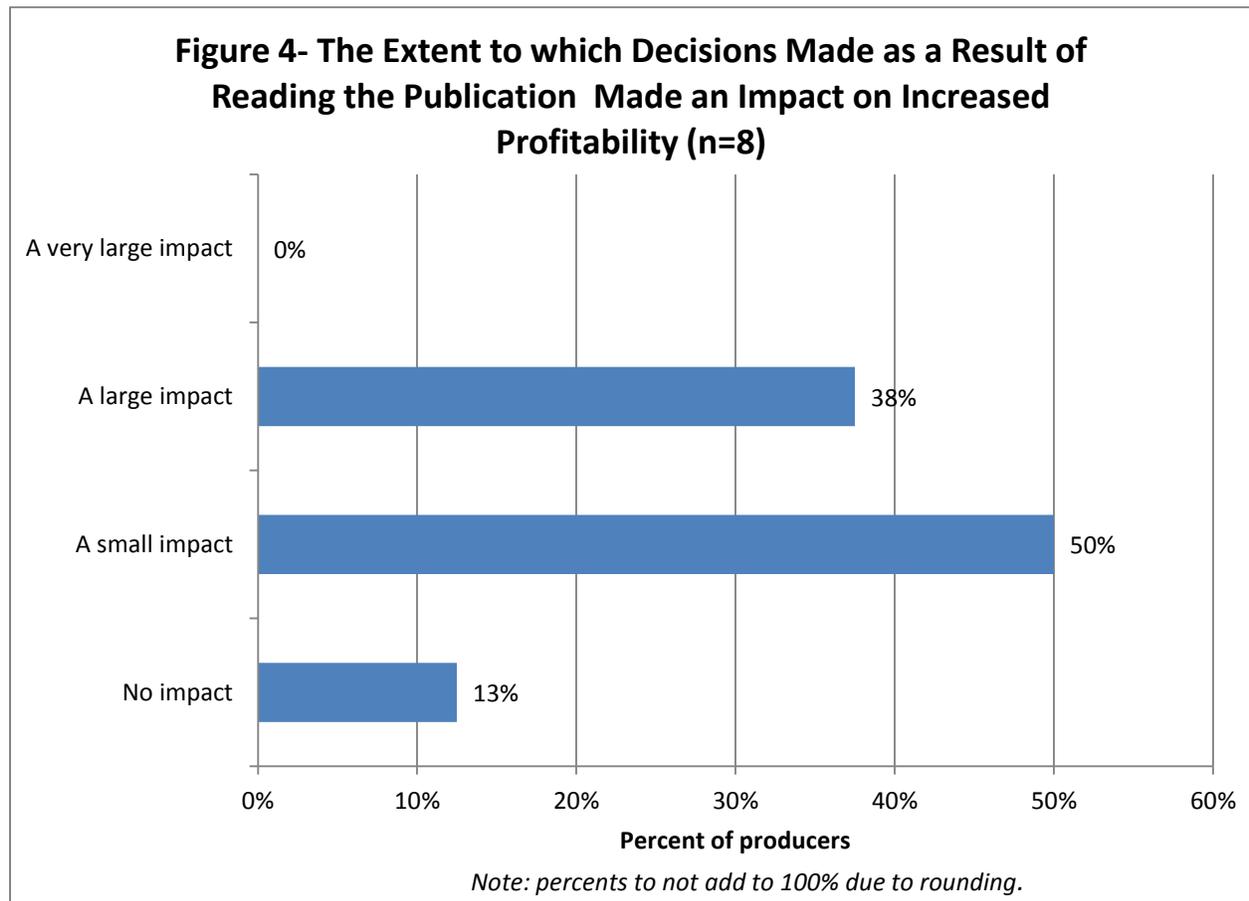
The data are summarized in Figure 3.



The 8 producers who indicated the profitability of their high tunnel production rose from 2012 to 2013 were asked to indicate the degree to which the decisions made as a result of reading PM 3025 led to that increase in profitability. Results are presented in figure 4. 88% said the decisions made as a result of reading the publication had some impact on the increase in profitability. However, no one indicated the decisions made as a result of reading the publication made a very large impact on the increase in profitability. 38% (3) indicated the decisions made as a result of reading the publication had a large impact on the increase in profitability, and 50% (4) said those decisions made a small impact. The total increase in profitability of the seven producers that indicated the manual had some impact was between \$3,150 and \$4,700.

Finally, producers were asked which high tunnel crops were most profitable in 2013. They could list as many as they wanted. Eight producers answered the question. The most common answer was tomatoes, with 50% of producers (4) mentioning it. 25% of producers (2) said the following crops were among their most profitable: arugula, chard, cilantro, kale, lettuce, radishes, and raspberries. Other crops mentioned by one farmer (13%) as most profitable include: beets, mixed greens, spinach, and strawberries.

In conclusion, the publication *PM-3025 Vegetable Production Budgets for a High Tunnel* drew people in to read it. 73% of producers (8) who read the publication and had grown in a high tunnel for at least two seasons increased profitability. 87% of those producers (7) indicated the decisions made as a result of reading the publication contributed to an increase in profitability. However, ratings of the publication were modest. Therefore, researchers involved in this project are encouraged to continue to investigate what tools or information are relevant in helping high tunnel producers increase profitability. Clearly this topic is of interest to producers and relevant ways to reach producers with information to increase profitability should continue to be offered.



Final Performance Report for

Iowa Department of Agriculture & Land Stewardship Specialty Crop Grant

Submitted: June 1st, 2012



www.iowavalleyfood.com

Project Title

Iowa Valley Food Cooperative for East Central Iowa

Prepared by Jesse Singerman and Jason Grimm



Prairie Ventures, LLC

Project Summary

The goal of the project was to establish a direct-to-consumer food co-op for local specialty crops growers in the Iowa Valley Region in East Central Iowa. The Linn-Johnson Local Food Task Force had identified the goal to strengthen the local food marketing campaign and ensure access to healthy seasonal and affordable food for Linn and Johnson County residents in their strategic food system plan. That Task Force identified a feasibility study for new buying clubs, food cooperatives and other business models as a strategy to achieve their goal. This project followed up a local consumer and producer survey that was completed in the fall of 2009 by the Iowa Valley RC&D, Prairie Ventures, and students of the U of I John PappaJohn Entrepreneurial Center. Efforts had included a public informational meeting that was held in Marion March 27th 2010. The meeting resulted in an attendance of 35 growers and buyers and an eight member volunteer steering committee.

The Task Force believed that it is very important to develop the Iowa Valley Food Co-op because it would help diversify market options for local growers and help fill local food access gaps in the region. The food co-op would also fulfill the tremendous demand for local food. Surveys conducted in the fall of 2009 resulted in 168 responses from two survey locations where 69% rated their participation as highly likely. Their top three reasons to participate were to obtain fresh food, support local family farmers, and support the local economy. In a 16 county region in Eastern Iowa 33 producers rated their interest as maybe or definitely interested in a survey conducted in March 2010.

The project was focused on fulfilling the following strategies to establish the Iowa Valley Food Co-op in Eastern Iowa:

- Facilitate the 8 member steering committee
- Complete the Co-ops legal incorporation including by-laws & articles of incorporation
- Examine and adapt operational procedures and organizational structures from Iowa, Nebraska, and Oklahoma Food Cooperatives
- Determine optimal product mix, preferred attributes and sales potential through consumer surveys
- Determine farm eligibility criteria, potential supply (both product mix and quantity)
- Examine needs including processing and storage, inventorying and ordering systems
- Identify and examine potential distribution locations based on criteria including cost, square footage, access, and location
- Develop a products standard for any product that would be sold through the co-op
- Identify and recruit consumer members through existing groups such as buying clubs, churches, and sustainable agriculture and environmental organizations
- Develop a business plan and marketing plan for the Iowa Valley Food Co-op

Project Approach

We established the Iowa Valley Food Cooperative (IVFC), a web-based, direct to consumer, marketplace for food, fiber and other producers in Eastern Iowa. The cooperative uses open-source software to facilitate commercial sales of local food, fiber and other products from its producer members to its consumer members and has been successfully operating since August of 2011.

Principal investigators on the project Jesse Singerman and Jason Grimm oversaw the following project milestones:

- Created, supported and facilitated a steering committee and start-up Board of Directors that guided and advised on the development of the cooperative.
- Began to develop the governance procedures necessary for the perpetuation of the organization, including educating and training the Board in its roles and responsibilities.
- Researched and made decisions needed to complete the cooperative's legal incorporation, including Articles of Incorporation and By-laws.
- Developed a start up business plan, including basic financial projections and communications planning needed to guide the cooperative in 2011.
- Researched, applied and was awarded funding from the Leopold Center for Sustainable Agriculture, Blooming Prairie Foundation and NRCS in the amount of \$52,190 to ensure that non-specialty crop members of the Co-op where covered by funds other than Iowa Specialty Crop Grant funds.
- Installed and modified open source software to support the operations of the cooperative.
- Created a web-site, Facebook page and Twitter account to provide visibility for the organizational effort and to aid in communicating with members and potential members.
- Recruited a critical mass of consumer and producer members to open the cooperative in 2011. As of May 31, 2012 paid-up members of the cooperative stand at 55 Producer Members and 272 Consumer Member households, exceeding our goal for year one.
- Determined IVFC product standards and preferred product attributes for use in recruiting potential producers and consumer members.
- Put in place accounting systems and other recordkeeping systems, such as databases of members needed to run the cooperative.
- Researched state and local licenses, and food safety requirements, necessary to open and run the cooperative.
- Established criteria for the distribution site and equipment needed to open the cooperative.



Example of Given Gardens' - producer profile on IVFC Website

- Researched, visited, and rated 18 potential distribution locations based on established criteria. Recommended final choice to the steering committee.
- Negotiated terms with the final distribution location – First Presbyterian Church in Cedar Rapids.
- Researched and procured equipment and supplies needed to open the cooperative.
- Created and produced member recruitment materials.
- Held 6 open houses to recruit new producer and consumer members.
- Spoke at multiple events about the cooperative, and attended over 15 local Farmer’s Markets to promote the cooperative and recruit members.
- Supervised and assisted in the software upgrade and refresh of the Co-op’s Website in April 2012
- Created a media plan and communication materials needed to inform members, potential members and project partners about the activities of the cooperative.
- Used media effectively to increase outreach, public impact and member recruitment through website blogging, PR releases, photo ops, open events, and media interviews.
- Networked with and visited another similar cooperative (Iowa Food Cooperative), other local foods working groups, and aligned businesses (such as Local Harvest Supply, Frontier Natural Products Cooperative and Kalona Organics) to elicit input, learn and collaborate. (articles attached)
- Promoted producers through the cooperative's website profiles, publicity and member recruitment materials.
- Researched, measured and reported on project outcomes to members, the Board of Directors and funders.
- Led 9 successful distribution cycles from August to May of 2012 with sales, average orders and producer payments increasing each cycle.
- Were at a breakeven in our first four months of operation and either even or ahead in 2012 projections.
- Updated the Co-op’s business plan for 2012 to guide the Co-op, including financial projections
- Conducted our first producer and consumer satisfaction survey in December 2011. Key results are indicated below.



IVFC Website's
www.iowavalleyfood.com

Goals and Outcomes Achieved

| Potential Impacts and Expected Measurable Outcomes | Current status of indicator | Current status of goal |
|--|--|--|
| In year one 30 producer and 100 consumer members will develop a direct relationship. | Membership stands at 32 producer members and 208 consumer households. | Goal achieved |
| An average of \$50 per monthly distribution purchased by each consumer member will result in \$60,000 dollars of sales in the first year returned to the local economy. | Average order size for the November 2011 distribution, the last of 2011 and the fourth distribution since we opened, was \$78.03. | Goal achieved |
| An average of \$50 per monthly distribution purchased by each consumer member will result in \$60,000 dollars of sales in the first year returned to the local economy. | Total sales for the first four months were approximately \$24,100. Sales in November were \$9363, both measures are well above the run rate needed to hit \$60K for 12 months | Goal achieved |
| Increase local specialty crop producers' sales by 15% at the end of year one. | Self report of 16 produce members surveyed in December 2011 shows the increase in sales of local foods above 20% (20%-100%) to be half of respondents or 50%. A significant portion of producers (about 70%) have increased sales more than 10% by joining the co-op. 88% of respondents say that participation in IVFC has increased their sales of local food overall. | We believe that as a group the increase in sales approaches 15%. |
| Increase the percentage of consumer members' local purchase of fruits and vegetables by 20% at the end of year one. | Self-report of 94 consumer members surveyed in December 2011 shows the increase in purchase of local foods above 20% (from 20%- 100%) to be over half of respondents or 53%. Approximately 90% of respondents say that participation in IVFC has increased their purchases of local food overall. | We believe, as a group, the increase for IVFC consumer members to be well above 20%. Goal achieved |
| Local fruit and vegetable sales through the project will equal the USDA average fruit and vegetable (local and non-local production) consumption per capita amount. | | The IVFC software does not allow for this type of analysis thus the Co-op is not able to evaluate orders based on this indicator |

Beneficiaries

The beneficiaries that benefited the most from this project are the specialty crop growers in Iowa that are members of the Co-op and the Co-op's consumer members. This project has developed a new successful outlet for specialty crop growers in the Cedar Rapids metro area year around. The Co-op has also filled a whole in a food desert in downtown Cedar Rapids where fresh, fair and healthy food was not available. In addition to the members of the Iowa Valley Food Co-op the Iowa Food Co-op in Des Moines has benefitted as well. Through numerous phone, email and face to face exchanges both Co-op's have learned a tremendous amount from each other's developments. Sales in the first 9 months of the Co-op exceeded \$57,500. This exceeds the goals of the project to meet \$60,000 within the first year of the Co-op being open.

Lessons Learned

Primary lessons learned during the project included the loss of one Iowa Valley RC&D project team member, due to USDA cutbacks, and the consequent loss of her hours and expertise. Tasks were absorbed by other team members as possible, but it presented an additional, unfunded burden for team members working on the project.

The software package – while freely available and functional for basic tasks– has many issues and may not be suitable as the co-op grows rapidly or wishes to expand into new channels of distribution such as selling to institutions or restaurants. We researched whether to upgrade to a new version of the software, and decided that the time, disruption and cost to the co-op. The upgrade provided a small amount of additional functionality in the newer version but the software still lacks basic functions.

The software performs the basic listing, shopping, pricing and invoicing functions necessary to provide an on-line marketplace for our local producers. However, it does not lend itself to any sort of data analysis, or even upgrades, and will have to be replaced as the co-op grows. It is both time consuming to use and difficult to manipulate and represents a significant weakness in the system.

It also took longer to find a distribution location than anticipated. It took persistence and networking to get responses from potential sites and to locate one that would work. It was also hard to predict the rapid growth that the Co-op was going to have thus we have already outgrown the refrigeration and frozen capacity we opened with and will need to add additional equipment in the spring. We will also need to move to a new distribution center in the next six months as the Co-op grows.

It took many hours of volunteer labor to get the cooperative up and running. Even with the grant funding help we had many hours of unpaid labor were required.

Contact Person

Jason Grimm
Iowa Valley RC&D - Food System Planner
319.622.3264 or jason@ivrccd.org

Jesse Singerman
Prairie Ventures – Owner
319.338.1874 or jesse.singerman@mchsi.com

Additional Information

Future project plans

By the end of 2012 we will capture best practices and stumbling blocks in a case study in order to document how this model can be replicated statewide and linked with other similar entities. In addition, the cooperative will be leveraged to develop and provide needed producer training and to research the potential for additional producer cooperatives.

We are analyzing the results of our first customer satisfaction survey and anticipate making changes in operations, expanding to a new distribution location and researching establishing an additional drop-site in Iowa City as likely goals for 2012.

We are pleased with the progress of our project and working hard to capitalize further on the gains we have achieved in the Co-op's operations. We are particularly pleased with the results of a question asking consumer survey respondents how likely they would be to recommend IVFC to others. This score is known as the Net Promoter Score (NPS) and it is widely used in industry to evaluate the performance of a company and potential for growth. The score also indicates whether customers have an emotional bond with the company which can translate into increased sales.

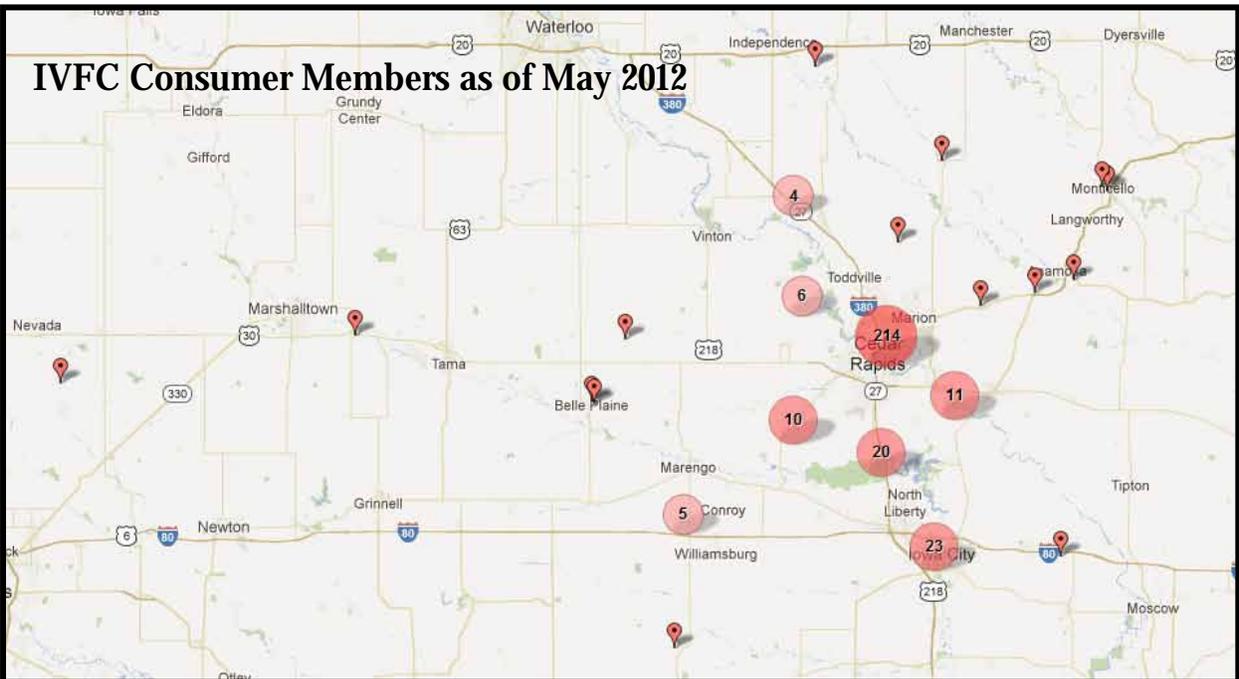
IVFC's NPS from consumers is extremely high at 85%; the Net

Promoter Score from Producers was also very high at 75%; both speak to the high regard and enthusiasm that members currently have for the co-op.

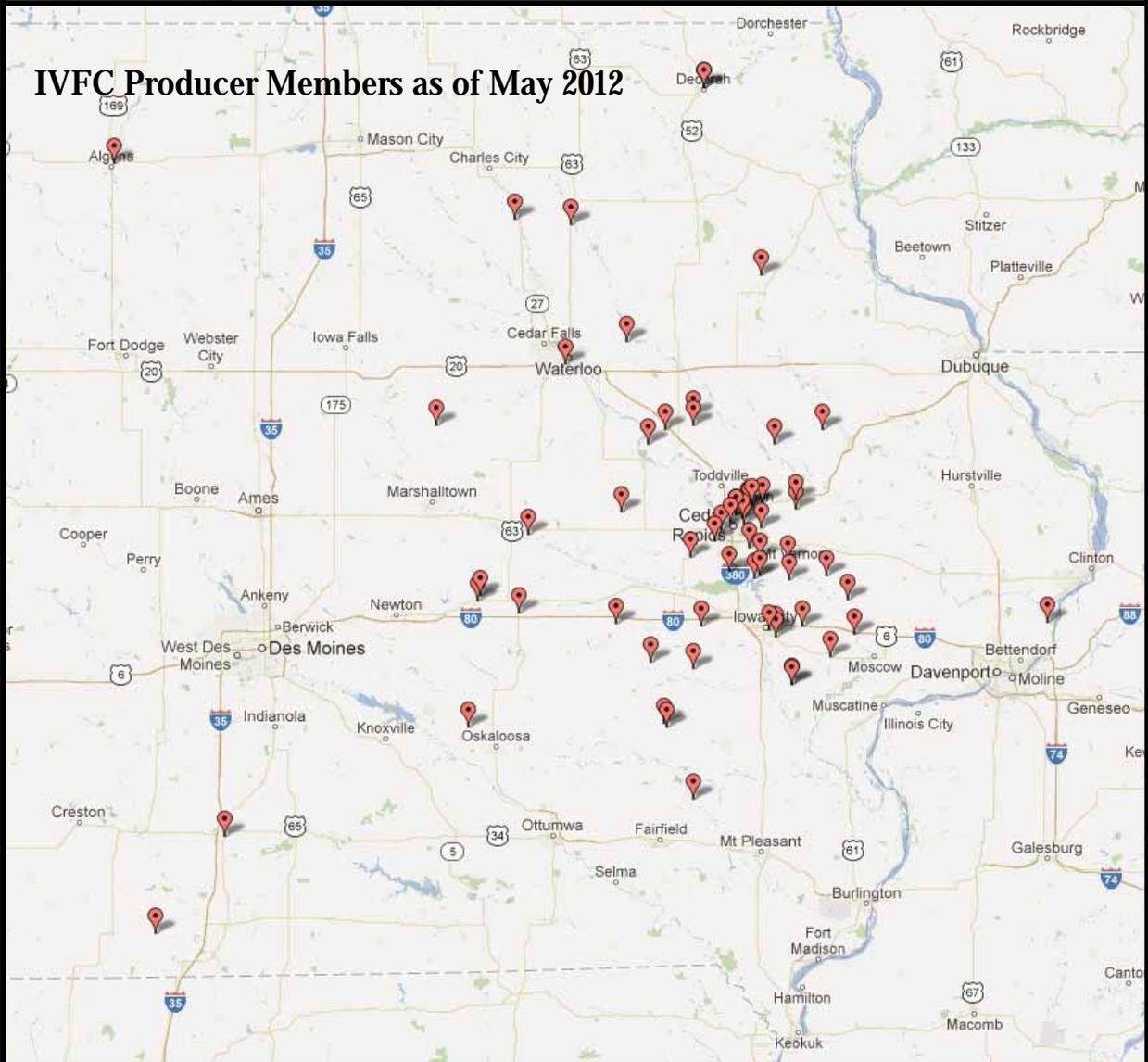
In addition, here are the top three words used to describe IVFC by the consumers and producers filling out our December 2011 satisfaction survey.



IVFC Consumer Members as of May 2012



IVFC Producer Members as of May 2012





Co-op volunteers distribute food to members

Cultivating the local food ecosystem

Co-op connects producers with customers

By Nick Bergus
Photos courtesy of Iowa Valley Food Co-op

Like many small family farms, Rapid Creek Ranch doesn't make enough money year round to be the sole occupation of its stewards. Doug Darrow and his stepson Justin Wade both hold full-time jobs off the farm to make it through the slow months. It makes for long days when there are cows to move and chickens to tend and eggs to collect on top of a regular workday.

But the Iowa Valley Food Co-op, which started selling locally produced meats, eggs and produce online in August and is attracting consumers and producers from in and around Cedar Rapids and Iowa City, is helping to change that.

"Our biggest problem with the co-op right now is meeting demand," says Mr. Wade. The demand for Rapid Creek Ranch's beef convinced the two, who sit on the co-op's volunteer board, to add chickens to the farm. The co-op offers a steady enough market that

Mr. Wade plans to leave his job working on hardwood floors this spring to be on the Oxford farm full time.

One of the co-op's main goals is to strengthen the local food ecosystem and it seems to be accomplishing that by offering a centralized place for local buyers and sellers to interact.

The Iowa Valley Food Co-op works like an amalgam of a buyers' club, a farmers' market and Amazon.com. Producers apply to sell through the co-op's web site, agree to disclose their production methods to buyers and have their farms scrutinized. Buyers browse producers' goods online and make orders for pick up once a month. Producers and consumers pay annual fees and a percentage of their transactions to the co-op. The co-op approves purveyors as well as organizing, and providing facilities and labor for, the monthly food distributions.

"It's the best of what you get at farmers' markets," says Jesse Singerman, who helped found the co-op. "You get an emotional bond with the people you buy

your food from as well as the transactional relationship."

In the first four months the co-op has sold food (it didn't make deliveries in December), it has seen the average order grow from about \$30 to nearly \$80. More than 250 consumers have joined in that time, and it already is in the black. And because producers are managing their own virtual store fronts, it leaves co-op volunteers to monitor production methods instead of inventory.

But as the co-op heads into its first full growing season, Ms. Singerman says she'd like to see more aggressive growth and has goals to nearly double the number producer and consumer members of the co-op.

The co-op is still focused on Cedar Rapids because there are fewer outlets at that end of the Corridor and thus higher customer demand. While it is already starting to outgrow the space at First Presbyterian Church in Cedar Rapids that it uses to collect and dis-



perse orders, and she would like to find a distribution point in Iowa City, Ms. Singerman says the plan is to expand deliberately, when the co-op has the volunteers and capital to support it.

So Ms. Singerman and the other volunteers with the Iowa Valley Food Co-op continue to carefully cultivate their small part of the local food ecosystem, and hope that it continues to grow. Q

Get the home of your dreams!

1-800-445-5725
hillsbank.com
Member FDIC

Consider Hills Bank and Trust Company

Cedar Rapids. Mary Jo, Mike, Heidi, Amy
Coralville. EmmyLou, Tammy, Sherry
Iowa City. Kevin, Chris, Ben, Matt
Kalona. Lori, Marion, Peggy, Patty
Mount Vernon. Stephanie
North Liberty. Todd

EQUAL HOUSING LENDER

Lucky the longer that you've been a Business by means of us.

photo by Mark Trade

CELEBRATING 20 YEARS IN THE MUD
CAMPBELL STEELE GALLERY
MARION UPTOWN DISTRICT

FINE ART
LIVE MUSIC
EXCELLENT WINE
WONDERFUL PARTIES

WWW.CAMPBELLSTEELE.COM

Food co-op connects producers, consumers

10:47 PM, Aug. 28, 2011|

A new initiative in the Iowa City/Cedar Rapids area is bringing consumers even closer to their food sources.

Iowa Valley Food Cooperative, which opened Aug. 1, is a web-based direct-to-consumer cooperative of producers and consumers that allows buyers to choose exactly what they want from farmers.

It's a little bit like a farmers market and a little bit like a CSA, organizer Jason Grimm said, but the difference is that consumers can pre-order specific products and pick them up at a designated time each month.

"Our mission is to increase the availability of fresh, fairly priced, sustainably produced food in Eastern Iowa," said Grimm, 25, who also works for the nonprofit organization Iowa Valley RC&D and trains beginning farmers.

The idea for the co-op came from a 2009 study that Grimm and co-organizer, Jesse Singerman of Prairie Ventures LLC, conducted during a joint project with a University of Iowa student group. More than 70 percent of the survey's respondents said they were interested in a buying club cooperative such as IVFC. The co-op format is based off of the Oklahoma Food

Cooperative and the Iowa Food Cooperative in Des Moines, Grimm said, which has acquired 700 members in three years.

The IVFC already has more than 100 members signed up to receive goods from 25 local farm members in its first month of operation, Grimm said.

Pick-up occurs once a month at First Presbyterian Church in Cedar Rapids, but they hope to increase the number of pick-up times and sites in the future.

Grimm said members pay a \$25 initial membership fee and \$10 a year to keep their memberships. The co-op receives 10 percent of the farmers' sales, and the consumer pays a 10 percent markup to share the risk. The proceeds go back to paying for IVFC's operations, Grimm said, but the "goal is to keep those costs at a minimum" so farmers and consumers can get the biggest bang for their buck.

"It helps fill another gap for people who want to buy local," Grimm said. "For local

Advertisement

**Protect Your Home
with ADT!**

ADT AUTHORIZED DEALER

[Click Here
to Learn More!](#)

Print Powered By FormatDynamics™

press-citizen.com

producers, they're guaranteed today's (sale). ... At a farmers market, they set up at 6 in the morning and work until noon and aren't guaranteed how much they'll sell."

Singerman, 64, said her goal is to encourage those who are interested in becoming part of the food industry to join as a producer.

"Many (of our producers) are just starting," she said. "Some are local bakers, some make jams and jellies. ... The farmers market is a tremendous outlet for that initiative, but we have a good base built here."

The co-op's grand opening will be Sept. 21; Singerman and Grimm hope to establish a strong network of producers and consumers between now and then, as well as explore new distribution sites, including one in Iowa City.

"The hope for the co-op is to help build a sustainable and financially viable future for farmers in the local region," Singerman said. "(We want) to help continue to invite consumers to get more involved in agriculture by learning more about the food system and being active participants, meeting growers and knowing where their food comes from."

IOWA VALLEY FOOD COOPERATIVE

- » Organizers: Jason Grimm and Jesse Singerman.
- » Opened: Aug. 1.
- » Address: 920 48th Ave., Amana.
- » Phone: 622-3264
- » Website: <http://www.iowavalleyfood.com>

[Get Listed Here](#)

Ads by Pulse 360

Master Project Management

Prepare Now for PMP Certification 100% Online Education - Apply Today
VillanovaU.com/ProjectManagement

Mortgage Rates Hit 2.75% (3.1% APR)

If you owe under \$729k you probably qualify for the Govt Refi Program.
www.MortgageRatesExperts.com

Free Credit Score From All 3 Bureaus

View your latest Credit Scores from All 3 Bureaus in 60 seconds for \$0
FreeScoreOnline.com

Advertisement

**Protect Your Home
with ADT!**

ADT AUTHORIZED DEALER

**Click Here
to Learn More!**

Print Powered By FormatDynamics™

Waiting to be unveiled



Jim Slosiarek photos/The Gazette

Laura Krouse uses a hoop house to grow produce at her Abbe Hills Farm in Mount Vernon. Krouse is growing lettuce, arugula, spinach and other greens.

New food co-op planned for Corridor; aims to start by June

By Cindy Hadish
The Gazette

Local foods will move beyond farmers markets when a new co-op comes to fruition in Eastern Iowa.

The Iowa Valley Food Cooperative, based in Cedar Rapids and Iowa City, plans a web-based system for farmers to offer fresh produce and other food to sell to co-op members.

Jason Grimm, food system planner for Iowa Valley Resource Conservation & Development, which is jump-starting the project, said the co-op is not intended to replace farmers markets or community supported agriculture, known as CSAs.

"This will improve the diversity of markets for our local producers," he said. "I see the co-op as another opportunity for those producers."

Grimm said the goal is to have the year-round co-op operating by June.

The co-op stems from more than two years of work by the Linn/Johnson Local Food Task Force, now known as the Iowa Corridor Food and Agriculture Coalition.

Issues that brought the group together included obesity, fuel prices — local foods don't have to be shipped as far — and food security, in having avail-

On the Net



See the Iowa Valley Food Co-op's page on the Iowa Corridor Food and Agriculture Coalition's website: www.iacorridor-localfood.org

- A new site will soon be available at www.iowavalleyfood.com
- Potential producers or members can contact Jason Grimm, Food System Planner for the Iowa Valley RC&D, at jason@ivrcd.org or (319) 622-3264 or Jesse Singerman of Prairie Ventures LLC at jesse.singerman@mchsi.com or (319) 338-1874.
- On Facebook, see www.facebook.com/iowaValleyFoodCoop

able supplies and guarding against potential attacks on the system.

Linn and Johnson counties are at the core of the region, which also includes Iowa, Benton, Tama, Poweshiek, Washington, Cedar and Jones counties. Grimm said producers likely will come from those areas, but could extend beyond that.

The group is patterned after food co-ops in Oklahoma and Des Moines. The Des Moines co-op, launched in 2008, has more than 400 members and sells thousands of dollars of locally pro-



A sign for Laura Krouse's farm is affixed to the side of a barn.

duced meat, vegetables, fruit, honey, baked goods and other items monthly.

This would be just the second such co-op in Iowa. The co-op differs from Iowa City-based New Pioneer Food Co-op, a member-owned grocery.

Organizers in December will actively recruit farmers and other producers and seek distribution points in Cedar Rapids and Iowa City.

Sites need to have space for sorting, coolers and shelves, Grimm said, noting that Merle Hay Mall donates space for the Des Moines cooperative.

Here's how the system will work:

Farmers set their prices. The co-op charges the producers 10 percent of their sales and another 10 percent from customers to cover the cost of utilities, staff and equipment.

It's up to the producers to post items online that are available each week. Even backyard gardeners are welcome to sell their

produce, Grimm said.

Using an online shopping cart, co-op members select items to purchase, from as many or as few producers as they wish.

Members pay online or at the pickup site. The co-op pays the farmers.

Volunteers will sort orders on the morning of pickup days to make available for customers in the afternoon.

"The co-op never owns the product," Grimm said. "They just create the transaction."

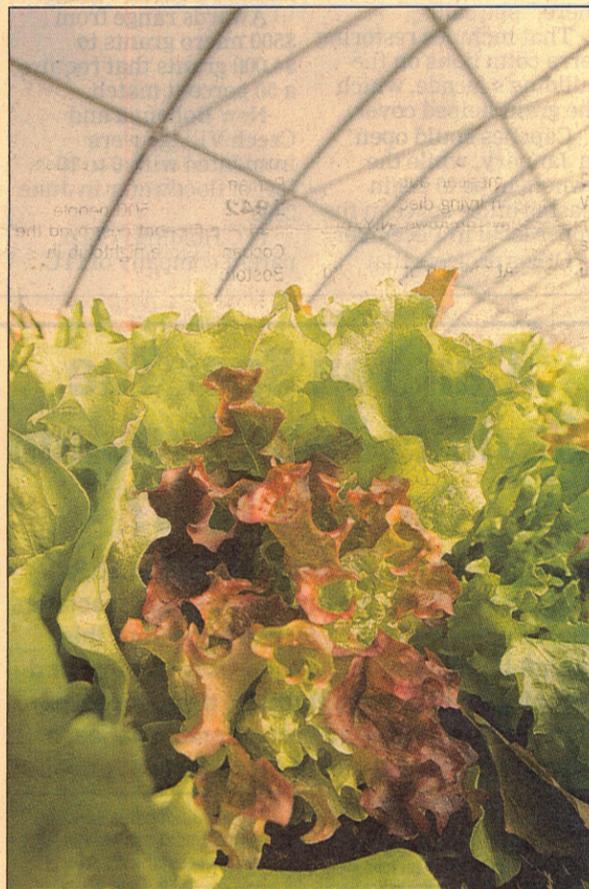
Members will be charged a one-time fee: \$25 for consumers and \$75 for producers. Grimm hopes to have 20 producer members and 100 consumers the first year.

Laura Krouse, owner of Abbe Hills Farm in rural Mount Vernon, is contemplating joining.

Co-ops are a good option for CSA growers after the CSA season ends, she said, noting that more farmers are using hoop houses and other means to extend the season.

"You could move a lot of vegetables with a small amount of logistical maneuvering," she said.

■ Comments: (319) 398-8428; cindy.hadish@sourcemedia.net



Lettuce grows in the hoop house at Laura Krouse's farm on Nov. 23 in Mount Vernon.



Posted September 21, 2011

Homegrown: Iowa Valley Food Co-op's grand opening

Cindy Hadish/SourceMedia Group

[Buy this photo](#)



Vendors and guests chat and share food samples during the grand opening of the Iowa Valley Food Co-Op at the First Presbyterian Church in downtown Cedar Rapids on Wednesday, Sept. 21, 2011. More than 30 producers contribute their goods to the co-op, ranging from meats to ice cream and clothing. (David Scrivner/SourceMedia Group)

CEDAR RAPIDS – The Iowa Valley Food Co-op announced its first board of directors during a grand opening Wednesday, Sept. 21.

The event featured samples from many of the producer members of the new co-op, an online system that allows members to order fresh produce, meats, cheese and other items from local sources.

Cheryl Guritz, of Frog Hollow Farm in Walker; Mark Armstrong of Acoustic Farms in Springville and Dora Bopp of HACAP in Cedar Rapids will serve on the board, along with members Doug Darrow of Rapid Creek Ranch of Oxford; Scott Koepke of New Pioneer Co-op in Iowa City and Jesse Otter of Cedar Rapids.

Members of the co-op pick up their monthly orders from First Presbyterian Church, 310 Fifth St. SE. where the grand opening was held.

One option that won't be available will be the award-winning cheese from Acoustic Farms.

Armstrong and his wife, Barbara Grant, have decided to leave the time-consuming dairy business and sell their registered Jersey cows.

Grant said the couple will sell cheese at the next two Saturday farmers markets in Iowa City.

Cheese curds are also available from Hy-Vee and other local stores, but once it's gone, it's gone.

Armstrong said the dairy operation gave little time for the couple's garden, chickens and other endeavors on their farm.

Acoustic Farms was one of just four "micro dairy" or farmstead operations in Iowa that use milk for cheese solely from their own cows.

Cheese is available from Iowa Valley Food Co-op from other sources, including goat cheese from Brenneman Farmstead Cheese near Parnell.

FYI:

Members can still join the Iowa Valley Food Co-op at www.iowavalleyfood.com

- [5](#)
- [Share](#) [3](#)
- [Print](#)
- [Email](#)

IV Food Co-op links producer, consumer

By MELINDA WICHMANN
mwichman1@dmreg.com

As the trend toward becoming a “locavore” — someone who eats locally grown and prepared foods — becomes more popular, finding safe, fresh, local food sources is becoming increasingly important to Americans.

Now, Iowa County area residents have another opportunity to do just that. The Iowa Valley Food Co-op opened for business Monday, Aug. 1. The Web-based cooperative is made up of producer members and consumer members, nearly all of whom are from eastern Iowa. All products are grown in Iowa.

Currently, the co-op includes 24 producer members and 80 consumer members. It is modeled on a similar organization, the Iowa Food Cooperative, in Des Moines, as well as the Oklahoma Food Cooperative. The Des Moines co-op was formed about three years ago and currently has about 700 consumer members and 60 to 80 producer members.

Iowa Valley Food Co-op producer members pay a one-time fee of \$75 which allows them to list their products, prices and production practices on the co-op’s Web site, www.iowavalleyfood.com. Consumer members pay a one-time fee of \$25 which allows them to place orders for the products listed on-line. Businesses can join for a \$100 membership.

When a monthly order cycle closes, the produc-

ers are sent information regarding who ordered what products. The producers then upload weights of products that can vary (such as beef roasts, whole chickens, etc.) and prices are finalized. At this time members can pay for their orders online or later when they pick it up.

Producers deliver the on-line orders each month to the co-op’s current distribution site at First Presbyterian Church, 310 Fifth St. SE, in Cedar Rapids.

The first distribution was held Aug. 17. Future distribution dates are Sept. 21, Oct. 19 and Nov. 16. Producers deliver the pre-ordered products to the site from noon to 3 p.m. Perishable items are stored in freezers or refrigerators. Customers pick up their orders from 4 to 7 p.m. Additional pick-up sites may be added in the future, as the co-op expands.

BENEFITS

One of the biggest benefits of buying food through a local co-op is the ability to purchase fresh food that hasn’t traveled thousands of miles before it reaches your family’s table. It supports local farmers and links consumers directly to the local farmers producing the food.

The co-op’s goals include improving access to healthy, seasonal and affordable food in the Cedar Rapids and Iowa City region, and of supporting local farmers and local food entrepreneurs.

Their Web site states, “We believe that by



supporting local producers and improving the distribution of local products, we can also increase access to healthy, nutritious, affordable food for consumers in our region.

“In addition, Iowa Valley Food Cooperative exists to support and develop existing local producers; to support and develop new farmers, including non-traditional farmers such as urban farmers; and convert more acreage to regional food production.

“The cooperative seeks to build linkages, partnerships and business relationships with other sustainable, local and regional food system participants.”

Products available from Iowa Valley Food Co-op producers include frozen meats, eggs, vegetables, dairy products and baked goods. Non-food items include soaps, lotions, cleaning products and cloth

diapers.

A complete listing of the producer members and their products can be found at www.iowavalleyfood.com. A link for each producer additionally lists product types, information about the producer and their animals, a complete listing of their products for sale, ingredients and their farming practices. A link to the producer’s Web site is also included, when available.

In order to sell through the co-op, producers must obtain certain licenses, such as an egg handler’s licence from the Iowa Department of Inspections and Appeals for selling eggs, or a Grade A Dairy License for selling milk or a Grade B Dairy License for products like cheese, sour cream or butter.

Farmers must also disclose their growing practices. Several of the Iowa Valley producers

offer certified organic products while others raise organic meats but since there are no certified organic meat processing plants in Iowa, the meat cannot be labeled organic after processing.

Although the co-op doesn’t have a home office, it is currently housed in the office of Jason Grimm at Iowa Valley Resource Conservation and Development, Amana.

Grimm, an Iowa County native, was instrumental in launching the project, along with Jesse Singerman, Prairie Ventures LLC. A grant paid for them to get the project up and running after a series of surveys showed a 76 percent interest in the concept of a food co-op in the area. The surveys were conducted in November 2009 in a joint project with the University of Iowa student group from the John Pappajohn Entrepreneurial Center.

After realizing the demand in this region for sustainably produced, local food — food produced with sound environmental practices, fair economic relationships, and concern for social impact, co-organizers Grimm and Jesse Singerman, Prairie Ventures LLC, began building the foundation for the Iowa Valley Food Co-op.

FUTURE

The future of the co-op is bright and filled with options.

A joint venture with the Des Moines co-op is a possibility, Grimm

notes. This would allow local co-op members to take advantage of additional products and, in turn, expand the Des Moines producers’ ability to sell product to a wider market.

Another potential future project is partnering with a retail outlet to provide a permanent home office and distribution site for the co-op.

“Having a retail site brings high overhead,” Grimm explains. Being able to share a facility would be ideal. Since there has been talk about a year around farmers’ market in Cedar Rapids, he would like to explore the potential of sharing a site with it.

Right now, the co-op pays rent for the distribution site space they occupy at First Presbyterian Church. Money for rent, as well as for insurance and the purchase and maintenance of freezers and refrigerators, comes from a 10 percent fee added to the farmers’ sales and the consumers’ purchases.

Grimm is optimistic about the launch of the co-op.

“The goal for the first month was \$1,200 in purchases, based on a \$25 average purchase by members,” he said in an interview before the first on-line order deadline had been reached. “So far, it looks like we’re running above that goal.”

“The Web site does a lot of the work,” Grimm notes, “and social media has been great for advertising.”

THIS WEEK'S BUSINESS NEWS IN REVIEW

Every Monday, we'll publish a summary of Press-Citizen business headlines from the past week. Have these headlines, and links to the full stories, delivered to your email inbox every Monday. Go to press-citizen.com/newsletters to sign up.

Airport receives \$1.2M

grant (Aug. 26) The Iowa City Municipal Airport will receive a major upgrade thanks to a \$1.2 million federal grant that could make the facility more accessible to a larger number of airplanes. The airport will use money from the U.S. Department of Transportation and Federal Aviation

Administration to construct a new 5,000-foot-long taxiway parallel to an existing runway.

Verizon plans Sept. launch for 4G network in Iowa City

(Aug. 26) Verizon Wireless's 4G Long Term Evolution network will soon be available for the company's Iowa City and Coralville customers. This week, Seamus Hyland, president of Verizon Wireless' Great Plains Region, announced the company would launch its 4G LTE network Sept. 15 in Iowa City.

U. Heights' project scaled back

(Aug. 25) Continued public backlash and the refusal by the Johnson County Board of Supervisors to support a public financing deal has forced the developer of a nearly \$50 million condominium and commercial project along Melrose Avenue to scale back plans.

Business wants TIF for bowling alley

(Aug. 24) A pair of local business partners aims to build a bowling alley and family entertainment center on the western edge of Coralville, and they are seeking city financial help to do so. Steve Schmitt of Coralville, who owns property on Westcor Drive off Highway 6, said he and partner Bob Miller of Hills are planning to build a 42,000-square-foot facility featuring a 24-lane bowling alley, sports bar, arcade and two-level laser tag area.

IN PROFILE | IOWA VALLEY FOOD COOPERATIVE

Food co-op connects producers, consumers

By Stephanie Wise

Iowa City Press-Citizen

A new initiative in the Iowa City/Cedar Rapids area is bringing consumers even closer to their food sources.

Iowa Valley Food Cooperative, which opened Aug. 1, is a web-based direct-to-consumer cooperative of producers and consumers that allows buyers to choose exactly what they want from farmers.

It's a little bit like a farmers market and a little bit like a CSA, organizer Jason Grimm said, but the difference is that consumers can pre-order specific products and pick them up at a designated time each month.

"Our mission is to increase the availability of fresh, fairly priced, sustainably produced food in Eastern Iowa," said Grimm, 25, who also works for the nonprofit organization Iowa Valley RC&D and trains beginning farmers.

The idea for the co-op came from a 2009 study that Grimm and co-organizer, Jesse Singerman of Prairie Ventures LLC, conducted during a joint project with a University of Iowa student group. More than 70 percent of the survey's respondents said they were interested in a buying club cooperative such as IVFC. The co-op format is based off of the Oklahoma Food Cooperative and the Iowa Food Cooperative in Des Moines, Grimm said, which has acquired 700 members in three years.

The IVFC already has more than 100 members signed up to receive goods from 25 local farm members in its first month of operation, Grimm said.

Pick-up occurs once a month at First Presbyterian Church in Cedar Rapids, but they hope to increase the number of pick-up times and sites in the future.



Tammy Walkner, center, of Solon hands meat to Sadie Walkner, left, as Iowa Valley Food Cooperative producer/member Ann Franzenburg holds a crate Wednesday at First Presbyterian Church in Cedar Rapids. MATTHEW HOLST / IOWA CITY PRESS-CITIZEN

IOWA VALLEY FOOD COOPERATIVE

- » **Owner:** Jason Grimm and Jesse Singerman.
- » **Opened:** Aug. 1.
- » **Address:** 920 48th Ave., Amana.
- » **Phone:** 622-3264
- » **Website:** www.iowavalleyfood.com.

Grimm said members pay a \$25 initial membership fee and \$10 a year to keep their memberships. The co-op receives 10 percent of the farmers' sales, and the consumer pays a 10 percent markup to share the risk. The proceeds go back to paying for IVFC's operations, Grimm said, but the "goal is to keep those

costs at a minimum" so farmers and consumers can get the biggest bang for their buck.

"It helps fill another gap for people who want to buy local," Grimm said. "For local producers, they're guaranteed today's (sale). ... At a farmers market, they set up at 6 in the morning and work until noon and aren't guaranteed how much they'll sell."

Singerman, 64, said her goal is to encourage those who are interested in becoming part of the food industry to join as a producer.

"Many (of our producers) are just starting," she said. "Some are local bakers, some make jams and jellies. ... The farmers market is a tremendous outlet for

that initiative, but we have a good base built here."

The co-op's grand opening will be Sept. 21; Singerman and Grimm hope to establish a strong network of producers and consumers between now and then, as well as explore new distribution sites, including one in Iowa City.

"The hope for the co-op is to help build a sustainable and financially viable future for farmers in the local region," Singerman said. "(We want) to help continue to invite consumers to get more involved in agriculture by learning more about the food system and being active participants, meeting growers and knowing where their food comes from."

The Salt

Virtual Trip To 'Local' Food Market Can't Beat The Real Thing Yet

02:54 pm

October 14, 2011

by JORDAN CALMES



Bart Sadowski/Stockphoto.com

The regular old supermarket is still king for choice, price and convenience

Farmers' markets, food cooperatives and community supported agriculture (CSA) groups have been all the rage among foodies looking for locally grown, organic or specialty foods for the past few years, even though they've existed far longer than the [modern supermarket](#).

But the new businesses aren't sticking to bricks and mortar traditionalism. In recent years, these grocery store substitutes have [exploded](#) on the Internet, offering far-flung consumers more choices than ever.

But so far, none of them have found the magic combination of choice, convenience, and price that will make local and sustainable agriculture competitive with the grocery store, says [Parke Wilde](#), associate professor at the Friedman School of Nutrition Science and Policy at Tufts University.

"It still has something to prove," Wilde says of the new business model.

The web-based services vary widely in their particulars. Some allow farmers to set up a profile and interact with customers directly by managing their own inventory and setting their own prices, while other sites never name the producers behind their inventory. An online food co-op might only sell food produced within a 100-mile radius of the town it serves, or it may offer bananas and coffee alongside its blueberries and maple syrup.

The online services do offer wide variety and avoid the major disadvantage producers face at farmer's markets, like figuring out how much inventory to bring.

The [Iowa Valley Food Cooperative](#) (IVFC), based in Cedar Rapids opened its virtual doors in August 2011. "The main inspiration was to develop a new opportunity for local producers," says co-founder and manager Jason Grimm.

IVFC focuses its efforts on small farms and unique foods being raised within a hundred-mile radius of Cedar Rapids. In addition to ground beef and Russet potatoes, customers can order elk brisket and Bavarian purple garlic, all from state-licensed farmers who have also met specific requirements set by the co-op's bylaws.

Grimm says members of IVFC are "able to know directly who they're buying from." He pointed out that at many food co-ops, the majority of the merchandise is not

locally produced.

"This type of model has a lot of great opportunities with it," Grimm said. "It allows us to reach out to more communities." In particular, IVFC is working to expand into local [food deserts](#), the type of communities that may not be able to support a grocery store, let alone a specialty co-op.

IVFC is also working with the state's Supplemental Nutrition Assistance Program (formerly the Food Stamp Program) so that lower-income families can participate in the co-op. At the moment, the organization has a single pickup point in Cedar Rapids one day a month, so it's not quite a grocery store replacement at this point.

Overall, grocery stores are a [\\$560 billion business](#)

So while alternative marketplaces keep multiplying, the sheer difference in scale is part of what keeps them from being competitive with a chain grocery store.

For instance, the Department of Agriculture reported a 17 percent increase in the number of farmers' markets between 2010 and 2011. Their [Farmers' Market Search](#) currently lists 7,222 different markets around the country, and a vendor working at one of those markets sells, on average, [\\$7,000 worth of food](#).

Statistics from the Food Marketing Institute say there were over 36,000 grocery stores in the United States that each moved at least \$2 million in merchandise last year.

And while smaller organizations are using technological innovation to the best of their advantage, so are supermarket chains, with services like [Peapod](#) that offer online shopping and home delivery. So smaller businesses have to work hard to convince customers that they're selling something special.

Another web-based co-op, The [Arganica Farm Club](#) based in Ruckersville, Virginia, avoids the complications of scheduling and pick-up sites. Custom orders are delivered to the client's door once a week, and the company picks up reusable containers, milk jugs, and even compostable table scraps. The club tries to make shopping for local foods as easy as possible without compromising sustainable practices.

One of the goals listed on Arganica's website is "providing transparency of food origin." But, this isn't as easy as it sounds. The ever-shifting list of specials makes eating locally look fun and exciting, but also overwhelming and pricy. And details like the names and locations of farmers are often lost in the shuffle.

My own hometown of Evanston, Wyoming is not the ideal location for a garden or a farmers' market, given its elevation of just under 7,000 feet and an average of 80 frost-free days per year. It's also not a great place for a specialty food store, since the population of just over 12,000 people is separated from its nearest neighboring town by at least 30 miles of sagebrush in each direction.

Even if you're a huge fan of [pronghorn jerky](#), Evanston is a terrible place to be a locavore. Until recently, the town and its environs relied on a single grocery store and a Wal-Mart supercenter for its groceries.

Then, members of the community discovered an online food co-op called [Bountiful Baskets](#). Some of them started using the service, despite having to drive to Utah to collect their veggies.

Fast forward a couple years, and Evanston has its own Bountiful Basket pickup station, staffed by volunteers who are willing to get out at 7 am on a Saturday in order to help their neighbors sort onions and sweet potatoes.

Now, the produce delivered in the standard mystery basket each week is neither local nor organic. It creates no lasting bonds between producer and consumer. In many respects, it falls short of the farm-to-table ideal. But those baskets also bring fresh figs to people who may never have seen them before, encourage home cooks to give Chinese eggplant a try.

Moving from Main Street to the Internet may not solve all of the conundrums faced by food shoppers, but it certainly brings the food conversation to a wider audience.

The idea is an attractive one that will probably continue to grow. "Lots of small-scale producers are interested in scaling up to mid-size level," Wilde tells *The Salt*. "I think a lot of consumers are interested in that scale, also."

Tags: [online shopping](#), [farmers market](#)

OPENING AUGUST 2011

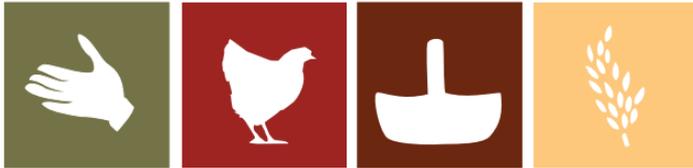
IOWA VALLEY FOOD CO-OP



5 REASONS TO JOIN THE CO-OP:

1. FRESH, FLAVORFUL FOOD
2. SUPPORT YOUR NEIGHBORS
3. HELP CREATE THE NEXT GENERATION OF FARMERS
4. SHARE THE GOOD LIFE IN EASTERN IOWA
5. GOOD FOR YOUR FAMILY, GOOD FOR THE REGION

OUR PURPOSE IS TO INCREASE THE AVAILABILITY OF FRESH, FAIRLY PRICED, SUSTAINABLY PRODUCED FOOD IN EASTERN IOWA.



WWW.IOWAVALLEYFOOD.COM

INFO@IOWAVALLEYFOOD.COM

Jesse Singerman: jesse@iowavalleyfood.com



Jason Grimm: jason@iowavalleyfood.com - 319.622.3264

IOWA VALLEY FOOD CO-OP



TOP REASONS TO BE A MEMBER

- Fresh, flavorful food
- Support your neighbors
- Help create the next generation of farmers
- Share the good life in Eastern Iowa
- Good for your family, Good for the region



WWW.IOWAVALLEYFOOD.COM

INFO@IOWAVALLEYFOOD.COM



WWW.IOWAVALLEYFOOD.COM

JOIN THE CO-OP TODAY

Our purpose is to increase the availability of fresh, fairly priced, sustainably produced food in Eastern Iowa.



- Fresh, flavorful food
- Support your neighbors
- Help create the next generation of farmers
- Share the good life in Eastern Iowa
- Good for your family, Good for the region



WWW.IOWAVALLEYFOOD.COM

INFO@IOWAVALLEYFOOD.COM

How does the cooperative work?

- Producer members list their products, prices and production practices on the IVFC's website.
- Consumer members place household orders for the products listed on-line.
- Producers deliver orders to **our distribution site** during a set time frame. Consumer members pick up their orders at the site the same day.

Distribution Site Location

First Presbyterian Church
310 Fifth St. SE.
Cedar Rapids, IA 52401

Distribution Day Schedule

12-3 PM Producer Delivery
4-7 PM Consumer Pick Up

2012 Calendar

| | Cart Opens | Cart Closes | Pick Up Orders |
|-----------|------------|-------------|----------------|
| April | 1st | 13th | 18th |
| May | 1st | 11th | 16th |
| June | 1st | 15th | 20th |
| July | 1st | 13th | 18th |
| August | 1st | 10th | 15th |
| September | 1st | 14th | 19th |
| October | 1st | 12th | 17th |
| November | 1st | 16th | 21st |
| December | 1st | 14th | 19th |

Join the Co-op Today Online

Co-op membership is open to all. Members pay a one-time redeemable and transferable membership fee. All members pay a annual \$10 renewal fee

\$25 Consumer Membership

\$75 Producer membership

\$100 Business Membership

Contact the Co-op

WWW.IOWAVALLEYFOOD.COM

INFO@IOWAVALLEYFOOD.COM

319.622.3264



USDA Final Performance Report

Project Title

Iowa Great Lakes Specialty Crop Promotion and Education

Project Summary

During the past decade, the number of specialty crop farmers has grown significantly in six Northwest Iowa counties, mainly due to the increasing popularity of the Lakes Area Farmers Market in Spirit Lake, Dickinson County, which serves as a centralized marketing hub for growers in those six counties. Like most of rural Iowa, Dickinson County's economy is firmly rooted in large-scale row crop agriculture; however, unlike most of rural Iowa, one-third or more of the county's economy is bolstered by a network of five natural lakes and driven by an influx of seasonal residents and visitors drawn to an urban atmosphere of arts, entertainment, and dining, as well as swimming, boating, skiing, hunting, fishing, and other activities. The county's year-round population of 19,000 burgeons to that of a small urban area, about 100,000, during four or five months of the year. Seasonal residents and visitors come from a 200-mile radius—Sioux Falls, Sioux City, Minneapolis, Omaha, Des Moines.

The Lakes Area Farmers Market began in 1987 in a cattle barn at the county fair grounds with five vendors who grossed about \$3,000. Today, the market takes place in an enclosed 60,000 square foot building on the fair grounds, features 40 vendors, and grosses an estimated \$150,000 annually. While that market has served well as an entry point into the local foods marketplace for regional growers, it has also served as something of an impediment for those growers who strive to establish specialty crop businesses that are more than a sideline. Success at the Lakes Area Farmers Market causes many established and new growers to focus their production and marketing energies on that market, only to discover that as the customer base and gross sales at the market increase, so too does the number of vendors, with an end result that their individual gross sales at the market plateau at about \$6,000-\$8,000. Some growers, generally those who have been in business for 10 years or more, have attempted selling to restaurants and stores, but have been unable to develop long-term outlets because of their inability to guarantee a regular supply of product, or because they lack marketing skills or time to pursue marketing beyond the farmers market.

A 2010 study, funded by the Iowa State University Leopold Center for Sustainable Agriculture, surveyed 30 restaurants, institutions, and grocery stores in Dickinson and surrounding counties and found five restaurants, one hospital, and a food co-op grocery stores interested in purchasing local fruits and vegetables and willing to view those products as specialty items worth more than those delivered by their regular wholesale distributors. The remainder of respondents either felt local growers would be unable to provide reliable quantities or were unwilling to pay more than they were currently paying wholesale distributors. A second survey of growers found 15 within a 30-mile of Spirit Lake interested in experimenting with aggregated sales and distribution. That effort resulted in about \$3,500 of cooperative sales to the previously mentioned restaurants,

hospital, and co-op store in 2010, sufficient success to convince several of the growers to continue their cooperative efforts.

The purpose of this Specialty Crop Block Grant project was to enhance the opportunity for local specialty foods growers to become viable businesses by: 1) increasing consumer awareness of the environmental, nutritional, and economic benefits of supporting local growers; 2) developing school programs to increase student awareness of food production and healthy eating habits; and 3) providing growers a better understanding of wholesale marketing and a set of marketing tools that will serve them for years to come.

This project was timely and important because of growing interest in local foods in this region spawned by the seasonal influx of consumers from more urban areas, coupled with the growing number of farmers interested in developing specialty crop businesses. This is a critical time for growers to gain awareness of available markets and the process of breaking into those markets. The Iowa State University Leopold Center for Sustainable Agriculture's market calculator indicates that less than one percent of the fruits and vegetables purchased in the six-county area are grown there, which amplifies the need for an effort that addresses consumer education, younger generation awareness, as well as increased production and marketing in the area.

Project Approach

This project performed activities and tasks in three main areas:

Consumer awareness and education—Directly reached about 1,000 consumers in a six-county region through a set of public presentations to civic organizations, parent groups, business fairs, school committees, community college and university classes and student groups, state meetings conducted in our region, and non-profit and governmental organizations, as well as events such as a local foods cookout at a Hy-Vee store, a local foods breakfast, and a local harvest soup supper. Other activities included an appearance on a Mediacom cable-TV show with an estimated audience of 2,000; a series of advertisements in The Lakes News Shopper, with a weekly circulation of 21,000; and three appearances on KUOO radio shows, with a listenership of 18,000. All of the media activities informed the audience about the benefits of a local food system and where local foods are available. Also sponsored a food preservation workshop (canning, freezing, dehydrating) with partners Lakes Regional Healthcare and the ISU Extension Service, which was attended by 10.

During the first dozen or so presentations evaluation forms were distributed to attendees, but the evaluation return rate was very poor. Twenty-seven evaluations were returned from those presentations. At that point, the project manager determined that attendee evaluation responses were consistent with comments and discussion during the presentations and there was no value in encumbering attendees with an evaluation form. In most instances, attendees were there for luncheon meetings or classes, with limited time to hear a presentation and then discuss it. Overall, the lack of time to fill out evaluation forms was a positive. In most venues, participants found the topic so interesting that the question and answer period ran well beyond the time allotted.

Of the 27 evaluations returned, 14 indicated they had learned something about the value of a local foods system, and 13 said they had either learned nothing or saw no value in developing a local foods system. Of the 14 positive responses, 8 said the most interesting fact they learned was that local foods sold at peak ripeness have higher nutritional value than food picked before they are ripe and shipped in to the area. The three most interesting facts learned from presentations, based on evaluations, were: 1) the nutritional value of local foods; 2) the potential economic impact of developing a local foods system, and 3) the positive environmental impact of buying food from local growers. As stated earlier, the findings from the limited sample of evaluation responses was very consistent with responses during presentation discussion and questioning, and after the presentations when attendees approached the presenter.

Perhaps more important than evaluation responses was the large number of positive outcomes that stemmed from presentations and educational programs. For example, the City of Spirit Lake and its Chamber of Commerce developed an evening street market, which ran every Wednesday from July 6-September 7 and provided an additional \$900 in sales for local growers. A State Farm Insurance agent offered financial assistance to the Dickinson County Community Gardens and initiated discussions with Spirit Lake school officials about applying for a \$25,000 State Farm community development grant geared toward improving childhood nutrition. A pre-school parent group voted the program on local foods the most informative of the monthly programs they sponsored during the year and selected a member of their group to participate on a Farm2School committee. Residents of Alta, in Buena Vista County, created a community garden modeled on the ones in Dickinson County. Membership in the Dickinson County Community Gardens increased from 28 to 52. Attendees at a statewide county naturalists workshop have begun developing lists of businesses that support local growers for dissemination in each of their counties. Representatives from Buena Vista University requested two additional programs for their students, eventually attended by 112. Two attendees at the local harvest soup supper offered to donate pies for next year's event. A local buying club began adding local produce to its monthly availability list, resulting in \$200 additional sales for local growers. A caterer began working with local growers, resulting in \$314 in sales. Three landowners offered a total of 11 acres for use by local growers or the community gardens. The city of Arnolds Park offered to establish a new farmers market in its city park for 2012. A young woman offered to help develop a CSA for local growers for 2012, using social media as a marketing tool. The Lakes Community Land Trust, a non-profit set up to provide affordable housing, began to explore ways in which land could be held in trust for emerging growers. Several partners—Lakes Regional Healthcare, the city of Spirit Lake, Spirit Lake Schools, and the Bedell Family YMCA, have embarked an application to gain designation as a Blue Zone and thus funding through Wellmark.

2) School curriculum development/presentation and other school activities—

With partners, developed six presentations for 100 4th graders at the Spirit Lake Elementary School, delivered every two weeks for two hours during the Spring 2011 semester. The lessons included information about regional diets around the world, what foods are grown in this area, how they are grown, and the business of food production. Classroom activities included starting and caring for tomato and pepper plants which

culminated in a May field trip to transplant into a children's garden provided by The Dickinson County Nature Center. Six more summer educational programs at The Nature Center extended learning for those students and their families. Results from this program were presented to representatives from seven other regional schools. Additional activities in the Spirit Lake schools were meetings with the Wellness Committee, the food service staff, the culinary arts instructor and class, all directed toward putting together a committee for formation of a Farm2School chapter. The application for IDALS funding for a Spirit Lake Farm2School chapter has been submitted at the time of this report.

The 4th grade program was very well received and resulted in the development of strong partnerships among the four 4th grade teachers, the elementary school principal, the Dickinson County Naturalist and assistant naturalist, an Americorps volunteer from the Lakes Community Land Trust, and Courtyard Gardens, a local nursery. All of those partners participated in the curriculum development. Members from two other partners, Dickinson County Community Gardens and the Blue Water Garden Club, became involved as mentors for students at the Children's Garden.

A pretest of the 100 4th graders revealed that 90 percent of them did not understand where the foods they eat come from. For example, after listing a favorite food, usually pizza, they responded that it came from such and such store and had no idea what ingredients went into that pizza or where they came from. The lessons were designed to incorporate a range of disciplines—mathematics, science, social studies, and communications. Students maintained journals in which they recorded information about foods and plants, and kept records of plant growth and germination percentages. The intent was to conduct a post-test on the final day of the project, following the field day of planting in the Children's Garden. Unfortunately, the schedule of events for that day and for the last days of the semester became too tight and the post-test was never given. Although no solid pretest/post-test comparative data is available, it can be reported that all four of the 4th grade teachers said a vast majority of their students exhibited increased understanding of where their food comes from, and perhaps more importantly, excitement for participation in food production, based on journal entries, responses in the classroom, classroom discussions, and comments from parents. Anecdotally, three of the teachers said several of their students told them they had convinced their parents to start a garden or that they were going to start one themselves, two students started plants at home in addition to those started in the classroom, five parents approached the project manager at the farmers market, saying they had never been to the farmers market before but decided to shop there through the urging of their children, and three other parents approached the project manager in public to express thanks for the knowledge their children had gained and brought home.

The teachers have initiated the program again this semester, Spring 2012, and the school was recently notified that its Farm2School application has been accepted and will receive \$4,000 in funding from the Iowa Department of Agriculture. With those funds the Farm2School Chapter intends to expand the elementary program so that it includes middle and high school components. Planned components include: developing 5th grade curriculum units that build on the material presented to 4th graders and includes a fall harvest field day; exploring the feasibility of establishing a garden site on school grounds, which could be utilized by a wide range of grade levels and classes; using foods

produced by local growers in the food service, the culinary arts program, and as part of the high school Spanish Club's annual salsa making session.

So funds from this grant initiated activities in the Spirit Lake schools that could eventually reach all 1,200 students in the school system for years to come. Also, the presentation to representatives from seven other school districts met with good response, so there is potential for this type of programming to impact many more thousands of students in Northwest Iowa in the future. That presentation took place at a high school entrepreneurial fair sponsored by the Lakes Corridor of Opportunity, an economic development non-profit.

Although the Spirit Lake schools did not purchase foods from local growers in 2011, three other schools did, resulting in about \$1,500 of sales.

3) Development of markets and education of growers to meet those markets—A series of meetings was conducted in winter/spring 2011 to determine the actual scope of sales potential for local specialty crops. Included in those meetings were restaurant chefs/managers, the Lakes Regional Healthcare CEO and food service director, The Market Community Cooperative board of directors and store manager, Iowa Lakes Community College food service managers, Buena Vista University food service managers, food service managers from five K-12 schools, Hy-Vee officials from Des Moines corporate offices, the Hy-Vee regional produce manager, and store and produce managers from three local Hy-Vee stores. Those meetings revealed potential 2011 sales of about \$500,000 within a 60-mile radius of the Lakes Area, \$150,000 within a 40-mile radius, and \$90,000 within a 20-mile radius..

Those meetings were followed by meetings with growers and grower groups to inform them of the sales potential and find growers interested in pursuing those markets. That information was presented to members of the Lakes Area Farmers Market, the Storm Lake Grower's Guild, an O'Brien County growers group, and seven other individual growers. The result of those meetings was 11 growers (eight of whom had participated in cooperative sales in 2010) interested in pursuing group marketing and distribution, and three growers interested in pursuing those markets on their own. The group of 11 formed Little Sioux Cooperative Growers and settled on markets within a 20-mile radius of Spirit Lake—the five restaurants, the hospital, and The Market food co-op store, which had been part of the 2010 experiment, as well as the addition of three Hy-Vee stores and three K-12 schools. Those markets projected sales of about \$80,000 for 2011.

In June, a website (www.littlesioxgrowers.com) was launched, containing individual pages for each grower and the capability of online ordering, which has not been used to this point. A run of 250 tri-fold brochures, promoting local growers, has been printed for use at public presentations and business fairs, along with four tabletop displays. Educational opportunities for the growers included two speakers provided by funding from the ISU Leopold Center—a speaker from Wisconsin with expertise in group marketing, sales, and distribution; and a speaker from Michigan with expertise in processing fruits and vegetables to extend seasonal sales. Also sponsored were a visit to a farm where five high tunnels are used to extend early and late season production, and a visit to a farm, featuring grass-fed beef and free range chickens. A total of 36 growers

and other interested parties attended those four programs. Throughout the season, regular meetings with buyers kept them informed of issues faced by the growers, and regular meetings with growers kept them informed of quality, packaging, and delivery issues that impacted buyers.

The overall outcome of those activities was total sales of \$10,000 to the outlets that had been broken into in 2010 along with the new markets taken on in 2011. About \$7,000 resulted from cooperative sales and about \$3,000 in individual sales to those new markets. The total of \$10,000 represents nearly a tripling of sales to new markets in 2010. At the same time, the five growers who benefited most from group sales and who are also among the largest produce vendors at the Lakes Area Farmers Market, experienced an increase in average gross sales at farmers markets from \$5,000 in 2010 to over \$7,000 in 2011. Those increases can be attributed to the fact that the 9 growers who participated most actively increased their total acres of production from 12 A. in 2010 to nearly 16 A in 2011, which not only gave them an even larger presence at the Spirit Lake FM but led several of them to participate in the newly created Spirit Lake Downtown Street Market, as well as a street market in Spencer.

This data leads to several conclusions. As small growers increase production with the intent of breaking into larger wholesale markets, their mindset continues to be more focused on increasing direct market sales, perhaps to the detriment of establishing themselves as reliable wholesale providers. For example, if the increase of about \$11,000 among the group in farmers market sales had been channeled into the wholesale market, they would have accomplished \$21,000 in wholesale sales rather than the \$10,000 they did accomplish, which would have been a much more significant presence among wholesale buyers. For Hy-Vee produce managers in particular that would have been a much stronger showing and an indication that this growers group can be relied upon to work toward the known potential of about \$75,000 annually at three Hy-Vee stores. As it was, the group did a reasonably good job of meeting the needs of five restaurants, a hospital, and two schools, and while sales to those and other similar outlets could continue to grow, the long-term potential for those markets is only about 10-15 percent of that of stores such as Hy-Vee.

At the end of the season, interviews were conducted with the 12 main local foods buyers from 2011 (5 restaurant chefs, 1 hospital food service manager, 3 school food service managers, and 3 grocery store produce managers) to determine their satisfaction and interest in continued purchases in 2012. Of the 9 non-grocery store respondents, all said they were very satisfied with the quality and cost of products delivered, 3 said they would purchase about the same quantities in 2012, and 6 said they would purchase larger quantities in 2012 if they were available. Of the three grocery store produce manager respondents, all said they were very satisfied with the quality and cost of products delivered, but very dissatisfied with the quantities available. All three said they would like to continue to work with local growers in 2012 for as much as 10-times the quantities purchased in 2011; however, one said he would be disinclined to work with local growers unless he had assurance they could provide sufficient quantities of diverse produce to warrant a regular local foods display section.

In meetings since the end of the 2011 growing season, the group has been wrestling about its future direction. The Market Community Food Co-op, one of their main 2011 outlets, has gone out of business. One of the growers has rented a downtown

Spirit Lake storefront, near the location of The Market, to fill that void. Marketing considerations for 2012 are a 15-20 member CSA operated through the new store, expansion of restaurant and school sales, and the potential of marketing through a 260 A. organic transition farm starting vegetable, grass-fed beef, and pasture raised chicken production in 2012 near Emmetsburg. The advent of that large specialty crop farm in the region is seen as a threat by some existing small-scale growers, but from an analytical standpoint, it is more likely to benefit them than harm them, providing them an opportunity to participate in larger markets well beyond their current capabilities.

Another area in which conclusions can be drawn from this project is the increased awareness among growers of their need for additional labor as they expand toward viable specialty crop businesses. Of the 11 growers involved in this project, only four currently rely on outside labor. In 2010, those four hired an average of 1 part-time employee. In 2011, they hired an average of 2.5 part-time employees. So this presents another conundrum for small-scale growers—at what point do increased equipment and labor costs derail the benefits of increased sales? Also, how available are reliable local workers? Data gathered during this project are too insignificant to draw conclusions about those questions, but they did result in a series of meetings with Iowa Lakes Community College officials about the prospects of establishing either certificate or degree programs for students interested in pursuing work on, or businesses in, specialty crop farms.

Which leads to another of the key conclusions from this project—there is a huge need to bring more young growers and workers into the equation. Most of the growers who play significant roles in specialty crop production in this region are well into their 50s on up to their 70s. Of the 15 growers who participated in 2010 co-op sales, four decided they were too old to consider increased production. From this year's group of 11 growers, one has reached that same conclusion. So while the need for additional growers increases, their numbers continue to decline, which reiterates the need for ongoing discussions with Iowa Lakes Community College as well as high school FFA chapters about the need to spark interest in specialty crop careers.

Goals and Outcomes Achieved:

For the most part, the project's goals and outcomes have already been presented extensively in previous sections of this report, so this section will be used to present a more detailed listing of activities, and focus on how two of the goals from the original grant proposal were accomplished in ways that differed from how they were expected to be accomplished

Public Presentations and events: (Attendee numbers in Parenthesis)

Blue Water Garden Club 2X (38)

Lakes Area Farmers Market meeting 2x (58)

Daybreaker Kiwanis (12)

Noontime Kiwanis (44)

Dickinson County Community Gardens 2X (31)

Grower meeting/Leopold listening session (28)

Lakes Community Land Trust annual meeting (25)
Storm Lake Growers Guild (8)
Nature Center class (8)
Nature Center Soup Supper (100)
RC&D annual meeting (25)
O'Brien County growers group (5)
ICCC Women in Denim breakout session (15)
Old Towne Merchants meeting 4X (36)
Spirit Lake Rotary Club (40)
Bedell Family YMCA health fair (40)
2nd grower meeting/education program (12)
High tunnel farm visit (4)
Grass-fed beef farm visit (12)
Local foods breakfast at Market (18)
Spirit Lake Schools Wellness Committee (10)
Mom's and Tots 2X (29)
Lakes Regional Healthcare community meeting (24)
Spirit Lake Home Show (50)
Children's Garden Families (8)
Northcentral Iowa Growers (19)
Spirit Lake Grower Appreciation Day (75)
State Conference of Iowa County Naturalists (16)
Buena Vista University ACES group (80)
Buena Vista University classes (22)
Iowa Lakes Community College classes (19)
Iowa Central Community College faculty (5)
Local Harvest Soup Supper (25)
Food Preservation Workshop (10)

School Related Activities:

Classroom presentations to 100 Spirit Lake 4th graders 6X (600)
Meetings with partners to develop curriculum 8X (56)
Meetings with K-12 school officials from seven other schools (29)
Meetings with community college and university officials (18)

Marketing/Grower Development

Meetings with buyers (chefs, food service managers, produce managers) (50)
Meetings with growers (75)

While the overall project goals of promoting local specialty crop growers and increasing awareness of the benefits of purchasing locally produced foods were met by the project, there are a couple significant ways in which project activities varied from those indicated by the grant application. For example, the grant application proposed to increase consumer awareness through a series of regularly published columns in regional

publications. Instead, the project manager determined that a more effective way of influencing consumer buying habits was to speak directly with groups of people in several communities throughout the region, and to develop events centered around local foods, such as the local foods breakfast and soup supper, and the local foods cookout at the Spencer Hy-Vee store.

A second way in which project activities strayed from those proposed by the grant application was in the area of a proposed series of meetings between buyers and growers, and educational programs set up for buyers (chefs/food service managers) to help them understand how to prepare local foods and understand their availability. As it turned out, chefs and food service managers felt fully competent in using local foods and saw no need for meetings with growers. Any uncertainties they felt in that regard were easily taken care of through individual meetings with chefs and food service managers, which resulted in questions or concerns that were conveyed to individual growers or groups of growers. In addition to time spent with buyers and growers, other of the time designated for this portion of the project was shifted to meetings with community college officials to address more pressing needs such as availability of qualified workers and development of new young growers.

Beneficiaries

Clearly, the biggest beneficiaries of this project are the growers in this region, who have not only learned which markets they are currently capable of breaking into, but just as importantly, which markets they are not yet capable of tackling, such as major grocery chains such as Hy-Vee. Although they still face many challenges as they consider markets, distribution systems, and bookkeeping, they are in a much better position to overcome those challenges today than they were a year ago. In addition, they have a set of marketing tools—website, brochures, presentation materials, that will serve them for years to come. Participation in this project has also helped some of them realize they don't want to develop specialty crop businesses as much as they thought they did.

Other beneficiaries are the consumers in this area, local residents who are gaining more access to local foods, as well as the visitors and seasonal residents from urban areas who are accustomed to having that access. Similarly, the young people from this area will benefit from their increased awareness of where food comes from, and how to make healthy food choices. Also, because of increased awareness among parents and school officials, it's likely that more schools in the area will start offering healthy local fruits and vegetables in their school cafeterias.

Lessons Learned

The primary lessons learned relate to grower production and marketing and are included in the "Project Approach" section of this report. However, aside from lessons learned presented earlier, it is important to note that project sustainability is critical. The key is to develop partnerships and commitments and help develop goals imbedded in the structure of schools and businesses. Hopefully, this project has made progress toward developing those partnerships.

Contact Person:

Dennis McDonald
712-330-1680
dmcdonald@iowalakes.edu

Additional Information:

Additional materials such as brochures, advertisements, press releases, and tabletop presentation materials are being sent by mail as part of the records for this project.

ABOUT US

Little Sioux Cooperative Growers, a network of small fruit and vegetable growers in Northwest Iowa and Southwest Minnesota, serves markets within a 50-mile radius of Spirit Lake, Iowa.

By working together, our growers can offer bulk sales and regular delivery of fresh, high quality local foods to stores, restaurants, institutions, and buying clubs.

Our membership represents diverse growing philosophies to meet the needs of diverse consumers—organic, biodynamic, natural, chemical free, and low chemical usage. Above all, we strive to restore the environmental, nutritional, social and economic benefits of a local food system.



**The growers serve
Northwest Iowa and
Southwest Minnesota
with fresh, high
quality locally
grown foods.**

**Providing local foods to:
restaurants * schools
hospitals * grocery stores**



SUPPORTING LOCAL GROWERS...



- GIVES YOU TASTIER AND MORE NUTRITIOUS FOOD

Studies show that fresh locally grown food is at the top of the nutritional scale, way above “fresh” food you buy at the super-market from California or other countries.



- BUILDS THE LOCAL ECONOMY

An ISU study shows that less than 1% of fruits and vegetables consumed in Iowa are actually grown in Iowa. An increase to 25% would create thousands of jobs and build healthy rural communities.



- IS BETTER FOR THE ENVIRONMENT

Today, on average, food travels 1,500 miles to your table, requiring unnecessary reliance on fossil fuels. Buying locally grown foods can cut dependency on foreign fuels.

Funds for this project were provided by the USDA Specialty Crops Block Grant Program through the Iowa Department of Agriculture and Land Stewardship.

OUR MEMBERS

- Brandt Gardens, Lakefield, MN
- Courtyard Gardens, Spirit Lake, IA
- Edlins Produce, Jackson, MN
- Good Eetens, Everly, IA
- Guritz Produce, Spirit Lake, IA
- McDonald's Produce, Spirit Lake, IA
- Mulberry Grove Family Farm, Milford, IA
- Tannenbaum Trees & Berries, Milford, IA
- Trojahn Gardens, Terril, IA
- Wes Kilts Farm, Arnolds Park, IA
- Wilder Thymes, Wilder, MN

MORE INFORMATION

info@littlesiousgrowers.com
or visit www.littlesiousgrowers.com



The Lakes Area's Everyday Source for Local Organic/Chemical-Free Produce



1610 Hill Avenue
Downtown Spirit Lake
712-336-2520

HOURS
8am - 6 pm Mon-Sat
10am-2 pm Sunday



Supplied by Little Sioux Cooperative Growers
www.littlesiousgrowers.com
Contact Dennis McDonald 712-330-1680

Available This Week

- Tomatoes • Onions • Potatoes**
- Seedless Cucumbers • Zucchini**
- Sweet Corn • Melons - musk & honeydew**



Funds for this project were provided by the USDA Specialty Crops Block Grant Program through the Iowa Department of Agriculture and Land Stewardship

LAKESIDE DINING
& EXCELLENT CUISINE

Phone 712.332.7578

37 Lake Street, Arnolds Park
(In front of the Queen II Dock)

www.lake-okoboji-restaurant.com



Maxwell's Beach Café

SUPPORTS LOCAL GROWERS

This Week Featuring
Vegetarian Lasagna

with locally grown organic vegetables

Wednesday - Sunday
August 24 - 28



Produce purchased from Little Sioux Cooperative Growers
www.littlesiousgrowers.com • 712-330-1680

LITTLE SIOUX MEMBERS:

- Brandt Gardens, Lakefield, MN
- Courtyard Gardens, Spirit Lake
- Edlin's Produce, Jackson, MN
- Good Eetens, Everly
- Guritz Produce, Spirit Lake
- McDonald's Produce, Spirit Lake
- Mulberry Grove Family Farm, Milford
- Tannenbaum Trees & Berries, Milford
- Trojahn Gardens, Terril
- Wes Kilts Farm, Arnolds Park
- Wilder Thymes, Wilder, MN



LITTLE SIOUX
COOPERATIVE
GROWERS

For fresh, high-quality, local produce.

Funds for this project were provided by the USDA Specialty Crops Block Grant Program through the Iowa Department of Agriculture and Land Stewardship

LAKES REGIONAL
HEALTHCARE
SPIRIT LAKE



Hwy. 71 South
712-336-8791
www.lakeshealth.org

EVERYONE
WELCOME

Local
Harvest

SOUP
Supper

**Monday,
November 7
5:30-7 PM**

Free Will Offering

Curried Squash ♦ Creamed Potato ♦ Tomato Bisque
Served in the Cafeteria

Following at 7:00 PM -- A Free Seminar

Safe Preservation of Fresh Fruits & Vegetables

♦ **Canning** ♦ **Freezing** ♦ **Dehydrating**

by ISU Ext. Specialist Holly VanHeel

Space Limited in Big Spirit Room. Registration required 336-3488

The evening is sponsored by Lakes Regional Healthcare, Little Sioux Cooperative Growers, ISU Extension, Iowa Lakes RC&D, and Lakes Community Land Trust, and is part of a project funded by the USDA Specialty Crops Block Grant Program through the Iowa Department of Agriculture and Land Stewardship.



**Proceeds going to the Dickinson County Food Pantry
of Upper Des Moines Opportunity Inc.**



Workshops

Saturday, January 22



Saturday 1 p.m.

Saturday 2 p.m.

Saturday 3 p.m.

Session 1

What If...a Perfect Vacation Is Closer Than You think?

**Michele Walker, Director
Western Iowa Tourism Region**

Find the perfect place in Iowa for your favorite vacation spot. Learn about Iowa tourism and get information on specific attractions.

Have You Seen My Jumper Cables?

**Tonya Schoenfelder, MS,
Wellness Consultant**

Does your energy battery need a re-charge? If you are ready to hook up the self-care jumper cables and re-energize your life this session is for you! Learn to prevent major detours by creating your own road to wellness.

Get on Board with Facebook Jennifer Tabke ISU Extension

Explore the basics of Facebook and move up to other neat uses. We'll cover both the personal side of the social networking site as well as some potential uses for your business or group.

Building Healthier Communities With Local Foods Dennis McDonald Iowa Great Lakes Local Foods Network

Reestablishing local food systems can strengthen the health, environment and economy of small towns. Learn more about the growing local foods movement.

Starting a Business Amanda Lynch & Amanda Walljasper

This panel of two small business owners and a business consultant will share information on the process to becoming a successful business owner. Lots of insight and information.

Session 2

Session 3

Session 4

Session 5

Vitamins and Herbs

Jon McKenna, RPh,

Director of Pharmacy - BVRMC

Let's talk about the most commonly used vitamins and herbs, uses and effectiveness.

Food Banking 101

**Linda Scheid, Executive Director
Food Bank of Siouxland**

A chance to learn what food banking is, how food is acquired and who is served. See the difference between a food bank and food pantry and how the need has changed in our communities and what we can do to fight hunger.

Did Someone Just Sneeze?

**Tonya Schoenfelder, MS,
Wellness Consultant**

Do you cringe when someone sneezes? Do colds and flu spread quickly in your home or office? Join this fun, informative session and learn how to create the healthiest living and work environment.

What's in Your Value Added Tool Kit?

Madeline Schultz

**Iowa State Extension-Value
Added Ag**

Interested in exploring value added agricultural options or improving your existing business? This session will highlight on-line resources, short courses, and organizations that can help create just the right tool kit.

Financial Planning

Brianne Babel

Edward D. Jones

Take control of your financial life by examining values and setting goals. Discover key strategies for 3 common goals: preparing for retirement, living in retirement and paying for education.



Dr. Wendy Wintersteen
Iowa State University
Dean of Agriculture

Wendy is an advocate for agriculture and a voice for women in agriculture, especially the women who have chosen to be a part of the "Women in Denim" conference. She will share trends and opportunities in agriculture as well as her enthusiasm for Iowa agriculture.

Saturday, 4 to 4:30
Anderson Auditorium

Closing, door prizes, and evaluations

Celebrating Women of
Rural America

7th
Annual

WOMEN
IN DENIM

Early Bird Registration: \$35
(Before January 14, 2011)

Full Registration: \$50
(After January 14, 2011)

Limited Registration

www.womenindenim.com



January 21-22, 2011

to be held at
Buena Vista University
Storm Lake, Iowa

USDA Specialty Crop Block Grant Program *Final Report*

PROJECT TITLE: Optimizing the Cropping Potential and Profitability for Growing Scab-resistant Apple Cultivars in Conventional and Organic Systems

ORGANIZATION: Iowa Fruit and Vegetable Growers Association

INVESTIGATORS: Dr. Paul Domoto, Dr. Gail Nonnecke and Mr. Dennis Katuuramu (graduate student), Department of Horticulture, Iowa State University

DURATION: 1 Nov 2010 to 1 Nov 2011; extended to 1 Aug 2012.

Project Summary

Since the 1990's, apple production in Iowa has declined from an annual average of 10.5 million pounds to an average of 4.1 million pounds. This decline has occurred due to a combination of factors: urban encroachment; aging apple growers; orchards that were based upon full-sized to semi-vigorous trees that have high labor and pesticide requirements; and cultivars being grown did not keep pace with changes in consumer demand. With the recent consumer trend for local nutritious foods, there is a renewed interest in locally grown apples, particularly amongst younger generations. For the Iowa apple industry to re-gain a competitive advantage, existing and new growers must adopt new orchard technologies that promote early and sustained production, reduce expenses, promote greater sustainability and less environmental impact, and satisfy consumer demands for wholesome fruit.

Adopting new orchard systems based upon size-controlling rootstocks that shorten the time from planting to production, and reduce labor and material inputs is a vital part of the fruit industry's change. Apple scab (*Venturia inaequalis*) is the most common disease of apples, and in the Midwest, can require from 10 to 15 sprays per year to obtain control. Since 1945, apple breeding programs in North America have developed over 30 scab-resistant cultivars with significant improvements in fruit quality and consumer acceptance in the more recent introductions. With excellent resistance to apple scab and good resistance to other common apple diseases, growers can now produce high quality fruit with fewer fungicide sprays and thereby reduce production costs and impact on the environment. However, little is known about these cultivars' cropping potential and the influence of crop load on fruit quality and return bloom.

Disease resistance cultivars reduce the need for fungicide sprays, and with the availability of organically approved insecticides and alternative control strategies, it is more feasible to grow apples organically. However, controlling crop load is a greater issue for organic growers because chemical thinning agents used by conventional growers are not approved for use in organic orchards. Therefore, organic growers have had to thin fruit by hand at a great expense or accept biennial bearing. Sprays containing some organic-approved materials such as lime sulfur, fish and various vegetable oils, salts and kaolin have been tried alone or in combination for thinning apples with some degree of success when applied during bloom. However, experience with these products is limited and they have not been tested under Iowa climatic conditions.

Project Approach

This project was undertaken to 1) Determine the optimal crop load for high fruit quality, size, and sustained productivity of scab-resistant apple cultivars through controlled hand thinning to specified numbers of fruits per tree based on the trunk cross-sectional area; and 2) Evaluate the effectiveness of organic-approved fruit thinning agents applied during bloom under Iowa conditions.

Optimal crop load studies:

2010: Initial plans were for a graduate student to conduct the crop load study on three scab-resistant cultivars (Redfree, Liberty and GoldRush), but a late spring frost killed most of the fruit buds that were in the petal fall stage of development. Therefore, an alternative study evaluated the performance of ‘Gibson Golden Delicious’ grown on five dwarfing rootstocks (M.9 T337, M.26, G.16, CG.3041, B.62-396) under different cropping densities. Following bloom, the trees were hand thinned to varying cropping densities ranging from 2 to 10 fruit per cm² trunk cross-section area (TCSA) as measured in the spring, and was replicated 2 times as single tree plots in a completely random design. Data were collected on fruit yield, and fruit quality parameters at harvest and after 60 days of storage. Following harvest, a preliminary analysis of the data showed that targeted high cropping densities were only achieved on trees on M.9 T337 and G.16 rootstocks. Data were re-analyzed by analysis of co-variance with the actual crop load serving as the co-variant factor. Significant results and trends observed in the study include:

- Increasing the cropping density increased fruit yield per tree and yield efficiency (kg fruit / cm² TCSA) on all rootstocks, but did not significantly affect the average fruit weight (*Figures 1 and 2*). However, there was a trend of reduced average fruit weight and lower percentage of large-sized fruit being associated with increasing cropping density on M.9 T337 and G.16 rootstocks (*Figures 2 and 3*). Across cropping densities, trees on G.16 produced the lowest percentage of large-sized fruit.
- At harvest, increasing crop density was associated with higher starch levels in the flesh of the fruit from all rootstocks (*Figure 4*). However, only fruit from trees on CG.3041 had a significant reduction in soluble solids associated with increasing crop density (*Figure 5*). Such a trend was evident for M.9 T337 and G.16, but not for M.26 and B.62-396. Increasing crop density did not significantly affect fruit firmness, but there was a trend of firmer fruit associated with increasing crop density for trees on M.9 T337, M.26, B.62-396 and CG.3041 rootstocks (*Figure 6*). The trend for lower soluble solids, higher fruit firmness and starch content associated with fruit at the higher cropping densities suggest that those fruit were less mature at harvest. At 60 days after harvest, no differences existed between rootstocks or crop density for starch content soluble solids or fruit firmness.
- At harvest and after 60 days of storage, skin color of the fruit was evaluated with a Hunter colorimeter. At harvest, the skin color of fruit from trees on M.9 T337 rootstock was darker at higher cropping densities (*Figure 7*). A similar trend existed for fruit harvested from trees on G.16 and M.26, but not on B.62-396 or CG.3041. Although no significant differences in hue existed at different crop densities within rootstocks, fruit from trees on G.16, M.26 and CG.3041 were somewhat greener at the higher crop densities (*Figure 8*). Fruit from each of the rootstocks exhibited a decline in chroma (brightness) with increasing crop density (*Figure 9*). The trend for darker skin color, somewhat greener hue and lower chroma values associated with fruit at the higher

cropping densities suggest that those fruits were less mature when harvested. At 60 days after harvest no differences in skin color existed between rootstocks or cropping density.

- Blossom clusters per tree were counted the following spring and no differences between cropping densities were evident (*Figure 10*).

In conclusion, due to a limited sample size and inability to achieve the highest cropping densities on M.26, B.62-396 and CG.3041 rootstocks it is difficult to predict the optimal crop load for ‘Gibson Golden Delicious’ trees. However, when the various indices of fruit quality were plotted against both crop load (number of fruit/cm² TCSA) and yield efficiency (kg fruit/cm² TCSA), the optimum cropping density appeared to be between 7 to 8 fruit/cm² TCSA at the time of thinning or based on the fall TCSA which is used to calculate yield efficiency, 5 to 6 fruit/cm². This cropping density product yield efficiency values in the 0.8 to 1.0 range on each of the rootstocks, and fruit size and maturity were not adversely affected. This would correspond to spacing fruitlets an average of 20 to 25 cm (8 to 10 in.) apart when hand thinning.

2011: The cropping density study was repeated on dwarf ‘Redfree’, ‘Liberty’ and ‘GoldRush’ apple trees propagated on M.9 rootstock as originally planned. Following bloom attempts were made to achieve cropping densities at harvest that would range from 3 to 12 fruit per cm² TCSA through controlled hand thinning. Treatments were replicated 10 times as single tree plots in a completely random design. Data was collected on fruit yield, and fruit quality parameters at harvest. ‘GoldRush’ fruit were re-assessed for storage quality 60 days after harvest. Preliminary analysis of the data showed that hand thinning did not always achieve the targeted cropping densities, and the data were analyzed by analysis of co-variance. Significant results and trends observed in the study include:

- For each cultivar, increasing the cropping density significantly increased fruit yield per tree and yield efficiency (kg fruit/cm² TCSA) and was associated with a significant reduction in average fruit size and percentage of large-sized fruit (> 68 mm diameter) (*Figures 11, 12, and 13*).
- For ‘Redfree’, increasing cropping density was associated with a significant decline in fruit soluble solids and starch content, and increased fruit firmness (*Figures 14, 15 and 16*). This suggested that the fruit at the highest cropping densities were less mature, and fewer carbohydrates were being assimilated in the fruit. ‘GoldRush’ fruit, also exhibited a significant decline in starch content and a trend for declining soluble solids with increasing crop density, but no difference in fruit firmness. ‘Liberty’ fruit exhibited a trend for decreasing soluble solids with increasing crop density, but no changes in firmness or starch content. At 60 days after harvest, ‘GoldRush’ fruit continued to exhibit a significant, but slight decline in soluble solids associated with increasing crop density.
- At harvest and 60 days after harvest, increasing crop density on ‘GoldRush’ trees was associated with fruit having a slightly greener hue, and a darker, duller in appearance to further suggest that the fruit at the highest cropping densities were less mature (*Figures 17, 18 and 19*). Cropping density had no significant effect on the skin color of ‘Redfree’ and ‘Liberty’ fruit, although there was a trend for fruit at the highest cropping densities to be darker and duller than fruit at the lower cropping densities.

- Blossom clusters per tree were counted the following spring and clusters per cm² TCSA were computed. For each cultivar, a decline in blossom cluster density was associated with increasing crop densities (*Figure 20*).

Over the varying cropping densities, ‘Redfree’ trees produced the smallest fruit, while ‘GoldRush’ trees produced the largest fruit, and the fruit from ‘Liberty’ trees were intermediate in size. This suggests that the optimum cropping density of ‘Redfree’ trees is lower than that for ‘GoldRush’ trees, and the optimum cropping density for ‘Liberty’ trees would be somewhere in between. Therefore, based on average fruit size, percentage of premium-sized fruit, return bloom and the various indicators of fruit quality, it appears that the optimum cropping densities are as follow:

| Cultivar | Number of fruit per cm ² trunk cross-sectional area | | Spacing between fruit when thinning by hand | | Targeted yield efficiency (kg/cm ² TCSA) |
|----------|--|-------|---|--------|---|
| | Spring | Fall | cm | inches | |
| Redfree | 6 - 7 | 5 - 6 | 25 - 20 | 10 - 8 | 0.7 - 0.8 |
| Liberty | 6 - 8 | 5 - 7 | 25 - 18 | 10 - 7 | 0.8 - 0.9 |
| GoldRush | 7 - 9 | 5 - 7 | 25 - 18 | 10 - 7 | 0.8 - 1.0 |

Thinning apples with organic-approved materials:

Prior to initiating this study, participants at the 2010 Iowa Organic Ag Conference and the 2011 Iowa Fruit and Vegetable Growers Conference were asked to fill out a questionnaire related to scab-resistant apple cultivars and growing apples organically:

- At the Iowa Organic Ag Conference, 36 participants completed a short survey.
 - 19% (7) grew apples.
 - Of those, 6 grew apples organically, one grew apples conventionally.
 - Of those currently not growing apples, 60% (15) indicated that they would consider growing apples organically if labor costs could be significantly reduced.
- At the Iowa Fruit and Vegetable Growers Conference, the survey was conducted during a fruit growing session and 9 participants returned the questionnaire.
 - All that filled out the questionnaire grew apples.
 - 78% were growing or considering growing scab-resistant apples.
 - Cultivars listed: ‘Redfree’, ‘Liberty’, ‘William’s Pride’, ‘Jonafree’, ‘GoldRush’, ‘Pristine’, ‘Enterprise’
 - 89% grew apples conventionally with chemicals.
 - Growers listed their greatest labor expenses as: pruning (67%), harvesting (67%), thinning (56%), and weed control (33%).
 - All growers indicated that they would grow or increase their production of scab-resistant apples if the quality of the fruit was improved.
 - When asked would you consider growing scab-resistant apples organically? The response was Yes 22%, No , Maybe 78%.
 - When asked would you consider growing apples organically if the cost of thinning in an organic orchard could be greatly reduced? The response was Yes 56%, No , Maybe 44%.

In 2011, a study was conducted to assess the effectiveness of liquid lime sulfur alone or in combination with spray oil applied a various times during bloom on thinning three scab-resistant apple cultivars (Redfree, Liberty and GoldRush) under Iowa conditions. Original plans were to use organically approved JMS Style-Oil; however, it was not registered for use in Iowa. On short notice, a petroleum-based spray oil (BioCover MLT) was substituted for JMS Style-Oil.

Treatments included (*See* Table 1 for the times of the applications):

- 4% (v/v) liquid lime sulfur applied 2 times (80-100% full bloom and at petal fall plus 3 days).
- 4% liquid lime sulfur applied 3 times (80-100% full bloom, at full bloom on axillary blossoms, and at petal fall plus 3 days).
- 2% liquid lime sulfur + 1% spray oil applied 2 times (80-100% full bloom, and at petal fall plus 2 days).
- 2% liquid lime sulfur + 1% spray oil applied 3 times (80-100% full bloom, at full bloom on axillary blossoms and at petal fall plus 3 days).
- A water only control.

Treatments were applied to run-off with a hydraulic spray gun on single-tree plots replicated nine times in a randomized complete block design. At about 7-10 days after the last treatment, when fruit set could be determined, fruits remaining on the trees were counted, and any fruit in excess of a pre-determine number of 6 fruit per cm² trunk cross-sectional area were removed by hand and the time required to remove those fruit was recorded. At harvest, the number and weight of fruit per tree were recorded. Data was analyzed in a split-plot design with cultivar whole-plots and thinning treatment sub-plots. Most often there was a significant cultivar by thinning treatment interaction, and the data was re-analyzed by cultivar.

Results are summarized as follows:

- Both liquid lime sulfur (LS) and liquid lime sulfur plus spray oil (LS+O) treatments induced phytotoxic symptoms on the leaves that were characterized by stunting, marginal curling and some necrosis (*Figure* 21). Two applications of LS and LS+O were associated with less severe symptoms than three applications (Table 2). Symptoms were less severe on ‘GoldRush’ than on ‘Redfree’ or ‘Liberty’.
- LS and LS+O sprays killed some spur and axillary blossom clusters with the greatest mortality occurring on ‘Redfree’ when treated with three applications of LS+O (*Figure* 22 and Table 2). No dead spur blossom cluster and very few dead axillary blossom clusters were evident on ‘GoldRush’ trees.
- Three applications of LS+O over thinned ‘Redfree’ and ‘Liberty’ trees (Table 2). LS sprays were more effective in thinning ‘GoldRush’ than LS+O sprays.
- Although three applications of LS+O over thinned ‘Redfree’ and ‘Liberty’, the average fruit weight was lower than on the controls, with the other treatments being intermediate and not different from either (Table 2). On ‘GoldRush’, LS and LS+O sprays improved the average fruit weight over the water sprayed control.
- With the exception of two applications of LS on ‘Redfree’, all other treatments significantly reduce the time required to hand thin the trees to an acceptable crop load (Table 2).
- ‘Redfree’ trees sprayed twice with LS had return bloom densities that were less than the water only control. All other treatments had return bloom densities that were not different from the controls (Table 2).

In conclusion, the use of liquid lime sulfur alone or at a reduced rate in combination with spray oil is a viable alternative for thinning apples in an organic orchard. The response to these treatments was cultivar-dependent in regard to the thinning response and phytotoxic symptoms. ‘Redfree’ and ‘Liberty’ were the easiest to thin and responded best to two applications of LS+O, but no benefit in improved fruit size was gained over the water sprayed control. One of the reported side effects of lime sulfur sprays is a temporary reduction of photosynthesis. This side effect and the foliar injury observed on ‘Redfree’ and ‘Liberty’ trees following the treatment probably explains the lack of improved fruit size being associated with the thinning response. ‘GoldRush’ trees were the most difficult to thin with LS or LS+O, and responded best to three applications. They exhibited the least foliar injury and almost not cluster mortality from the sprays, and all thinning sprays improved fruit size over the water sprayed control. With the exception of 2 applications of LS on ‘Redfree’, all other LS and LS+O treatments significantly reduced the time required to supplemental hand thin the trees to acceptable crop loads compared to the hand thinned controls. In most cases where over-thinning did not occur, the time required to supplemental thin the trees was reduced to one-quarter of the time required to hand thin the control trees.

Goals and Outcomes Achieved

Optimal crop load studies: Goal was to attain a better understanding of the effects of cropping density on the performance of an apple cultivar on selected dwarfing rootstocks, and on the performance of selected scab-resistant apple cultivars to identify cropping densities to optimize high yields of high quality fruit on a sustained basis for both conventional and organic fruit growers.

- Studies were undertaken by Mr. Dennis Katuuramu, ISU graduate student in Horticulture, as his thesis component for a Master of Science degree. Dr. Gail Nonnecke, Dept. of Horticulture, Iowa State University served as Mr. Katuuramu’s major advisor, and Dr. Paul Domoto served as a member of his thesis committee.
- Mr. Katuuramu conducted field studies in 2010 and 2011, and was awarded degree in May 2012. As part of this thesis, two drafts of journal articles were prepared.
- During the time of his studies, he reported on his progress:
 - 2 published progress reports.
 - 3 grower conferences
 - 2 field days
- It was originally proposed to conduct a two-year study on the effects of cropping densities on the performance of scab-resistant apple cultivars in a randomized block design. However, a late spring frost in 2010 destroyed the blossoms in the scab-resistant apple cultivar plot, and the study on cropping density was switched to the ‘Gibson Golden Delicious’ plot on selected rootstocks. In both studies, the inability to achieve targeted crop load densities though hand thinning, data had to be analyzed by analysis of co-variance in a completely random design.

Thinning apples with organic-approved materials: The goal was to evaluate methods to chemically thin scab-resistant apple cultivars with organic-approved material under Iowa condition to make growing apples organically a less labor-intensive enterprise.

- Prior to initiating the study, participants at the ISU Organic Conference and apple growers at the Iowa Fruit and Vegetable Growers Conference were asked to participate in

a short survey. In both cases, the majority of those taking the survey (non-apple growers at the Organic Conference, and apple growers at the Fruit and Vegetable Growers Conference) indicated that they would consider growing apples organically if the cost of thinning in an organic orchard could be greatly reduced.

- This study was undertaken by Drs. Paul Domoto and Gail Nonnecke, Dept. of Horticulture, Iowa State University with assistance from Mr. Dennis Katuuramu, ISU graduate student in Horticulture, and Mr. Lynn Schroeder, field lab tech, ISU Horticulture Research Station.
- Spray treatments of 4% (v/v) liquid lime sulfur (LS) or 2% liquid lime sulfur in combination with 1% (v/v) spray oil (LS+O) were applied two or three times during the bloom period and compared to a water only sprayed control on dwarfed ‘Redfree’, ‘Liberty’ and ‘GoldRush’ trees.
- Results from the study showed that apples could be thinned using LS or LS+O, and significantly reduced the time required to supplemental hand thin the trees to acceptable cropping densities. Cultivar differences were evident regarding the optimum treatment combination.
- Because petroleum-based spray oil was substituted for the organic-approved JMS Style-Oil, the study was not considered an organic thinning trial only. However the results would apply if an organic-approved spray oil were used.
- Progress was reported in:
 - 1 published progress report.
 - 2 grower conferences
 - 1 field day

Beneficiaries

Optimal crop load studies: Results from the studies on ‘Gibson Golden Delicious’ grown on various dwarfing rootstock, and on scab-resistant ‘Redfree’, ‘Liberty’ and ‘GoldRush’ apple trees would apply to both conventional and organic apple producers in the Midwest. Optimizing the cropping density assures high yields of quality fruit in size ranges that bring a premium sales value on a sustained basis, and allow growers to maintain a competitive advantage.

Thinning apples with organic-approved materials: Results from this study would apply to organic apple growers in the Midwest who wish to lower their labor requirements and/or expand their orchard, and to conventional growers considering transitioning to an organic production system. For an organic apple grower, regulating the crop load by hand thinning is the one major expense to manage compared to conventional apple production. Treatments that induced a significant fruit thinning response reduced the time required to supplemental hand thin the trees by at least one-quarter of the time required to hand thin control trees. Such a savings greatly increases the feasibility for growing apples organically. However, liquid lime sulfur is not registered for use on apples during the bloom period. Therefore, for organic apple growers in Iowa to use it for thinning apples, a Section 18 specific exemption for the use of liquid lime sulfur for thinning apples during the bloom period would need to be obtained. Such an exemption has been obtained for the Washington apple industry.

Lessons Learned

- It is very difficult to attain specific cropping densities on apple trees through hand thinning. Thinning has to be accomplished within about 35 days from full bloom before

the existing crop loads would have an affect the return bloom for the following year's crop. During this period, natural fruit set is still being determined. In addition, weather-related events can occur during the growing season that would affect cropping density. Therefore, studies of this nature require a high number of replications to account for variability from various sources.

Contact Person:

Dr. Paul Domoto
Dept. of Horticulture
Iowa State University
Ames, IA 50011
Ph: (515) 294-0035
Email: domoto@iastate.edu

Additional Information

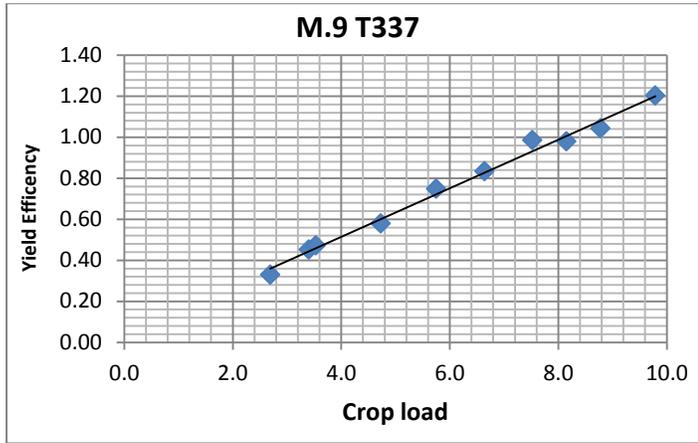
Publications:

- Katuuramu, D., G. Nonnecke, and P. Domoto. 2011. Influence of rootstocks and crop load ratios on Gibson Golden Delicious apple yield and fruit quality. Ann. Prog. Rept. – 2010 for Hort. Res. Sta., ISRF10-36:25-26. <http://www.ag.iastate.edu/farms/10reports/HortStation/InfluenceRootstock.pdf>
- Domoto, P., D. Katuuramu, G. Nonnecke, and L. Schroeder. 2012. Thinning scab-resistant apples with liquid lime sulfur sprays during bloom. Ann. Prog. Rept. – 2011 for Hort. Res. Sta., ISRF11-36:48-49. <http://www.ag.iastate.edu/farms/11reports/Horticulture/ThinningScabApples.pdf>
- Katuuramu, D., G. Nonnecke, and P. Domoto. 2012. Influence of crop load on tree growth, yield and fruit quality of scab resistant apples at harvest. Ann. Prog. Rept. – 2011 for Hort. Res. Sta., ISRF11-36:55-56. <http://www.ag.iastate.edu/farms/11reports/Horticulture/InfluenceCropLoad.pdf>
- Katuuramu, D. N. 2012. Evaluation of rootstock and crop load effects on the performance of ‘Gibson Golden Delicious’ and three scab-resistant apple cultivars. MS Thesis. Iowa State Univ., Ames, IA.

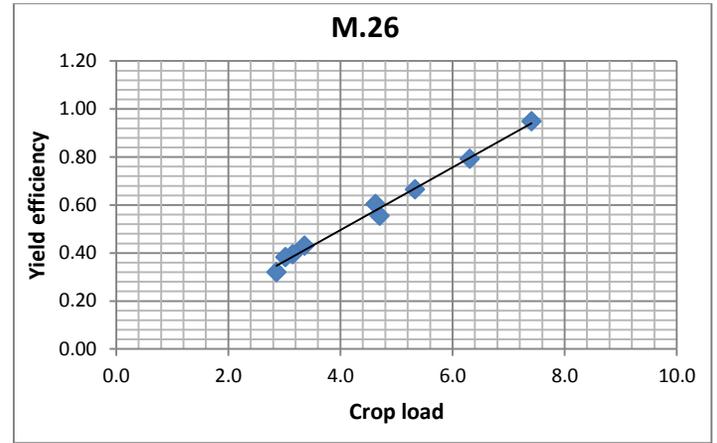
Presentations:

- Katuuramu, D. *Influence of rootstocks and crop load ratios on ‘Gibson Golden Delicious’ apple yield, fruit quality and return bloom.* All Horticulture Field Day, 29 July 2010, Horticulture Research Station, Ames. (200 attendees)
- Katuuramu, D. *Organic Apple Update.* Iowa Organic Conference, 22 November 2010, Ames. (230 attendees)
- Katuuramu, D. *Influence of rootstocks and crop load ratios on ‘Gibson Golden Delicious’ apple yield and fruit quality.* 29 January 2011, Iowa Fruit & Vegetable Growers Conference, Des Moines. (120 attendees, 25 in session)
- Domoto, P. *Thinning apples with organic-approved materials.* 29 January 2011, Iowa Fruit & Vegetable Growers Conference, Des Moines. (120 attendees, 25 in session)
- Katuuramu, D. *Influence of crop load ratios on yield, fruit quality of scab-resistant apple cultivars, and thinning scab-resistant apples with lime sulfur sprays.* All Horticulture Field Day, 19 July 2011, Horticulture Research Station, Ames. (180 attendees)
- Domoto, P., D. Katuuramu, G. Nonnecke, and L. Schroeder *Thinning scab-resistant apples with lime sulfur sprays.* (poster) 27 Jan 2012, Iowa Fruit and Vegetable Growers Conference, Ankeny, IA (150 attendees)
- Katuuramu, D., G. Nonnecke, and P. Domoto. *Influence of crop load on tree growth, yield, and fruit quality of scab resistant apples at harvest.* (poster) 27 Jan 2012, Iowa Fruit and Vegetable Growers Conference, Ankeny, IA (150 attendees)

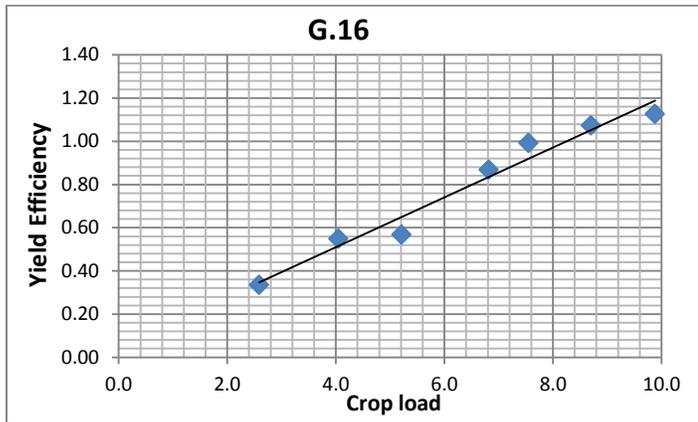
PROJECT TITLE: Optimizing the Cropping Potential and Profitability for Growing Scab-resistant Apple Cultivars in Conventional and Organic Systems



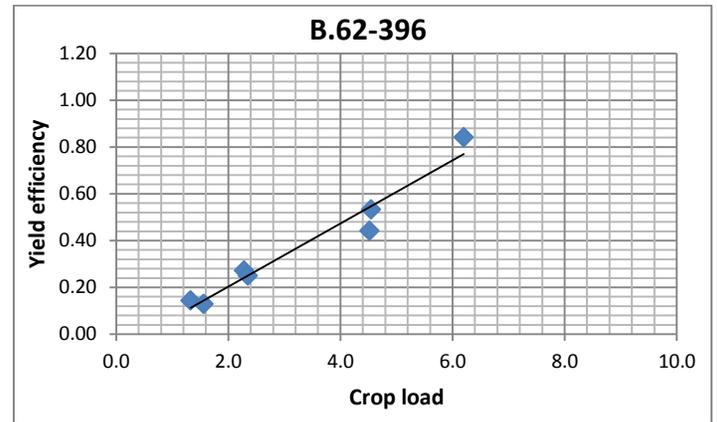
P=,0001



P=,0001

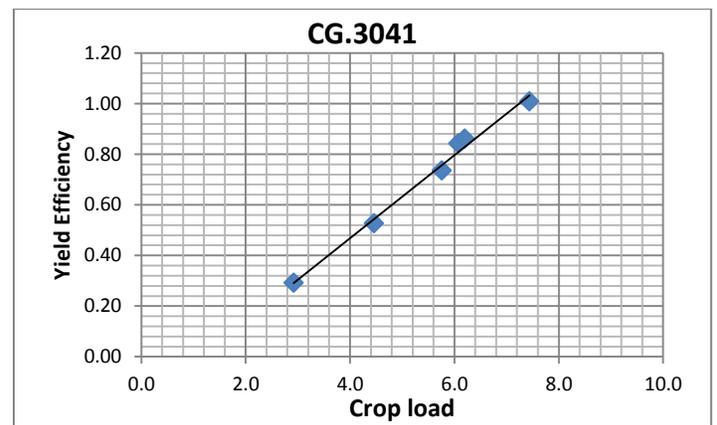


P=,0001

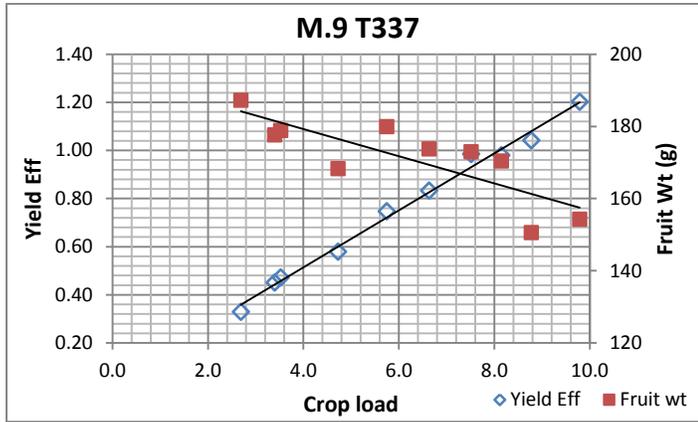


P=,0001

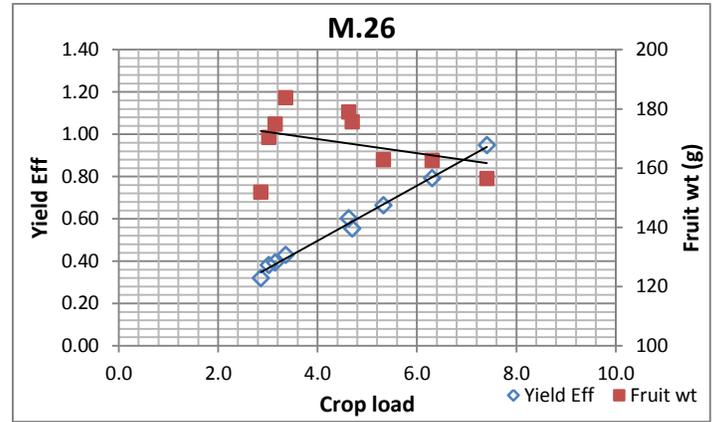
Figure 1. The effect of varying cropping densities reported as fruit per cm² TCSA as measured in the spring on the yield efficiency reported as kg/cm² TCSA (measured in the fall) on ‘Gibson Golden Delicious’ trees grown on five dwarfing rootstocks.



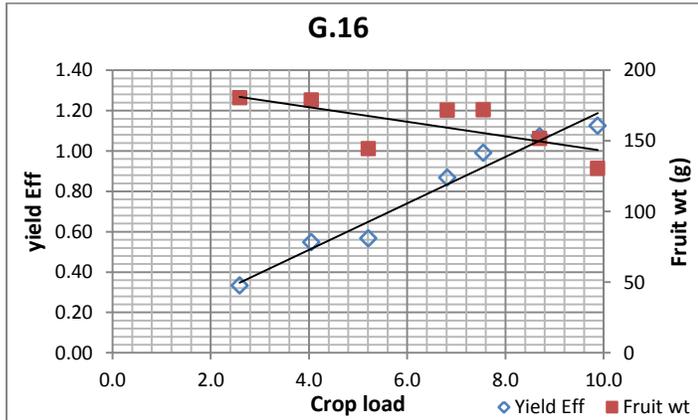
$P = .0001$



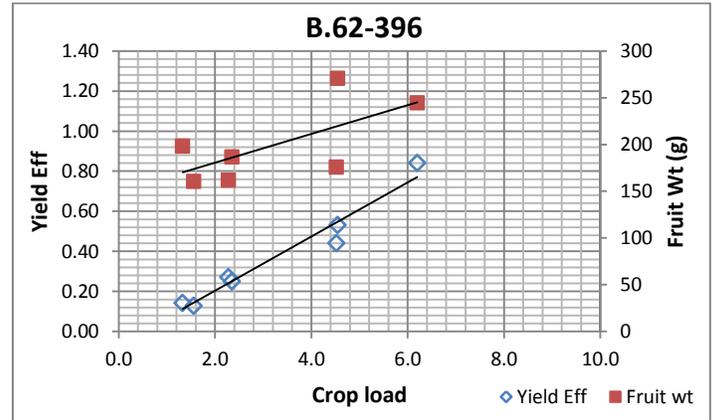
$P = .7273$



$P = .8828$

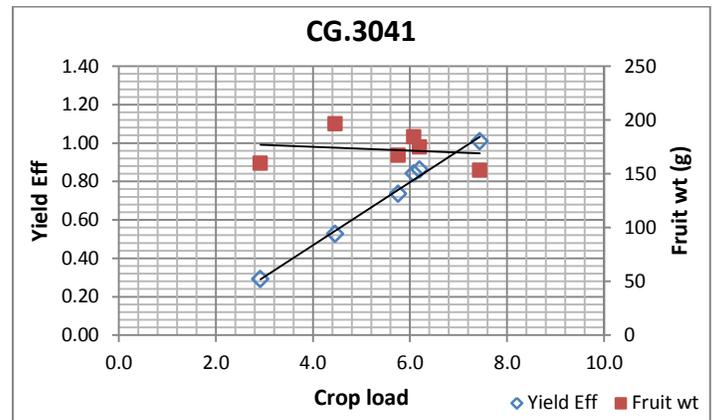


$P = .6704$

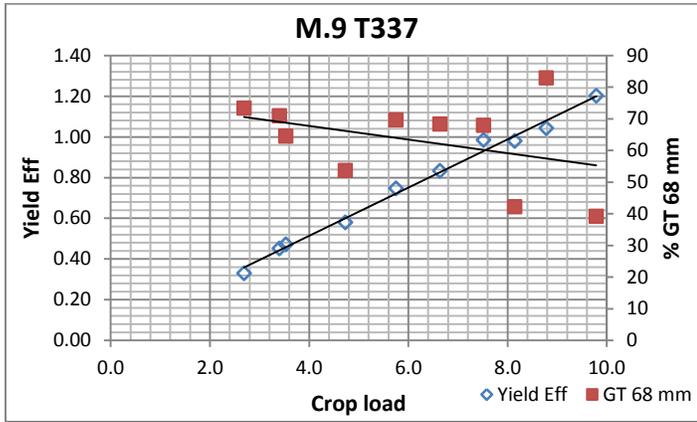


$P = .0730$

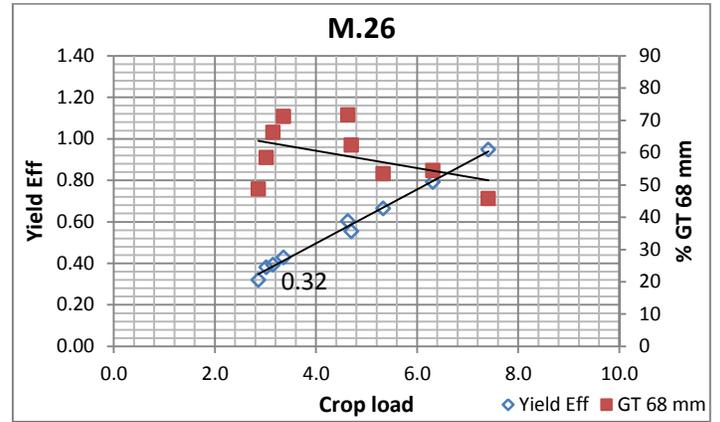
Figure 2. The effect of varying cropping densities reported as fruit per cm² TCSA as measured in the spring on the average fruit weight on 'Gibson Golden Delicious' trees grown on five dwarfing rootstocks.



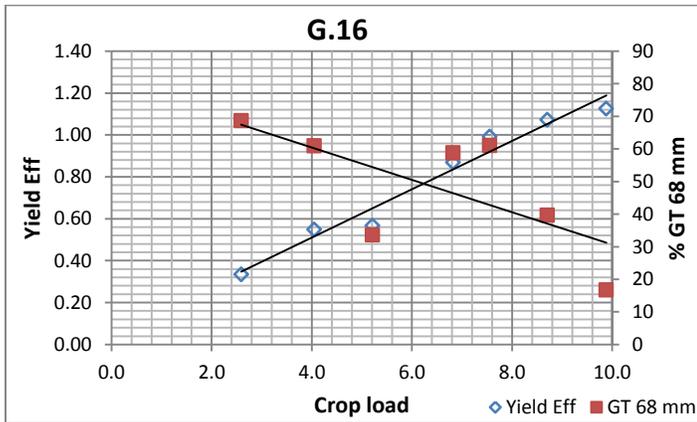
$P = .9104$



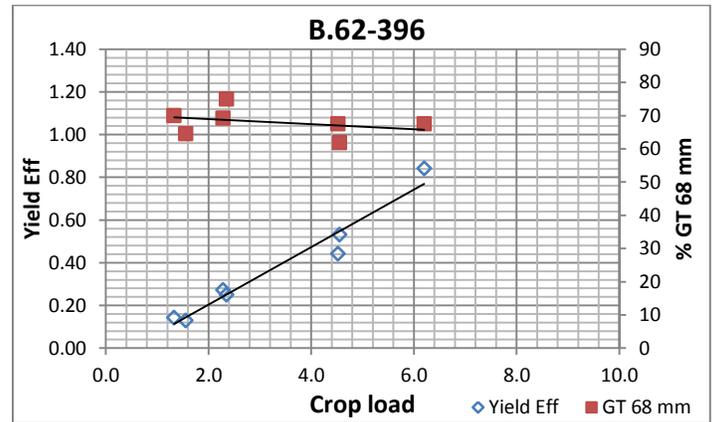
NS



NS

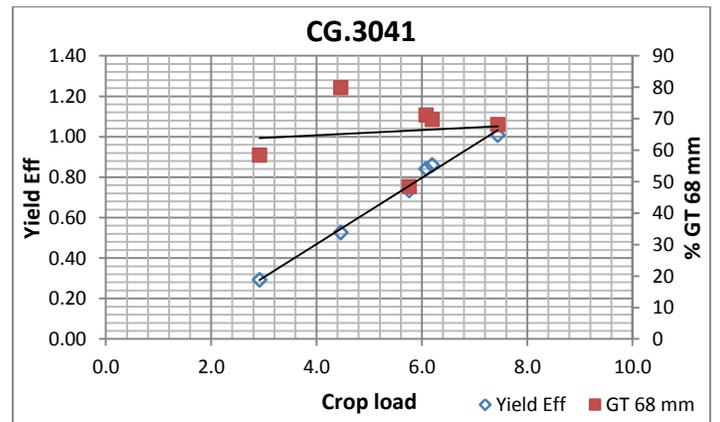


NS

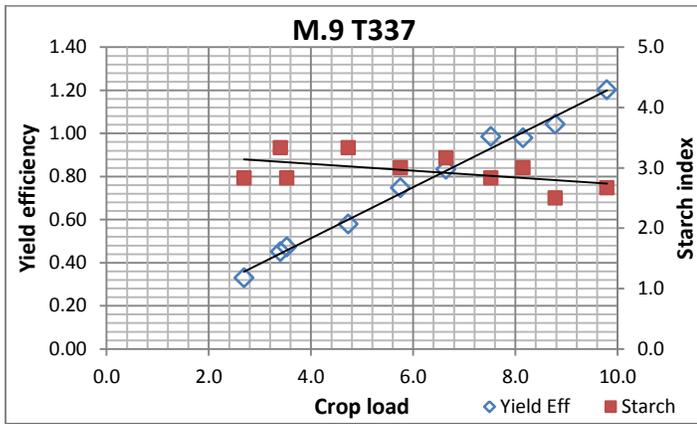


NS

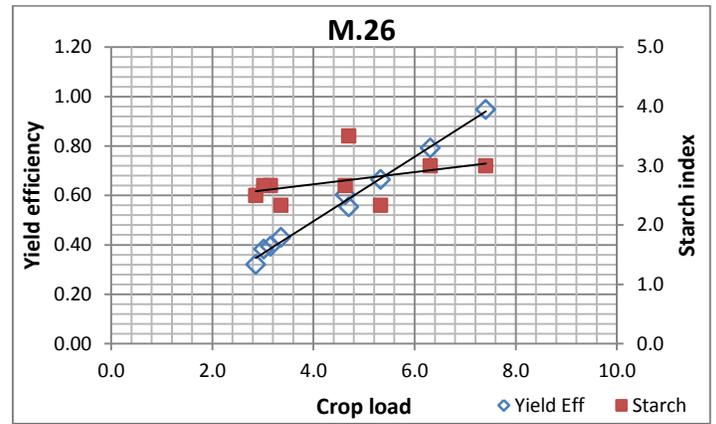
Figure 3. The effect of varying cropping densities reported as fruit per cm² TCSA as measured in the spring on the percentage of large-sized fruit on ‘Gibson Golden Delicious’ trees grown on five dwarfing rootstocks.



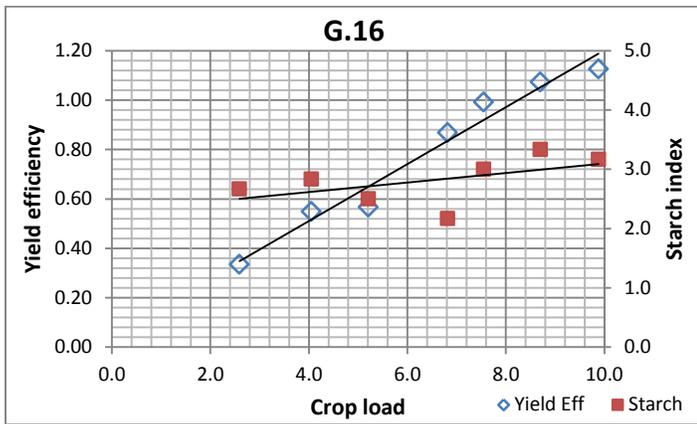
NS



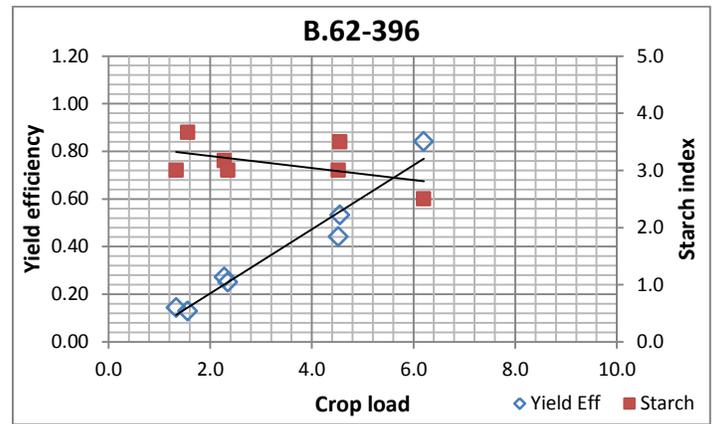
$P=.0047$



$P=.0016$

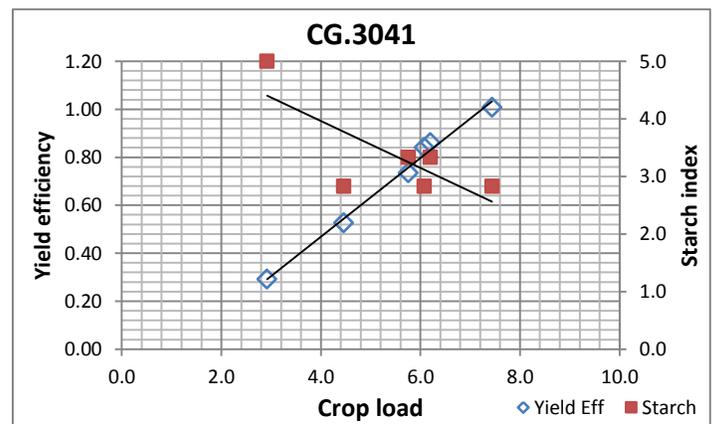


$P=.0009$

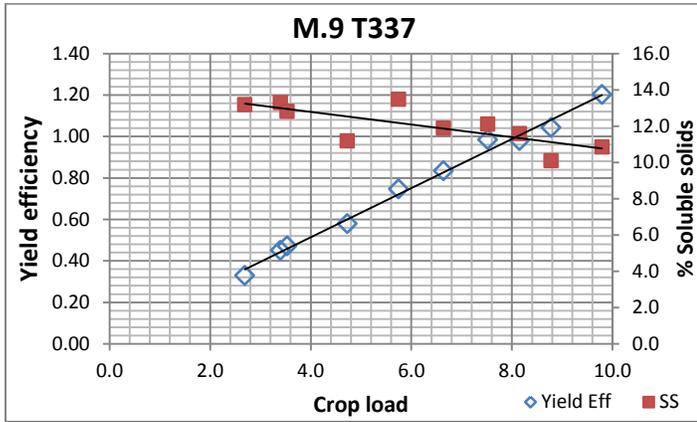


$P=.0433$

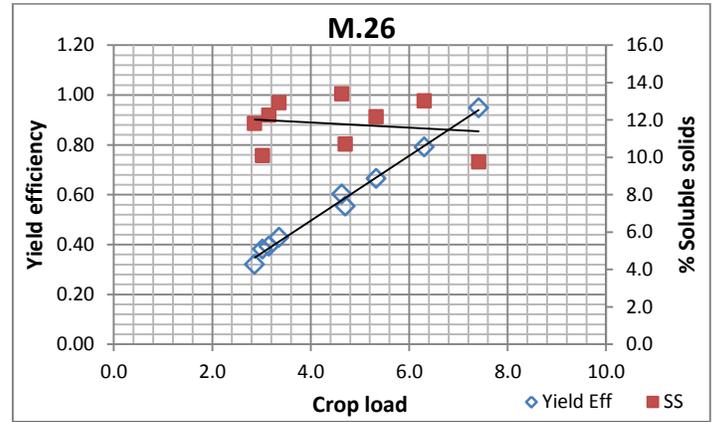
Figure 4. The effect of varying cropping densities reported as fruit per cm² TCSA as measured in the spring on the starch index values at harvest for fruit harvested from ‘Gibson Golden Delicious’ trees grown on five dwarfing rootstocks. Higher values indicate less staining of the flesh when dipped in an iodine solution.



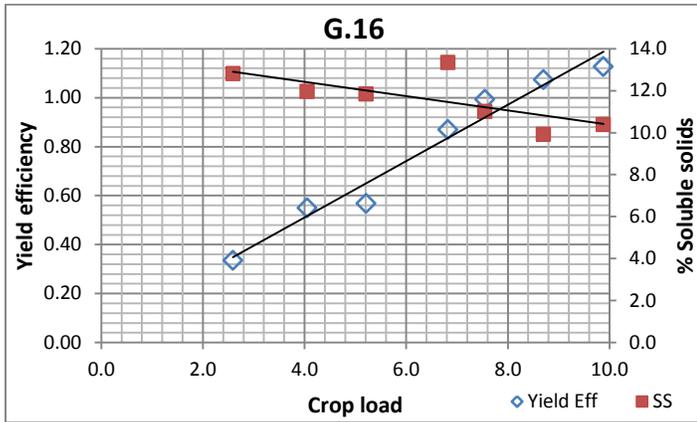
$P=.0005$



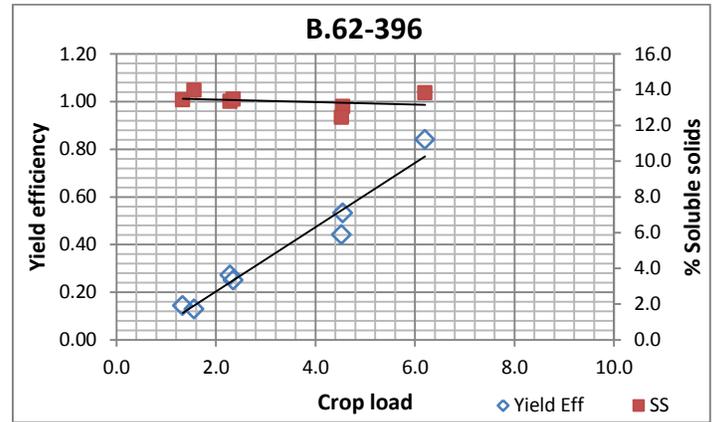
$P=.1768$



$P=.0557$

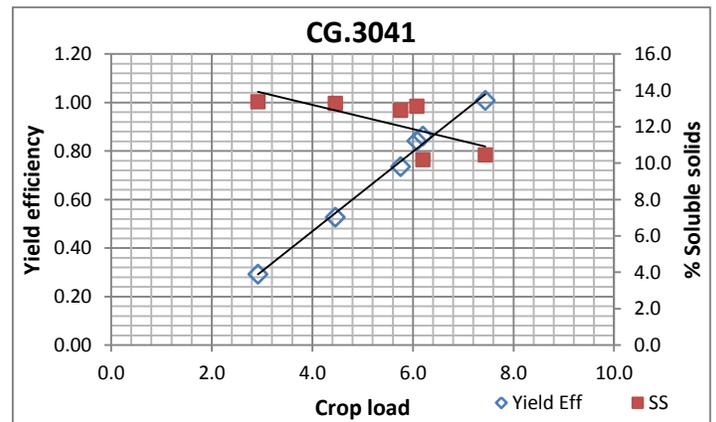


$P=.2776$

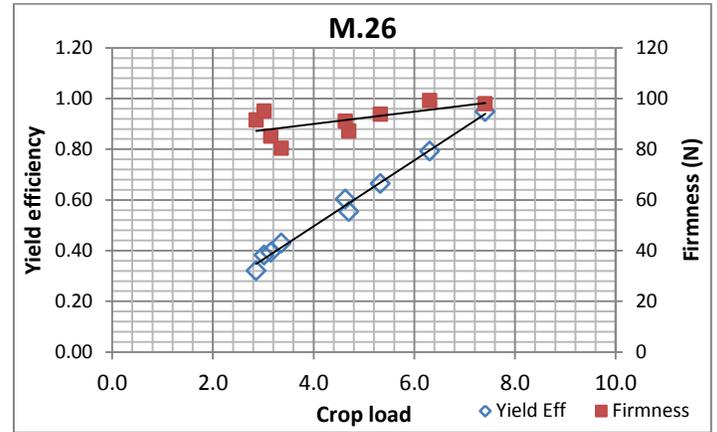
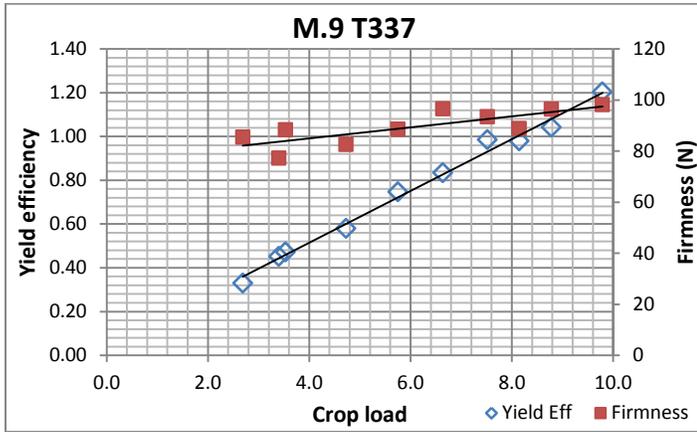


$P=.1409$

Figure 5. The effect of varying cropping densities reported as fruit per cm² TCSA as measured in the spring on the percentage of soluble solids at harvest for fruit harvested from ‘Gibson Golden Delicious’ trees grown on five dwarfing rootstocks.

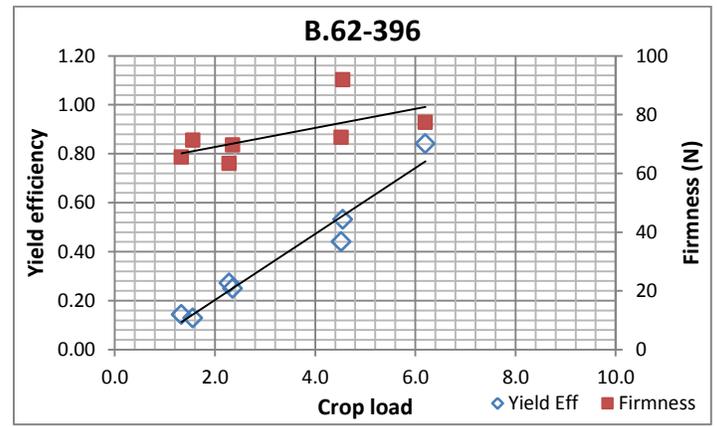
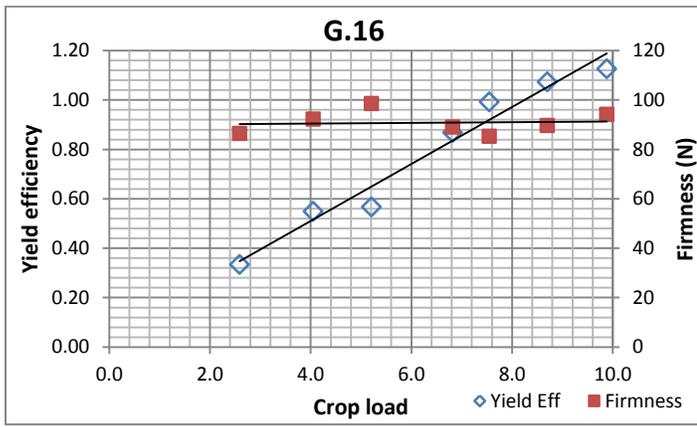


$P=.0379$



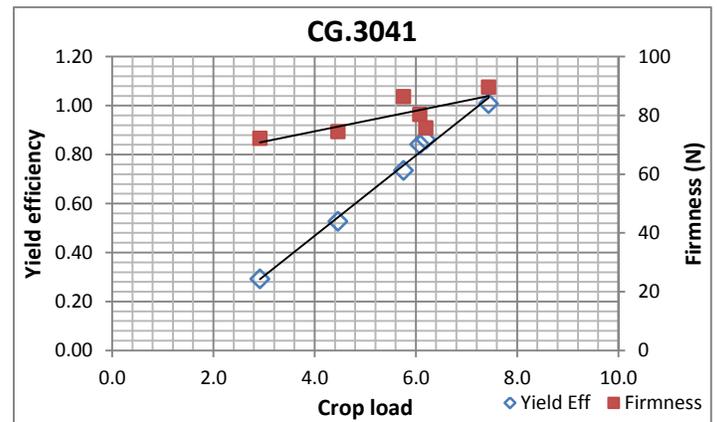
NS

NS



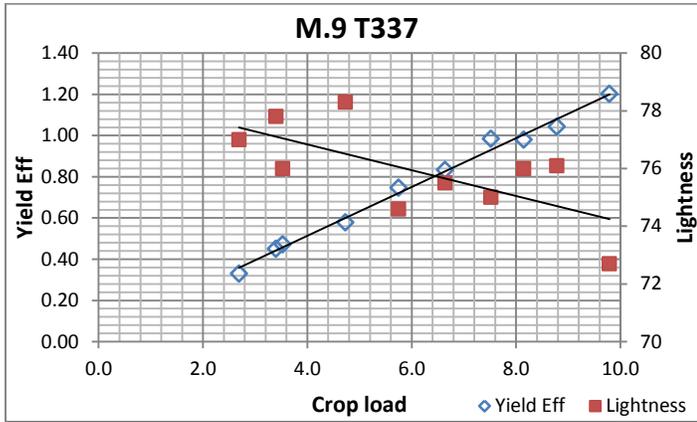
NS

NS

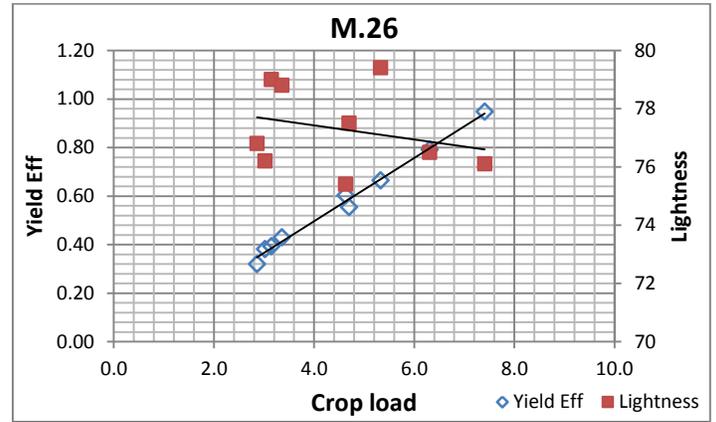


NS

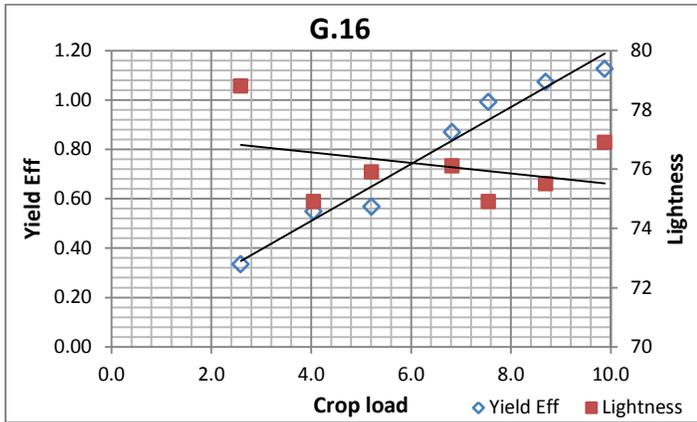
Figure 6. The effect of varying cropping densities reported as fruit per cm² TCSA as measured in the spring on the firmness (*in* Newtons) at harvest of fruit harvested from ‘Gibson Golden Delicious’ trees grown on five dwarfing rootstocks.



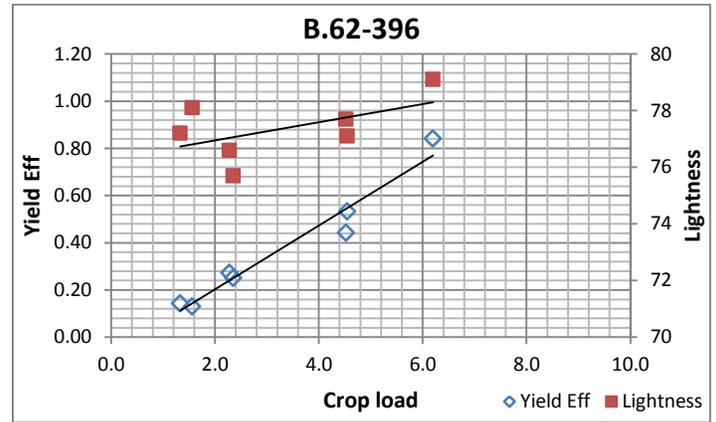
$P=.0322$



$P=.0086$

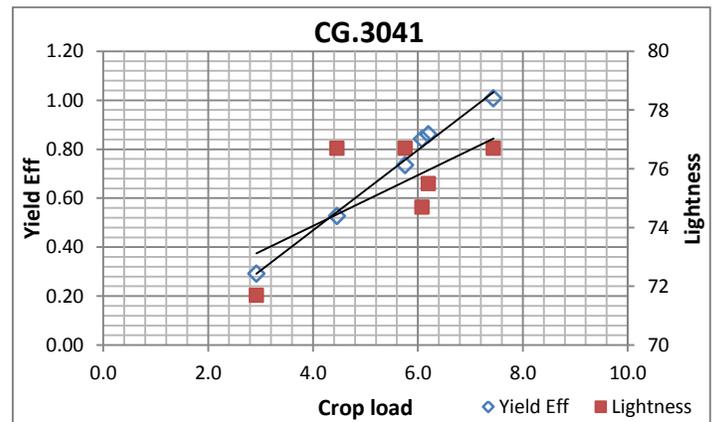


$P=.1511$

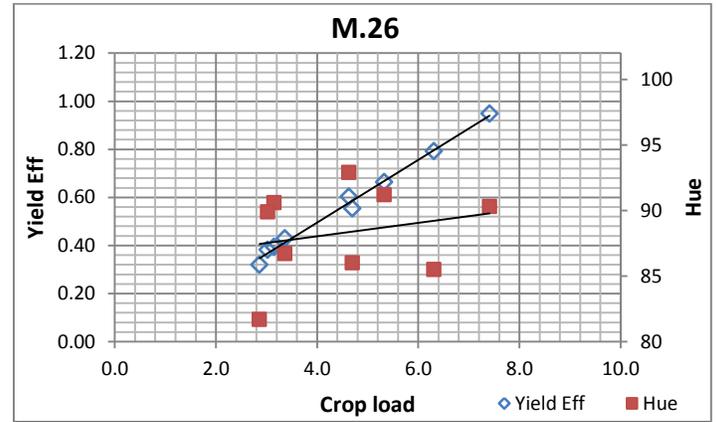
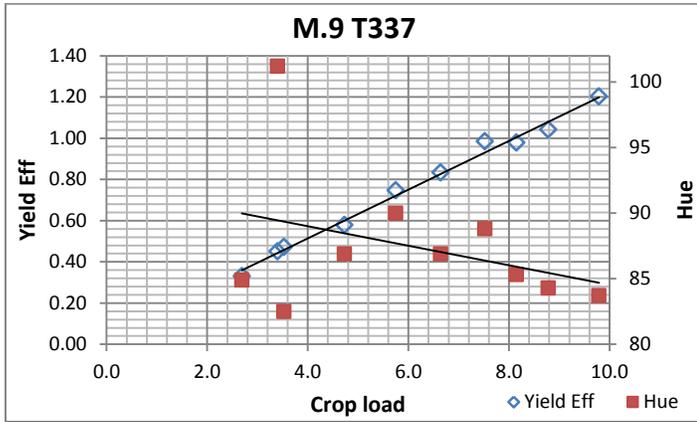


$P=.0675$

Figure 7. The effect of varying cropping densities reported as fruit per cm² TCSA as measured in the spring on the lightness of apple skins at harvest for ‘Gibson Golden Delicious’ fruit grown on five dwarfing rootstocks. Higher values indicate a lighter shade.

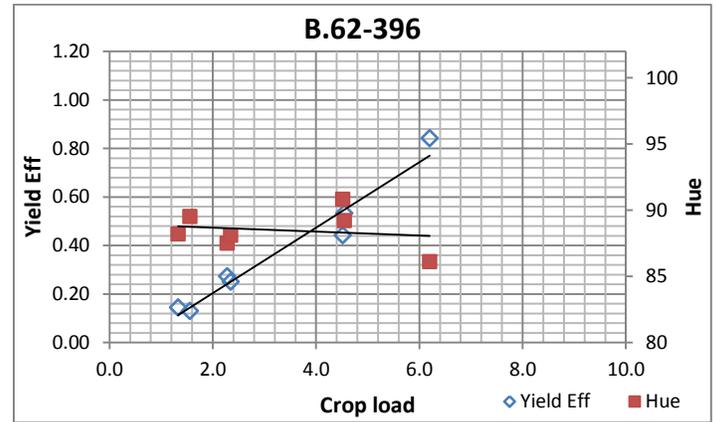
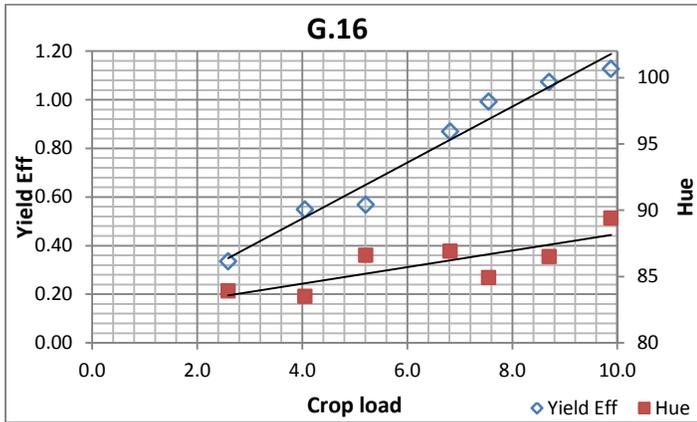


$P=.2876$



NS

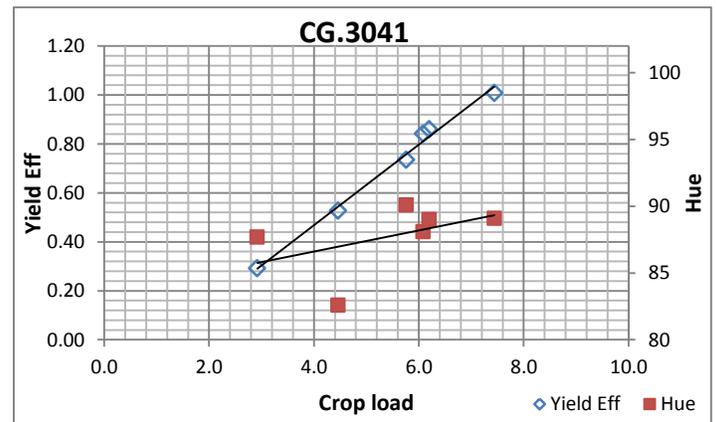
NS



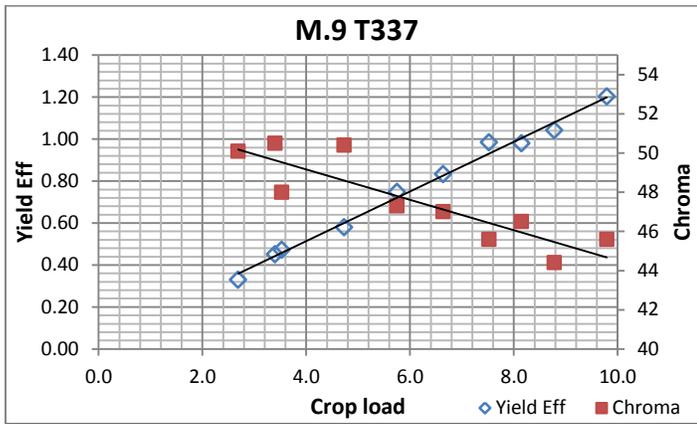
NS

NS

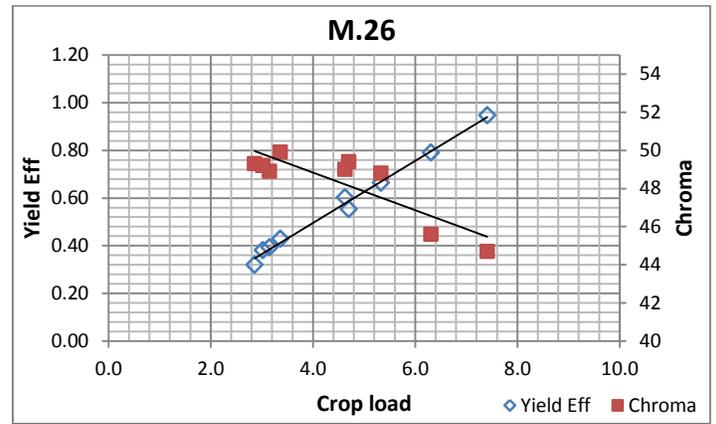
Figure 8. The effect of varying cropping densities reported as fruit per cm² TCSA as measured in the spring on the hue of apple skins at harvest for ‘Gibson Golden Delicious’ fruit grown on five dwarfing rootstocks. Values near 0 = red, 60 = yellow and 120 = green.



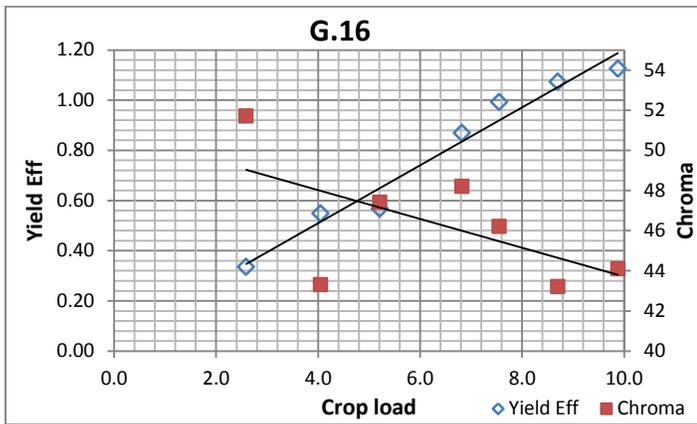
NS



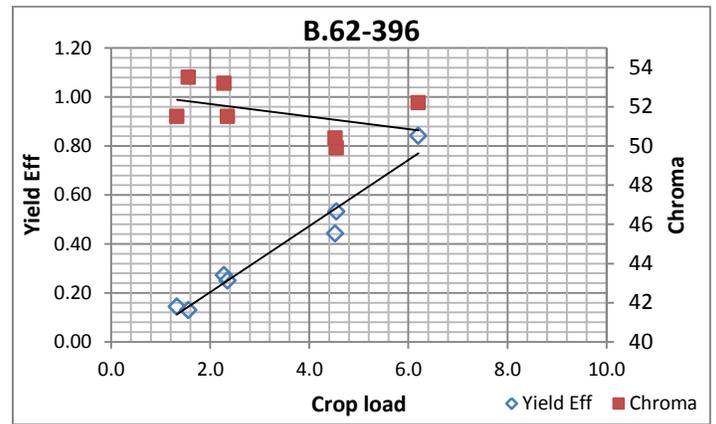
$P=.2763$



$P=.2063$

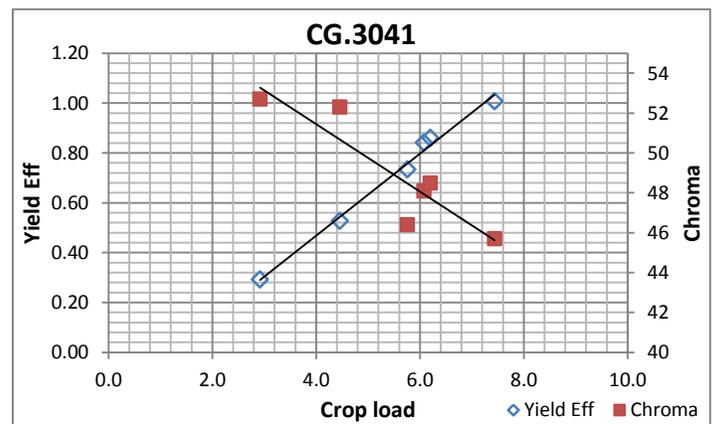


$P=.2923$

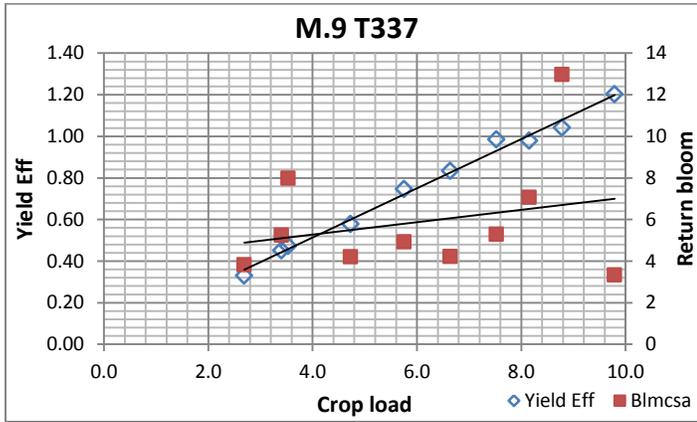


$P=.0142$

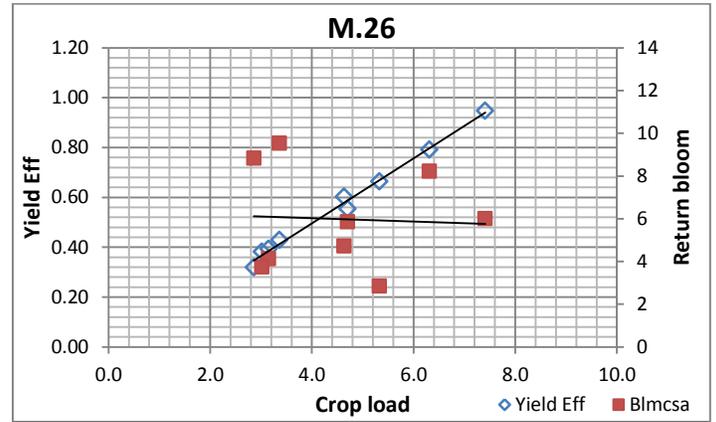
Figure 9. The effect of varying cropping densities reported as fruit per cm² TCSA as measured in the spring on the chroma of apple skins at harvest for ‘Gibson Golden Delicious’ fruit grown on five dwarfing rootstocks. Lower values indicate a duller finish.



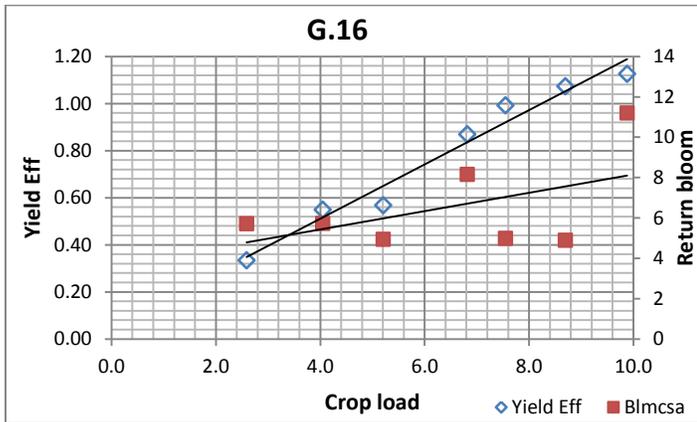
$P=.1514$



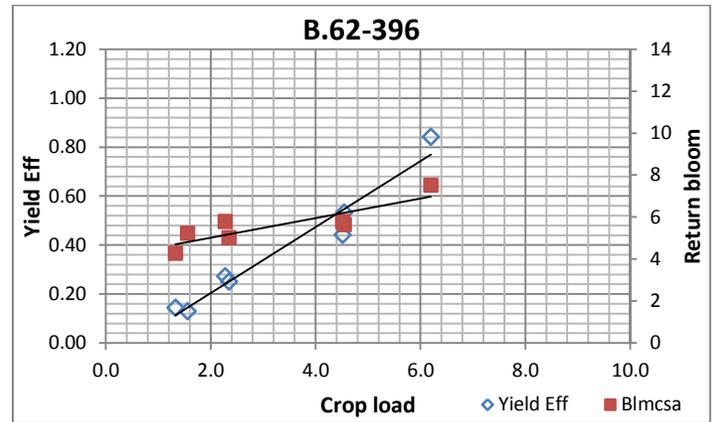
NS



NS

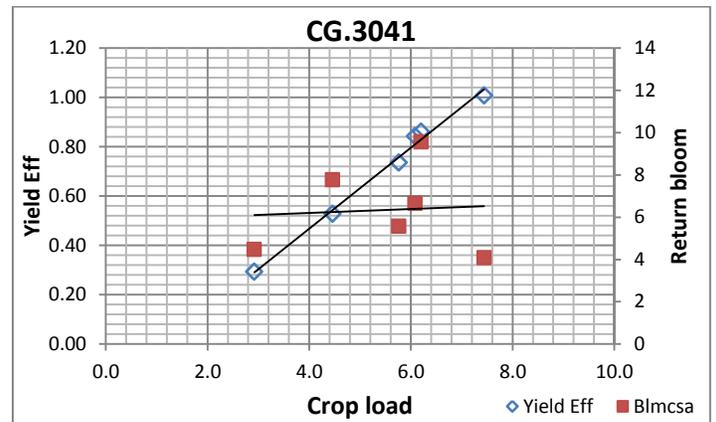


NS

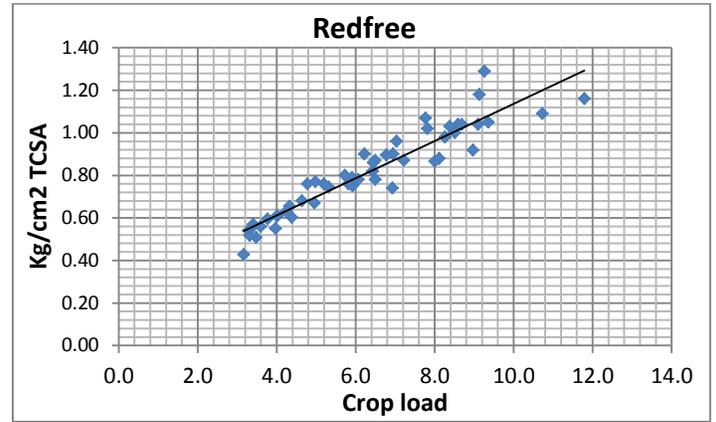
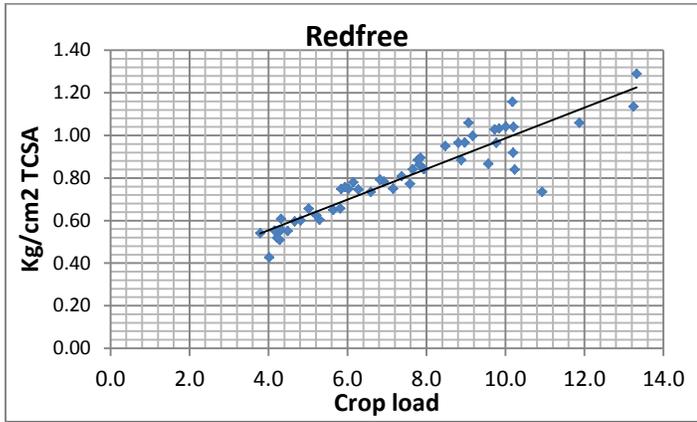


NS

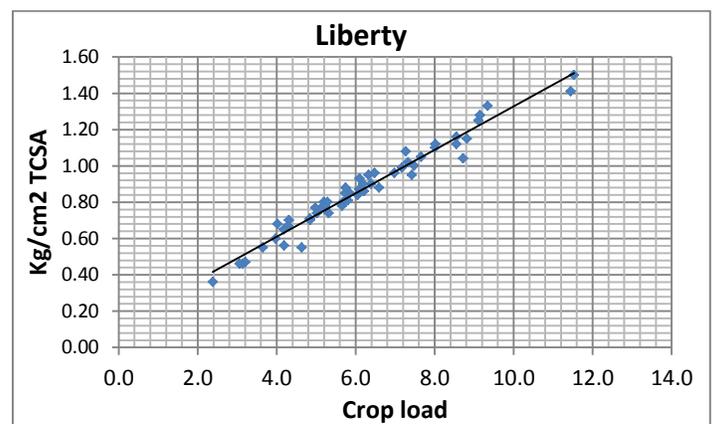
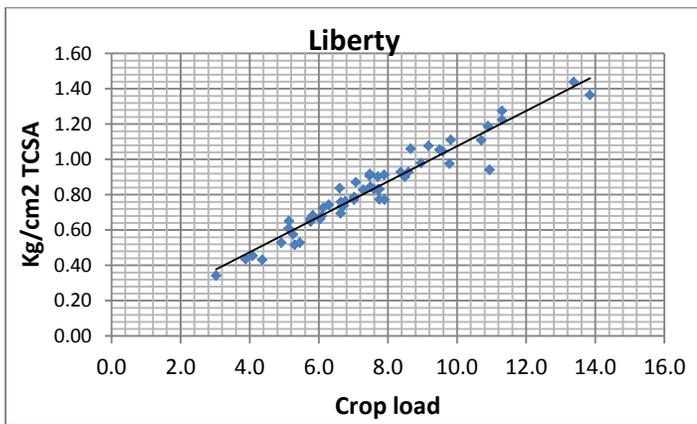
Figure 10. The effect of varying cropping densities reported as fruit per cm² TCSA as measured in the spring on the return bloom density of ‘Gibson Golden Delicious’ trees grown on five dwarfing rootstocks.



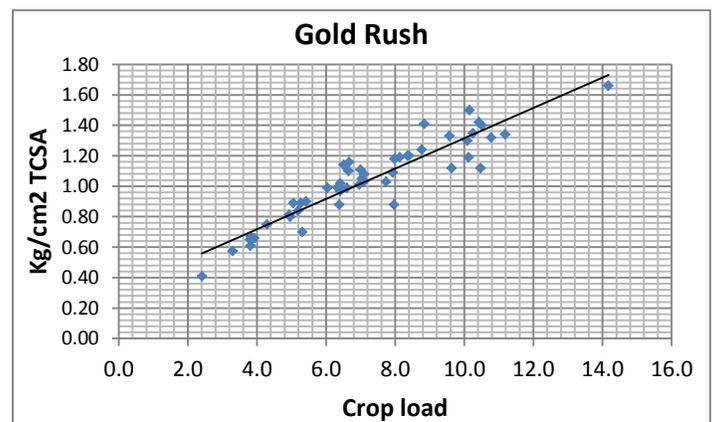
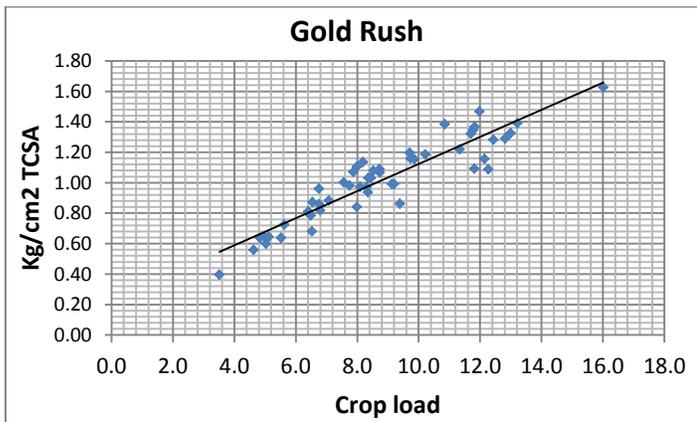
NS



$P = .0001$

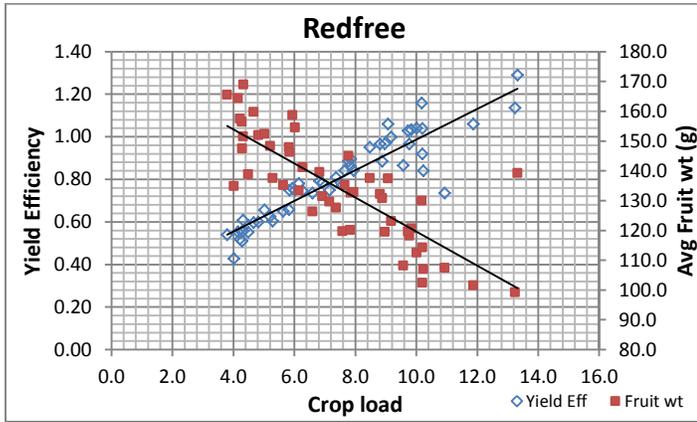


$P = .0001$

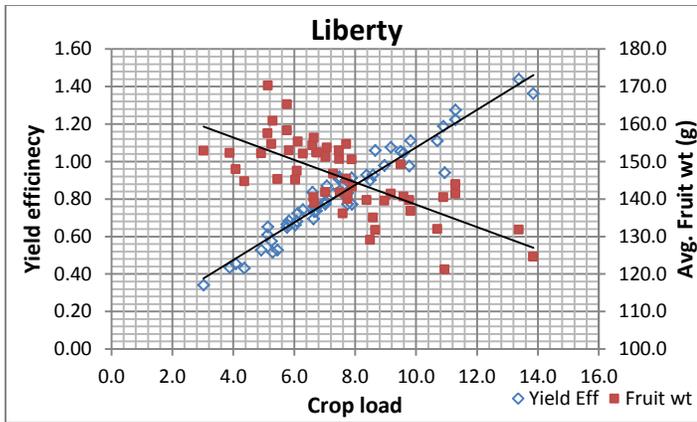
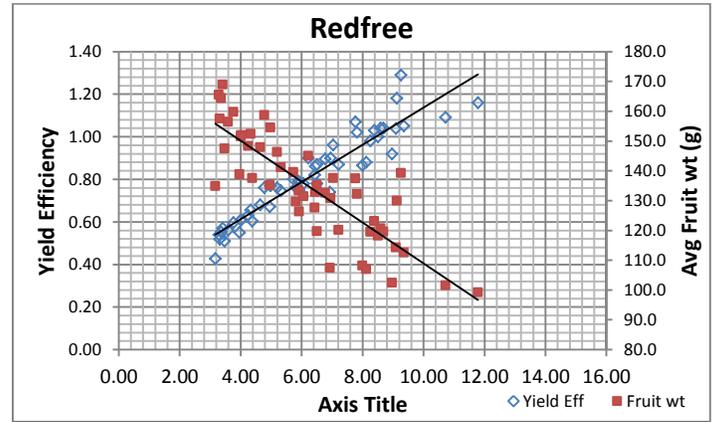


$P = .0001$

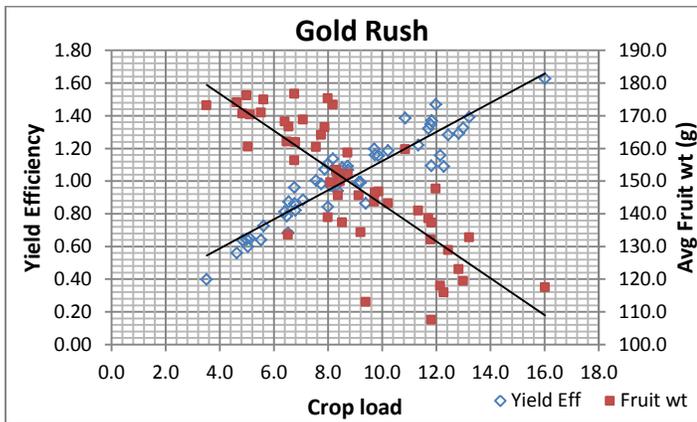
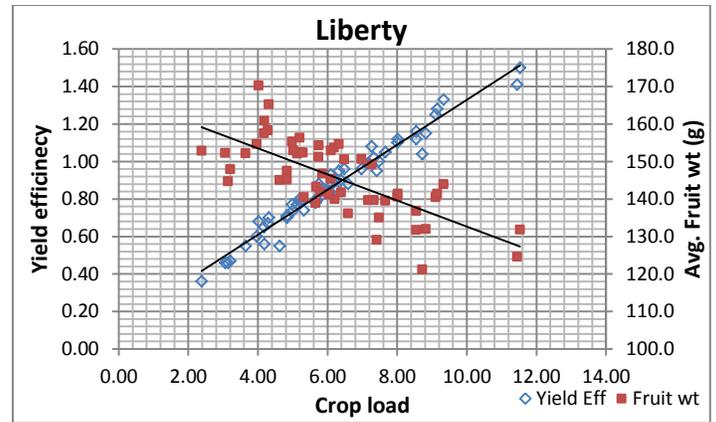
Figure 11. The effect of varying cropping densities reported as fruit per cm^2 TCSA as measured in the spring (*left column*) and in the fall (*right column*) on the yield efficiency reported as kg/cm^2 TCSA (measured in the fall) on three scab-resistant apple cultivars on M.9 rootstock.



$P=.0001$



$P=.0034$



$P=.0001$

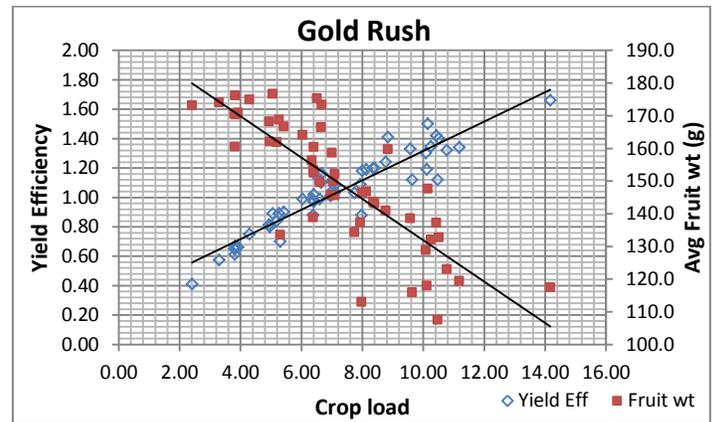
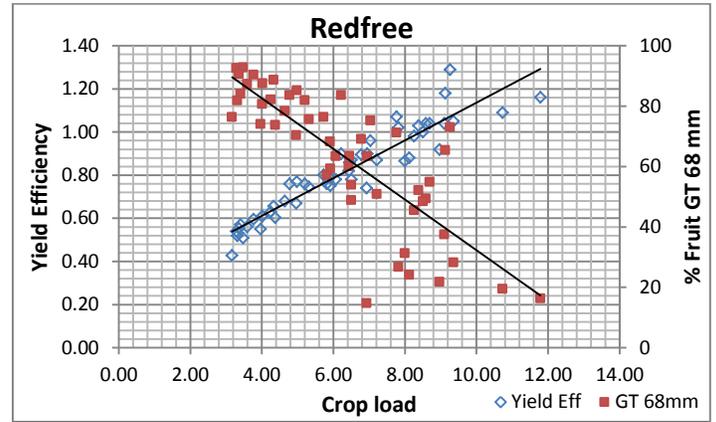
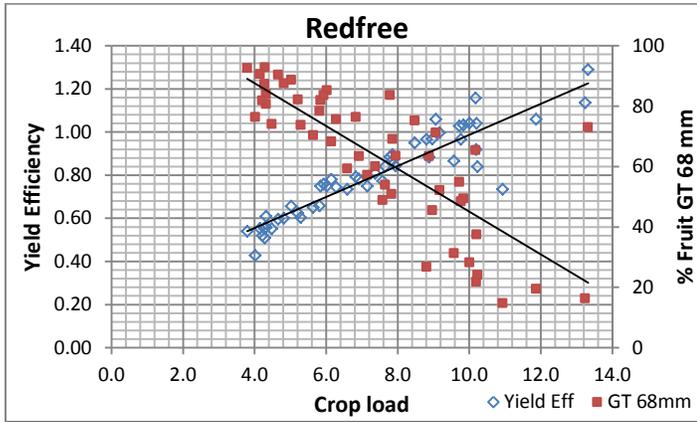
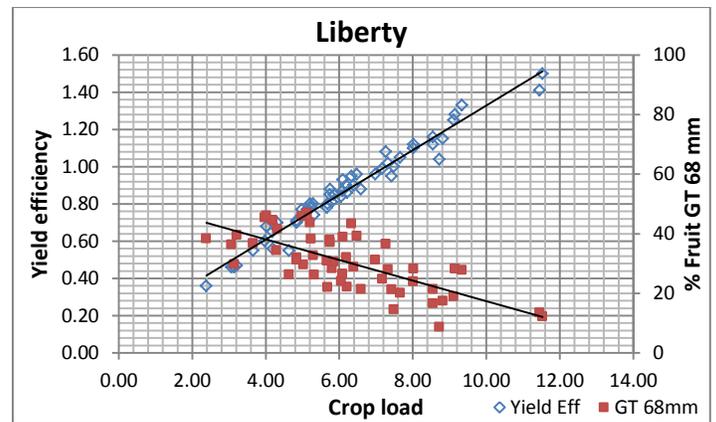
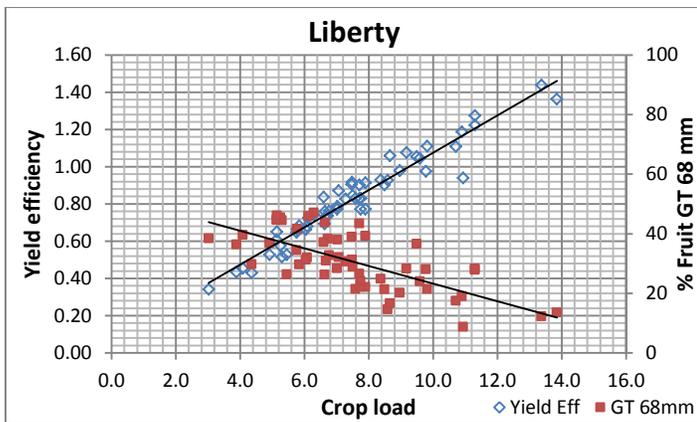


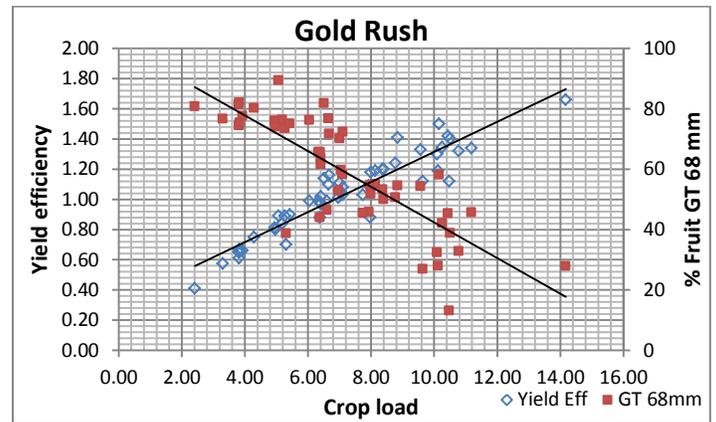
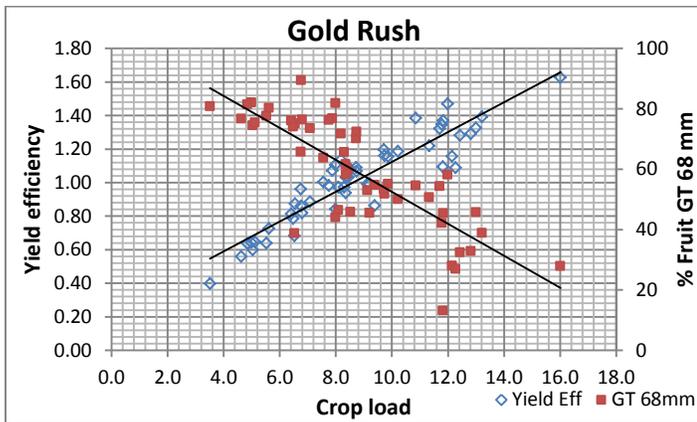
Figure 12. The effect of varying cropping densities reported as fruit per cm^2 TCSA as measured in the spring (left column) and in the fall (right column) on the average weight of fruit harvested from three scab-resistant apple cultivars on M.9 rootstock.



$P=.0001$

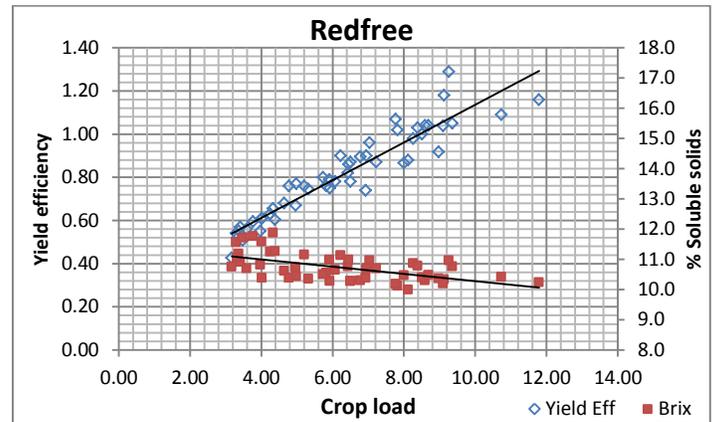
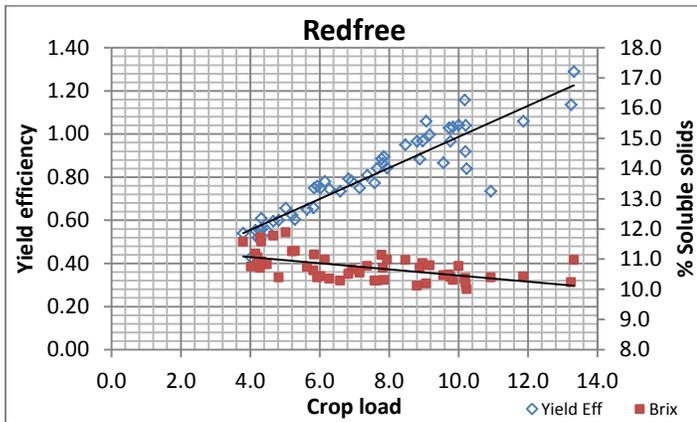


$P=.0001$

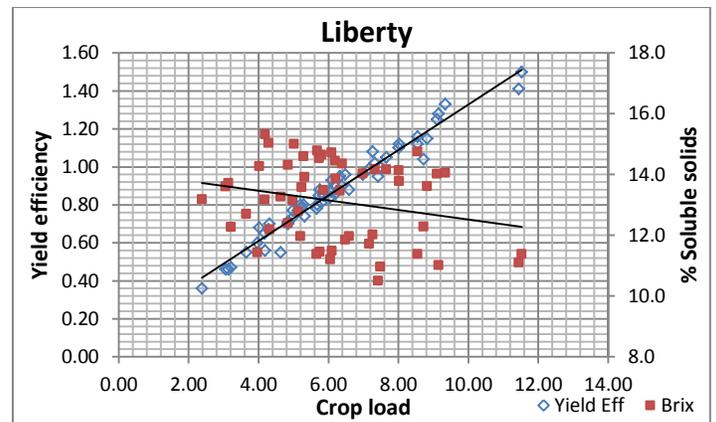
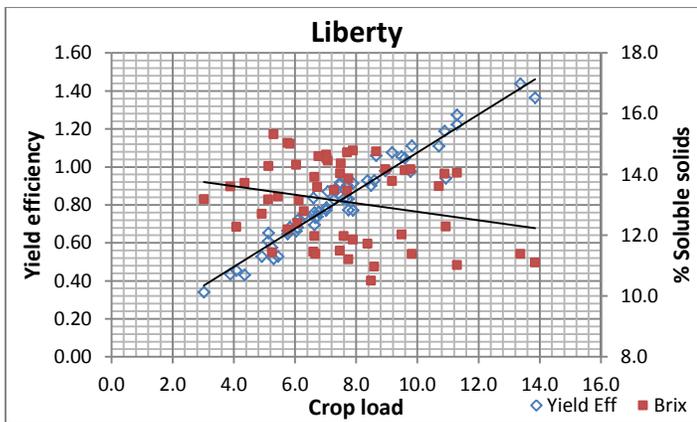


$P=.0001$

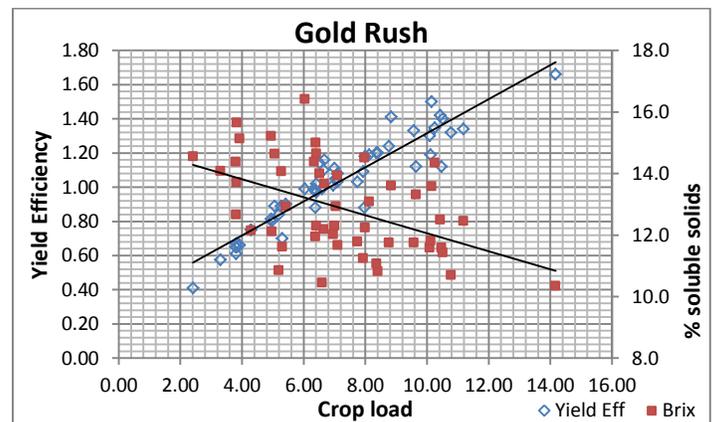
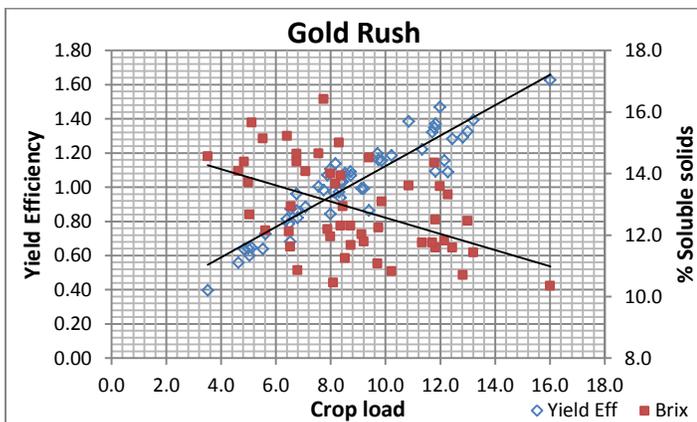
Figure 13. The effect of varying cropping densities reported as fruit per cm^2 TCSA as measured in the spring (left column) and in the fall (right column) on the percentage of large-sized fruit harvested from three scab-resistant apple cultivars on M.9 rootstock.



$P=.0001$

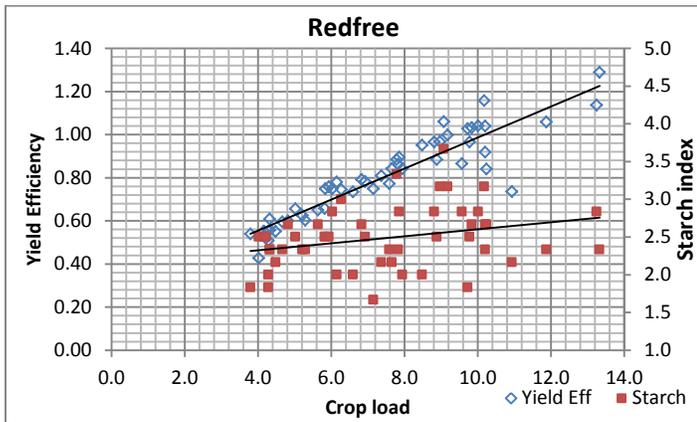


$P=.0766$

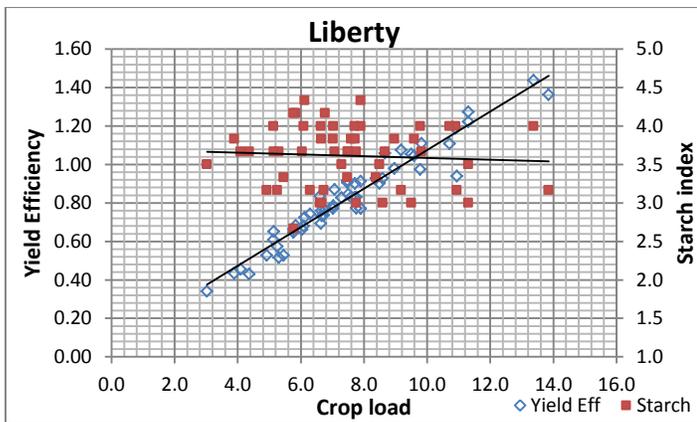
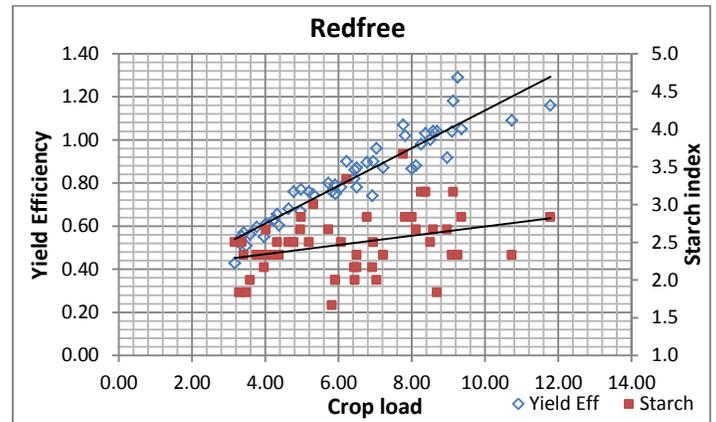


$P=.4005$

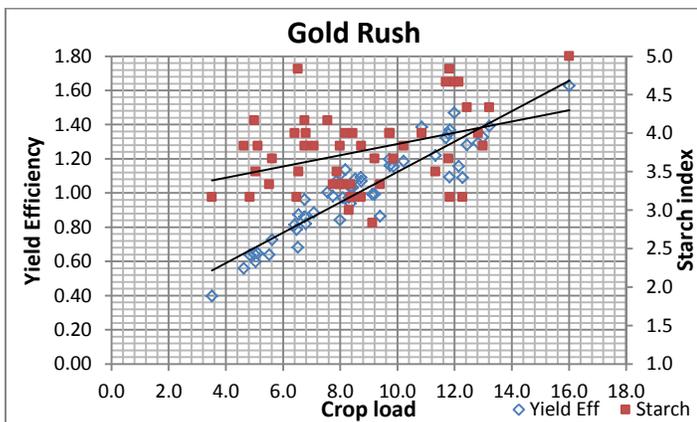
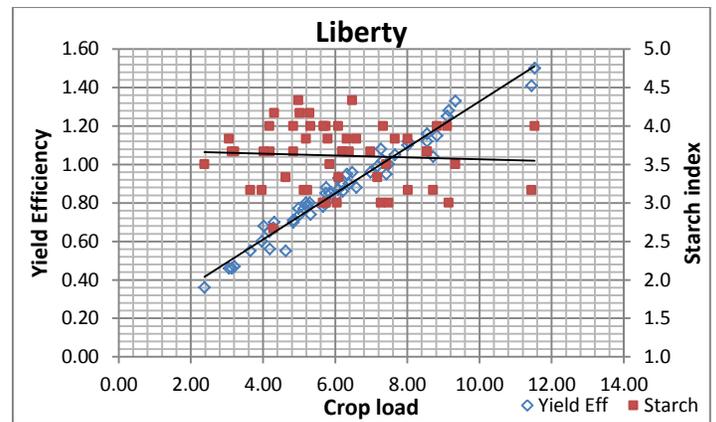
Figure 14. The effect of varying cropping densities reported as fruit per cm² TCSA as measured in the spring (*left column*) and in the fall (*right column*) on the percentage soluble solids at harvest for fruit from three scab-resistant apple cultivars on M.9 rootstock.



$P=.0443$



$P=.5910$



$P=.0055$

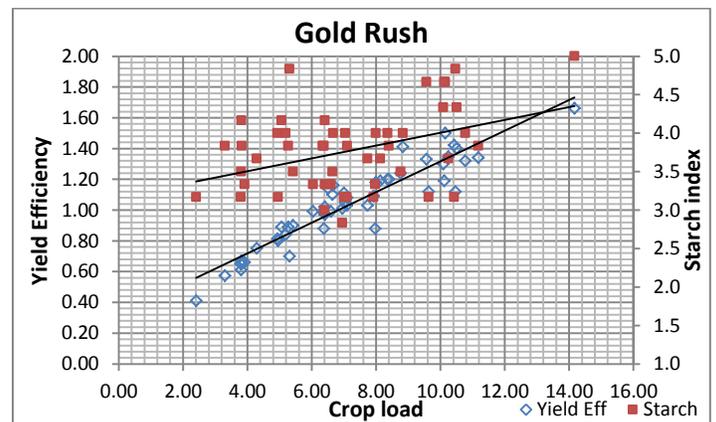
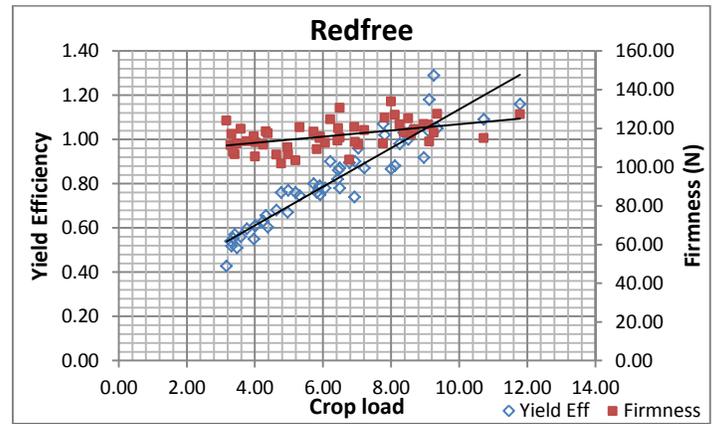
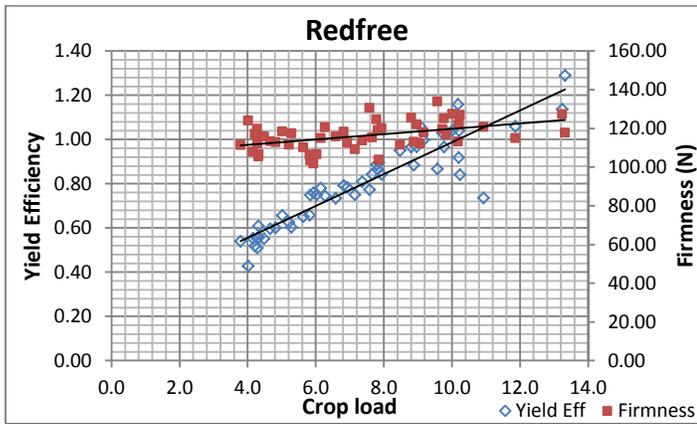
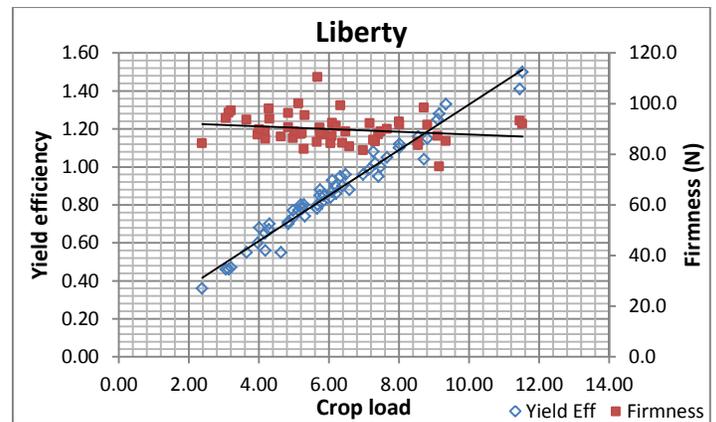
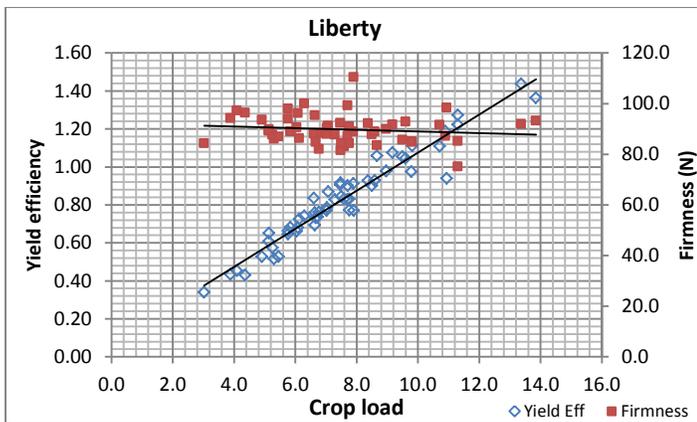


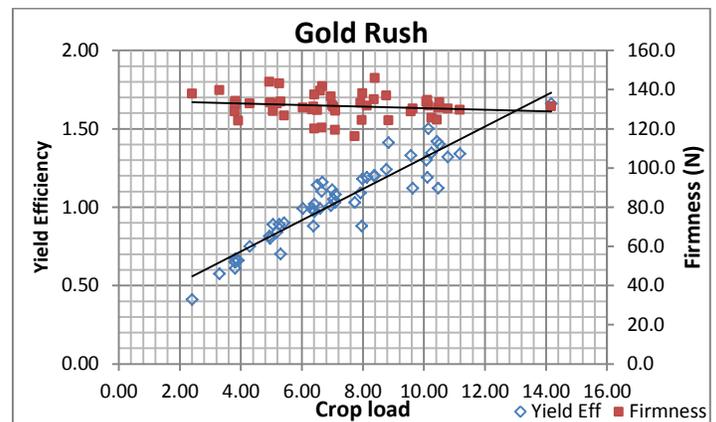
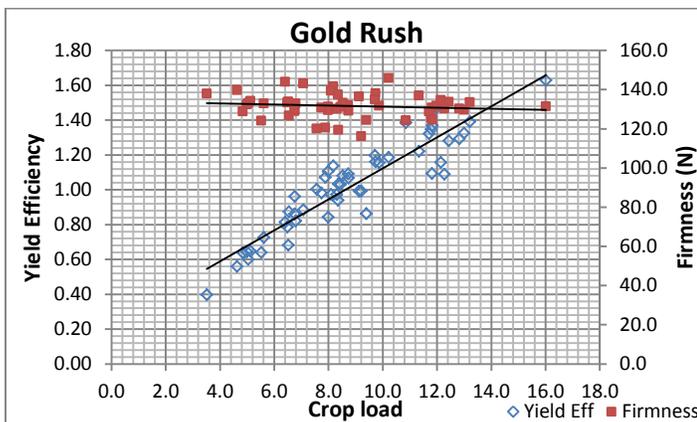
Figure 15. The effect of varying cropping densities reported as fruit per cm^2 TCSA as measured in the spring (left column) and in the fall (right column) on the starch index values at harvest of fruit from three scab-resistant apple cultivars on M.9 rootstock. Higher values indicate less staining of the flesh when dipped in an iodine solution.



$P=.0005$

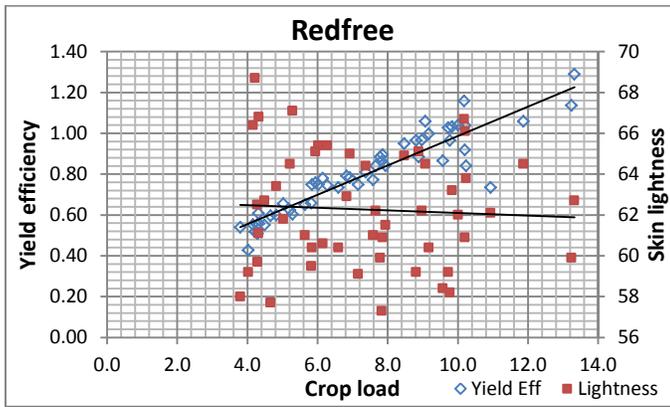


$P=.3551$

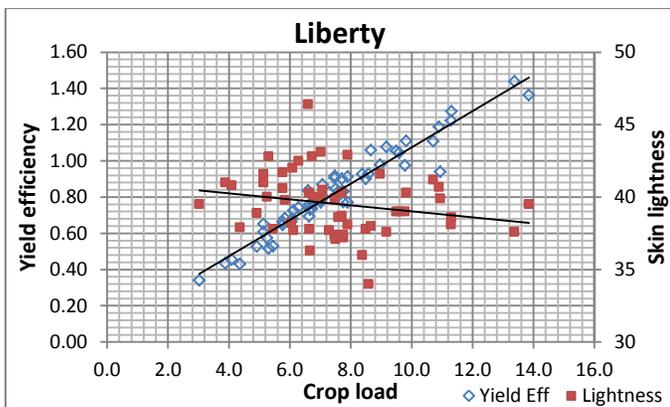
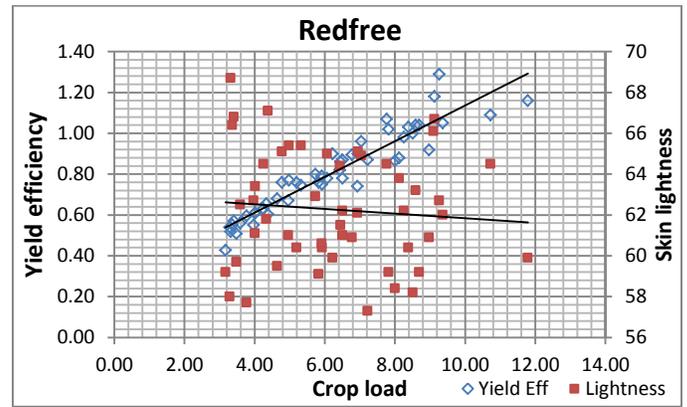


$P=.4005$

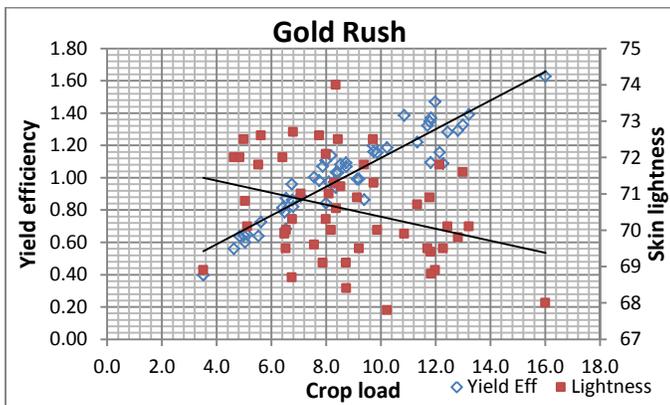
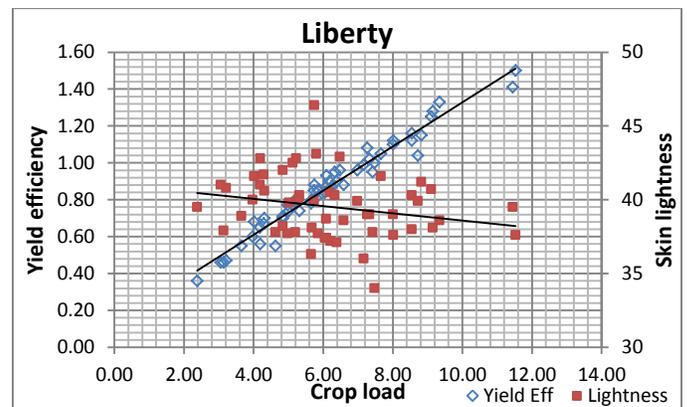
Figure 16. The effect of varying cropping densities reported as fruit per cm² TCSA as measured in the spring (*left column*) and in the fall (*right column*) on the firmness (*in Newtons*) at harvest of fruit from three scab-resistant apple cultivars on M.9 rootstock.



$P=.6991$



$P=.1113$



$P=.0282$

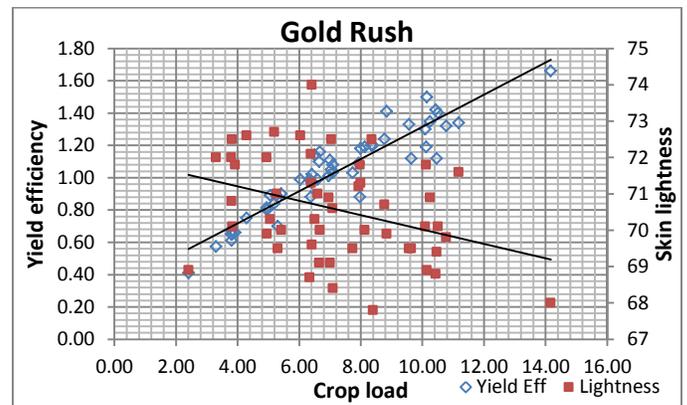
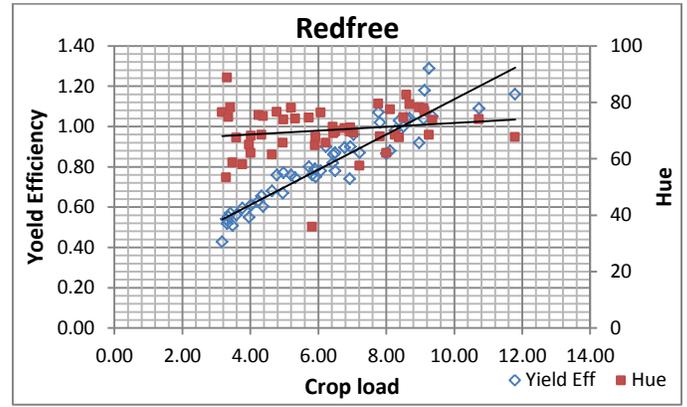
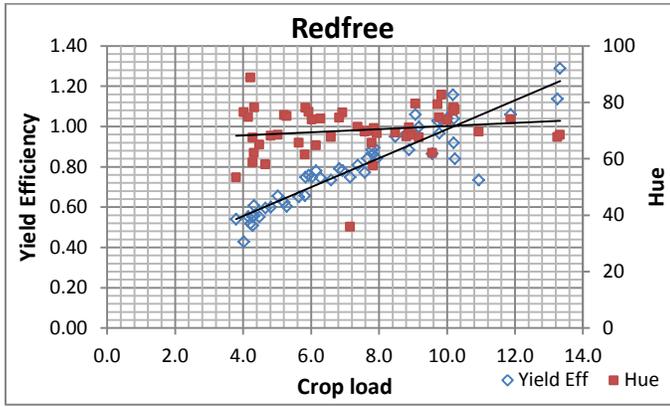
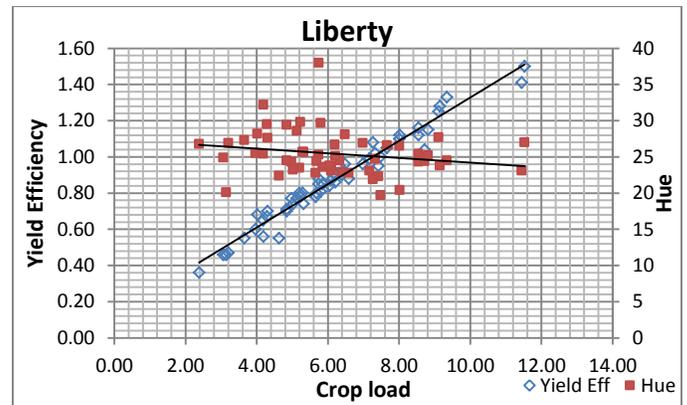
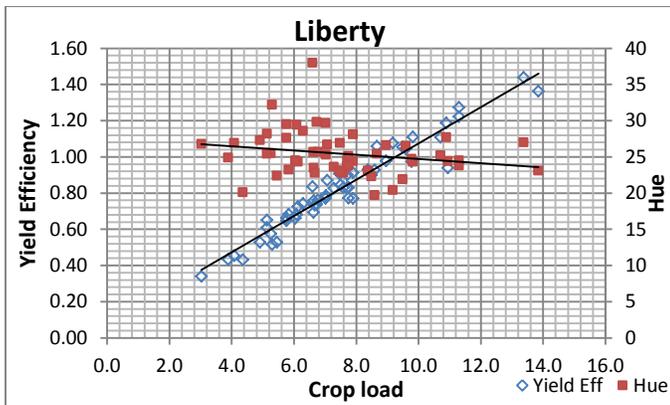


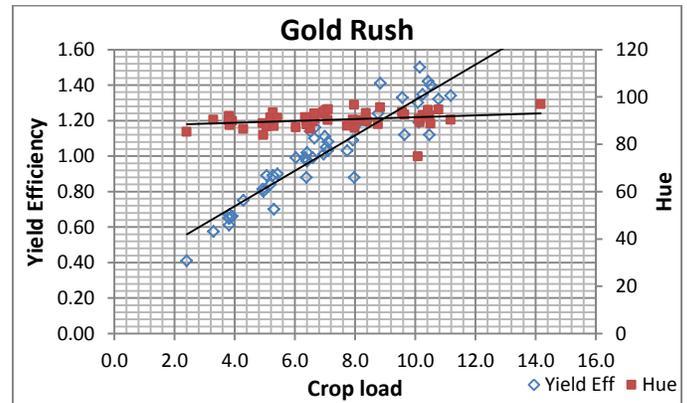
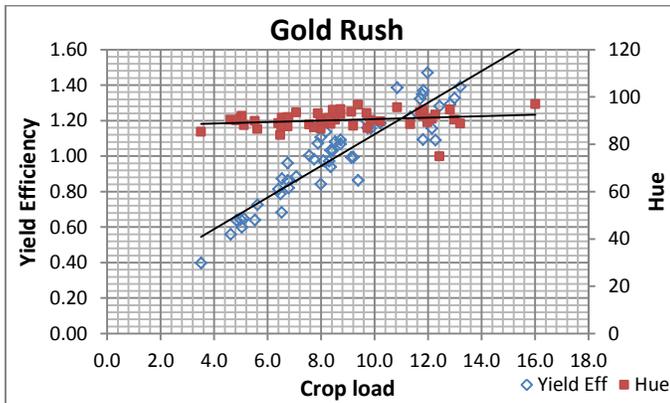
Figure 17. The effect of varying cropping densities reported as fruit per cm^2 TCSA as measured in the spring (*left column*) and in the fall (*right column*) on the lightness of apple skins at harvest for fruit from three scab-resistant apple cultivars on M.9 rootstock. Higher values indicate a lighter shade.



$P=.1812$

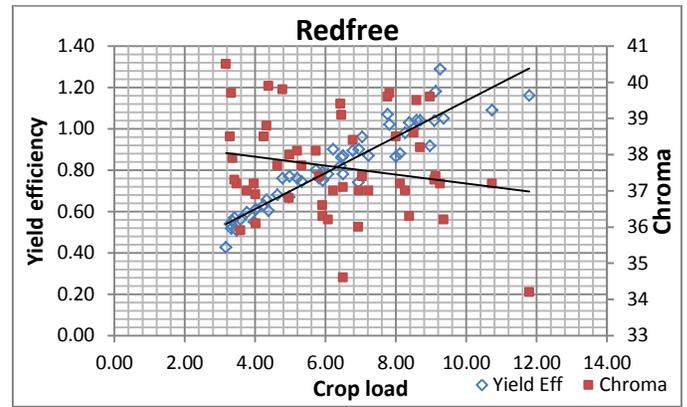
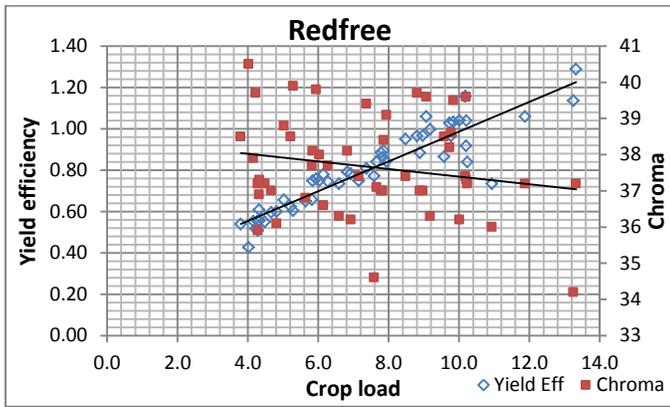


$P=.1179$

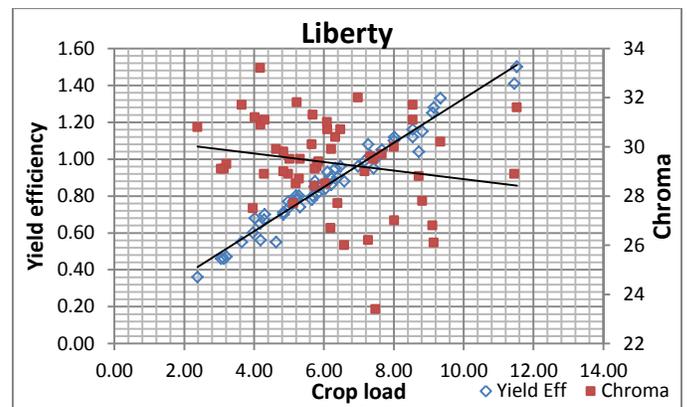
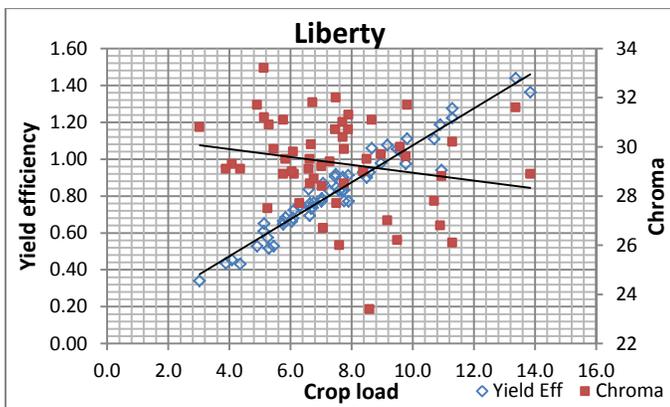


$P=.0005$

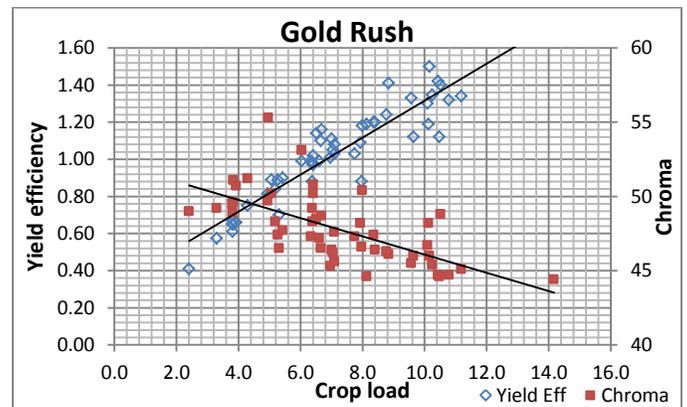
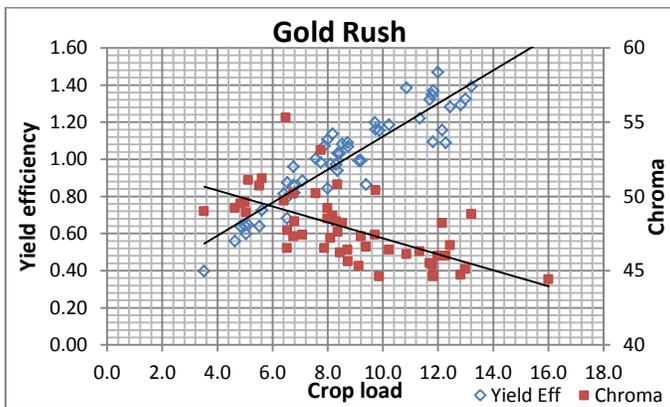
Figure 18. The effect of varying cropping densities reported as fruit per cm^2 TCSA as measured in the spring (left column) and in the fall (right column) on the hue of apple skins at harvest for fruit from three scab-resistant apple cultivars on M.9 rootstock. Values near 0=red, 60=yellow and 120=green.



$P=.1788$

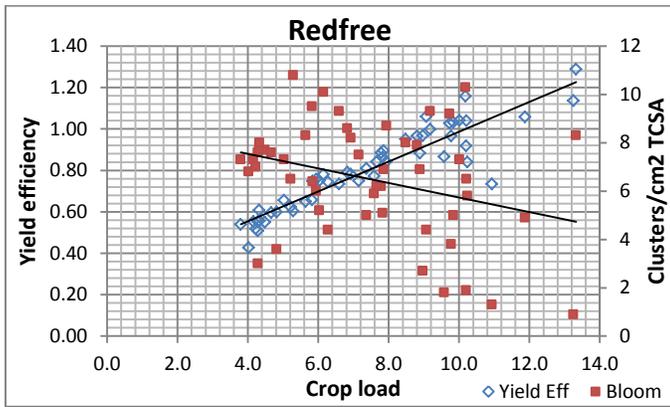


$P=.1361$

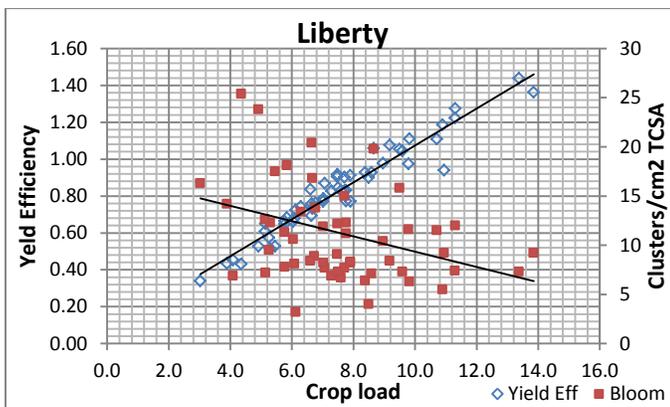
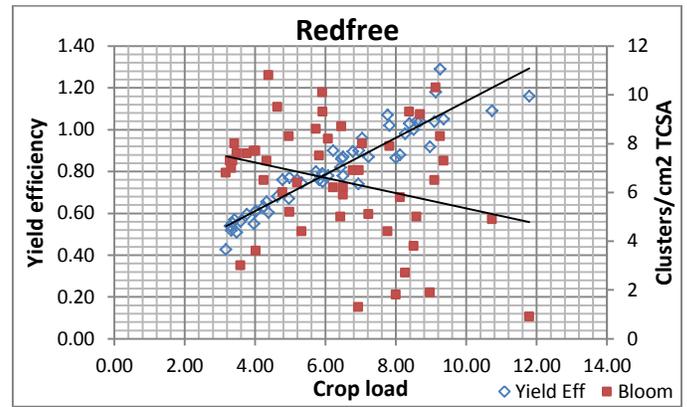


$P=.0001$

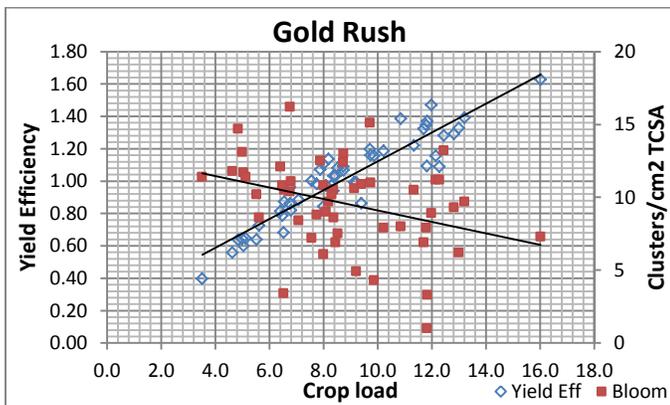
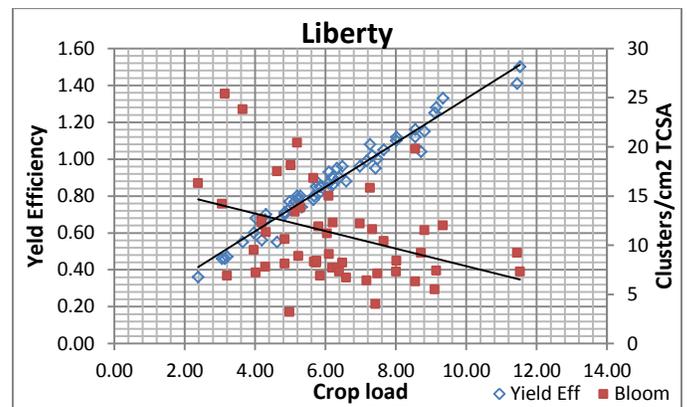
Figure 19. The effect of varying cropping densities reported as fruit per cm² TCSA as measured in the spring (left column) and in the fall (right column) on the chroma of apple skins at harvest for fruit from three scab-resistant apple cultivars on M.9 rootstock. Lower values indicate a duller finish.



$P=.0195$



$P=.0142$



$P=.0115$

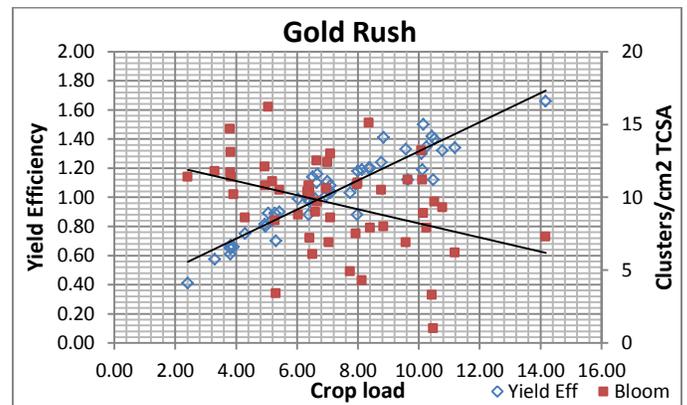


Figure 20. The effect of varying cropping densities reported as fruit per cm^2 TCSA as measured in the spring (left column) and in the fall (right column) on the return bloom density of three scab-resistant apple cultivars on M.9 rootstock.

Table 1. Liquid lime sulfur thinning treatments and time of applications by cultivar.

| Code | Treatment | 80-100% Full Bloom | Full Bloom Axillary buds | Petal Fall + 3 days |
|---------|---|-----------------------|-----------------------------|------------------------|
| 2x LS | 4 % (v/v) lime sulfur applied 2 times: | X | | X |
| 3x LS | 4 % (v/v) lime sulfur applied 3 times: | X | X | X |
| 2x LS+O | 2 % (v/v) lime sulfur + 1% (v/v) oil applied 2 times: | X | | X |
| 3x LS+O | 2 % (v/v) lime sulfur + 1% (v/v) oil applied 3 times: | X | X | X |
| Control | Water only | X | X | X |

Date of application:

| | | | |
|----------|--------------|--------|--------|
| Redfree | 16 May (FB) | 23 May | 27 May |
| Liberty | 11 May (FB) | 16 May | 23 May |
| GoldRush | 11 May (80%) | 16 May | 23 May |

Table 2. Effects of lime sulfur sprays applied during the bloom period on thinning dwarf Redfree, Liberty and GoldRush apple trees in 2011.^z

| Treatment | Phyto- toxicity rating ^x | Dead spur clusters /tree | Dead axillary clusters /tree | # of fruit /tree | # of fruit/cm ² TCSA Spring | Fruit yield /tree (lb) | Yield eff. kg/cm ² TCSA Fall | Average fruit wt. (g) | Predicted thinning time (min) | Return Bloom clusters/ cm ² TCSA |
|-----------|---|-----------------------------------|---------------------------------------|------------------------|---|---------------------------------|--|-----------------------------|--|--|
| Redfree: | | | | | | | | | | |
| Control | 1.0 c | .0 b | .0 c | 179 a | 7.9 a | 50.5 a | .88 a | 129 a | 5.7 a | 9.9 a |
| 2x LS | 3.0 b | 1.8 ab | 10.0 bc | 169 ab | 7.6 ab | 44.6 a | .78 ab | 119 ab | 5.8 a | 4.2 b |
| 3x LS | 4.3 a | 1.8 ab | 17.6 b | 132 bc | 6.0 bc | 36.3 ab | .64 bc | 125 ab | 2.5 b | 7.3 ab |
| 2x LS+O | 2.8 b | 1.8 ab | 10.8 bc | 129 bc | 5.4 cd | 34.7 ab | .54 cd | 121 ab | .6 b | 7.1 ab |
| 3x LS+O | 4.5 a | 5.4 a | 34.9 a | 89 c | 3.8 d | 22.9 b | .36 d | 116 b | .0 b | 8.4 a |
| Liberty: | | | | | | | | | | |
| Control | 1.0 c | .0 a | .0 b | 212 a | 8.4 a | 66.7 a | .96 a | 145 a | 6.8 a | 10.2 a |
| 2x LS | 3.2 b | .3 a | 2.1 b | 131 bc | 6.2 b | 38.9 b | .68 b | 141 a | 2.2 b | 13.0 a |
| 3x LS | 4.3 a | .2 a | 2.4 b | 132 bc | 6.0 b | 38.9 b | .63 b | 139 ab | 1.9 b | 11.8 a |
| 2x LS+O | 3.0 b | .6 a | 2.8 b | 135 b | 5.7 b | 39.1 b | .58 b | 137 ab | 1.0 b | 9.8 a |
| 3x LS+O | 4.8 a | 1.1 a | 8.1 a | 82 c | 3.7 c | 22.2 c | .35 c | 126 b | .0 b | 13.4 a |
| GoldRush: | | | | | | | | | | |
| Control | 1.0 c | .0 a | .0 a | 380 a | 10.5 a | 115.0 a | 1.24 a | 140 c | 16.9 a | 9.4 a |
| 2x LS | 2.9 b | .0 a | .5 a | 244 b | 6.5 bc | 84.4 b | .80 b | 162 ab | 5.5 b | 11.1 a |
| 3x LS | 4.0 a | .0 a | 1.0 a | 161 b | 4.9 c | 60.3 b | .69 b | 175 a | 3.5 b | 10.7 a |
| 2x LS+O | 2.8 b | .0 a | .4 a | 224 b | 7.5 b | 74.8 b | .90 b | 154 bc | 6.7 b | 11.1 a |
| 3x LS+O | 3.6 a | .0 a | .5 a | 192 b | 6.0 bc | 66.4 b | .76 b | 163 ab | 2.7 b | 10.0 a |

^z Mean separation by Tukey's HSD ($P=0.05$), means followed by the same letter within a cultivar are not significantly different.

^x Phytotoxicity rating (scale of 1 to 5): 1= no symptoms; 2=slight; 3=moderate; 4=severe; and 5=very severe.



Figure 21. Phytotoxicity symptom on 'Redfree' treated 3 times with lime sulfur.



Figure 22. Axillary blossom clusters on 'Redfree' killed by 3 applications of lime sulfur plus dormant oil.

USDA Final Performance Report:

Assisting Growers in the Production of Iowa Fresh Christmas trees

Project Summary: The purpose of the project was to provide funds for Iowa Christmas Tree Growers Association (ICTGA) to further the education of tree growers to help them maintain and grow their businesses.

Project Approach: The education was to be done through the regular statewide meetings held by the Association during the summer of 2011 and the winter of 2012. Speakers and seminars were to be offered at the meetings. At the 2012 winter meeting, the program was titled “Dynamics of Estate Planning – Passing your Farm to the Next Generation” and was divided into three sessions. The first session titled “Estate planning and involving the family in the business” provided growers with strategies to involve family members in the operation, thus reducing outside labor costs, increasing production, and strengthening the future existence of the individual operation. The second session titled “Taxes, Federal Estate Taxes, State Inheritance Taxes and Death Taxes” provided information on the tax liability of transitioning an operation to the next generation to minimize any significant loss of capital that would decrease the competitiveness of the next generation of growers. The third session titled “Dealing with Death. Do we keep the farm in the family or sell?” provided information on the general aspects of transitioning an operation to the next generation which would help reverse the recent decline in the number of growers and ensure the continued existence of an individual operation as well as the Christmas tree growing industry.

Goals and Outcomes Achieved: Meetings of ICTGA members were held twice a year. Each program brought in speakers and offered educational opportunities. Attendance at the 2011 summer meeting was 150 which exceeded our goal of “at least 100”. The goal of “attracting 30% more growers” was exceeded as the 150 attendees was more than double the average attendance of 70.

In a survey taken at the 2012 winter meeting, only 11% of the attendees had prior experience with estate planning. After the educational program, 100% of the attendees responded that the information presented would help them make better business decisions and plan for the continued operation of their Christmas tree farm.

The Association used \$800 of the \$3,000 grant funds. The funds helped pay for two speakers- one at the winter meeting and one at the summer meeting

Beneficiaries: Christmas tree Growers attending the ICTGA winter (80 attendees) and summer meeting (150 attendees).

Lessons Learned: Attendees, through their response to an evaluation survey at the end of each meeting, were very positive about the programs. They indicated they found the material relevant to their interest in growing Christmas trees.

The remaining \$2,200 of the grant is being returned to the grantor. The Association misunderstood what the grant funds could be used for and was not able to access funds to help with what we believed was important for our members. ICTGA continues to offer educational, programs and to hold meetings for the growers.

Contact Information:

Lona Lewis

ICTGA Board member

712-374-6098

tllewis@wildblue.net

Jan Pacovsky

ICTGA Executive Director

641-394-4534

janpacovsky@hotmail.com

MVGA Marketing Campaign

Project Summary

The purpose of the project was to expand the sales of specialty crops at three Farmers' Markets in eastern Iowa through advertising. Commercials promoted the sales of specialty crops at the Bettendorf Farmers' Market, the Trinity Farmers' Market, and the Davenport Farmers' Market. This was an opportunity for growth of local specialty crop sales by increasing awareness of markets and creating interest in purchasing specialty crops.

Project Approach

A video commercial was produced that was shared among three television stations. Commercials aired from the end of April through October promoting the three markets.

A total of twenty customer counts taken at the three markets throughout the season compared with the previous market season showed a decrease in attendance on average of 112 people per market day.

Vendors were surveyed about changes in total sales from the previous market season showing an average of 15.8% growth in sales for all specialty crop producers. This average exceeded the expected 12% increase in spite of the decrease with the floriculture producers. Vegetable growers for the most part had a good season. Strawberry, melon, and peach crops were excellent. Apple crops were a little short due to a late spring freeze.

Matching funds from the three media stations doubled the exposure of the commercials funded by the grant.

Goals and Outcomes Achieved

Twenty baseline customer counts were taken periodically at each of the three Farmers' Markets in 2010 and then again the same weeks in 2011. The counts ranged from an increase of 41 customers to a decrease of 291 customers per market day with 112 people the average decrease per market day. This was in sharp contrast to the expected 7% likely increase in attendance achieved with previous increases in advertising.

A video was filmed at the markets and a commercial developed. Crawl lines were arranged for different months to promote various specialty crops and to inform consumers that the markets were certified Farmers' Market Nutrition Program redemption locations. The commercials were aired on three different television stations starting the last week of April and continuing through October.

Vendors were surveyed as to a percent of increase/decrease in sales from 2010 to 2011. Results were tabulated showing an average increase of 15.8% in sales, above the estimated 12% increase. With less customers, it is obvious that customers spent more this year per person. Cash customers had to contribute to this increase. The Iowa Farmers Market Nutrition Programs also experienced an increase

of 3% in redemption of vouchers from WIC clients in Scott County and 2.3% in redemption rates from Seniors in the market area. EBT usage increased in the area as well.

Increased awareness of specialty crops may have contributed to an increase in sales from the previous season. However, it did not translate into increased attendance at the three markets overall when compared to 2010. Only the June count had an increase in customer attendance at the Bettendorf Farmers' Market when compared to June, 2010. The interest in purchasing specialty crops increased as less customers purchased more specialty crops to have vendors experience an average increase of 15.8% in sales.

Beneficiaries

Thirty-one specialty crop growers experienced a 15.8% average increase in sales. The data reported showed that the vegetable and fruit producers had the most increases among vendors at the three markets. The commercials could also impact specialty crop vendors at other markets in the range of the three television stations.

Lessons Learned

With the downturn in the economy, less people attended markets. The focus of customers that did attend was on essentials of fruits and vegetables as these items had increased sales. In surveying crafters, bakers, meat producers, and other vendors, most experienced decreases in sales. It would appear that non-essential products or more expensive products had reduced sales.

One wonders if the economy was the reason for lower attendance and lower sales for non-essential products, then sales might have been even lower for specialty crops without the commercials funded by this grant. When business is down the most important expenditure is advertising.

Contact Person

Jane A. Weber

(563)332-5529

Farmer71@aol.com

Project Title: Farm to School initiatives

Project Summary

It takes time and diligence to build a strong Farm to School program. Our Farm to School efforts have focused on increasing awareness in the value of locally-grown produce through better taste, to the increased nutritional value obtained by picking produce at its prime. The key behind all of this, however, is to create and strengthen the desire for each crucial partner to work with each other. By establishing a sustainable, long-lasting working relationship between growers and food service within schools, we cannot only increase markets for specialty crop growers but ultimately improve students' health. To actually increase the consumption of specialty crops within our schools, we need to be inclusive of all of the contributors. We have created different initiatives to target food service, growers, community and students.

SCBG funds that were budgeted by the Iowa Department of Agriculture and Land Stewardship for administrative costs were not used by sub-grantees and needed to be utilized by the end of the grant period. These funds were used to purchase supplies for the Farm to School Initiative – “A Garden is the way to Grow” and are scheduled to be distributed in the spring of 2014. Complete coordination and implementation of the “A Garden is the way to Grow” initiative also takes place in the spring of 2014.

Project Approach:

Wrap Your Own—Iowa Grown

Emails were sent to growers as well as schools, giving them the opportunity to team up with each other to offer Iowa students the opportunity to experience fresh, locally-grown produce served as a school meal or snack. To increase participation in this initiative we offered a wrap recipe contest for school food service. The school selected as having the best wrap utilizing the most locally-grown

produce received an additional \$300 to be used to purchase additional locally-grown fruits/vegetables and an assembly for their students. This was a great opportunity for food service to showcase their creativeness and expose students to great Iowa produce. A photography contest was also offered for students to capture the best looking Iowa-grown produce. One hundred dollars was awarded to the school of the winning photography entry to be used to procure additional locally-grown fruits and vegetables.

Food Safety

Food safety kits were assembled containing: two plastic reusable food crates, disposable gloves, and a Food Safety Begins on the Farm Grower Guide for each grower as well as sample food safety checklists. The kits were given to each established Farm to School Chapter for them to provide to the growers from which they purchase specialty crops. These kits were distributed at our Farm to School Collaboration. By again offering schools the opportunity to connect with their local growers; we continue to build strong working relationships between schools and growers.

Chapter Initiative

Chapter opportunities are promoted through the Iowa Department of Agriculture and Land Stewardship (IDALS) and the Department of Education's activities and events such as outreach meetings with both food service members and growers, newsletters, websites and through word of mouth. The requests to become a chapter continue to grow. Information posted on-line also informs the public of the great benefits of working with local growers and the health benefits derived from making healthier food choices.

A Garden is the way to Grow

"A Garden is the way to Grow" initiative focuses on increased education and awareness of Iowa's specialty crops and the benefits of developing healthy eating habits. By providing appropriate

grade-level educational opportunities, through classroom instruction and hands-on learning, student awareness of specialty crops increases throughout the school.

Goals and Outcomes Achieved:

The benefits of the Farm to School initiatives continue long after the funding or food is gone. The relationships created between schools and growers can have a lasting impact. While growers did report seeing an increase in income as a result of working with schools, the increase fell short of the goal of “at least 10%” with growers reporting a growth of “less than 10%.” Eleven schools comprising of 3800 students participated in the Wrap Your Own—Iowa Grown initiative. These schools purchased a combined total of twelve different varieties of locally-grown fruits or vegetables and two different herbs. Furthermore, the schools expressed an interest to expand this experience by purchasing items they have not procured locally in the past. Five growers sold to schools for the first time. In addition to this transaction, the results of a positive experience have left both the grower and the schools interested in working with each other in the future. Six of these growers sold to the schools on more than one occasion.

The Food Safety Kits distributed to the existing chapters were offered to 37 growers. The names of the growers receiving this kit allows us to continue to build a database for other schools to draw upon and continues to enhance the rapport we are developing with the specialty crop producers throughout our state.

Another notable growth of the Farm to School program is the expansion of Farm to School Chapters into metro schools. This program, to date, has been primarily within smaller school districts in more rural locations. It is much easier to source locally grown produce for a smaller number of students. Through new chapter establishment we have been able to expand the Farm to School program into metro areas increasing the exposure and education of specialty crops to an additional 2180 students. This is monumental to the growth of this program. One of the benefits of the chapter system is to use these school successes as a model for other schools across the state. These metro

chapters are offering students the opportunity to get involved in gardening clubs, participate in food demonstrations and create and organize student-led farmers markets. One school is also offering a school-wide planting day, allowing each student to plant a seed in the garden as well as offering curriculum enrichment activities to teachers. Partners identified through the chapter establishment include school administrators, PTA members, growers and parents. Other programs in place such as “Pick a Better Snack” (Department of Education) help to reemphasize the nutritional benefits being taught regarding making healthier food choices. The impact of all of these efforts will hopefully make a lasting impact which will resonate with students into adulthood.

Gardening supplies were purchased for the “A Gardening is the way to Grow “ initiative, which is an ongoing Specialty Crops Block Grant Program project under grant agreement 12-25-B-1228.

Supplies were purchased to provide schools with educational gardening materials and tools such as an “Insect, Disease and Weed Guide,” row covers, thermometer/rain gauges, soaker hoses, and other equipment needed to plant, maintain and study a garden. This project; however, goes well beyond simply producing food. Students will watch videos on “watering gardens, weeding gardens and season extension.” Before and after questionnaires will measure the increased knowledge obtained from these real life experiences and the garden tools will allow students to implement them. The supplies provided correlate with the videos to maximize the benefit. Science, reading, and a core curriculum in math is included within this project by school educators. Additional benefits are the physical activity and the student’s ability to try fresh, healthy food options.

Previously collected data from a garden initiative in 2012, showed 3,300 students (k-12) impacted, 26 different kinds of fruits/vegetables grown, and seven different methods used to integrate garden produce into the school curriculum (such as taste tests, sampling in garden, and through classroom projects-crockpot soup).

Beneficiaries:

In a recent survey sent to growers, a specialty crop producer stated that this program is “good for both schools and growers.” The wide-ranging measure of this program may not be revealed for years to come. Through this funding opportunity we continue to expose students to the value of choosing healthy locally-grown fruits and vegetables. There is a direct impact on students; however, educators, parents and specialty crop growers are indirect beneficiaries. Heightened awareness of the correlation between the food we eat and the impact on our health is a powerful lesson. Teachers report that gardening is a positive incentive that motivates and excites the students. Learning the origins of their food, how to grow it and the benefits derived from these foods undeniably increases the knowledge and competitiveness of specialty crops now and well into the future. As these students grow into adults with buying power we believe the effects of our work today will impact the decisions they make in the future.

| | | | |
|-----------------------------|-------------------|-------------------|------------|
| Wrap Your Own | 11 schools | 3800 students | 16 growers |
| Food Safety | 37 growers | | |
| Chapter Initiative | 8 schools | 2180 students | 17 growers |
| A Garden is the way to Grow | Not yet available | Not yet available | |

Lessons Learned:

School budgets tend to be one of the largest barriers to increasing Farm to School activity. While this funding offers schools the opportunity to work with specialty crop growers, it does not compensate for the excessively tight budgets most school food services are facing. In addition, Iowa had below-normal temperatures with above-average rainfall last spring. This caused a considerable delay in spring production, making it more difficult to find readily available produce for the Wrap Your Own—Iowa Grown initiative.

The data we are collecting reflects that schools are doing business with local growers on a more frequent basis than our funding allows. Much of our focus has been on increasing the demand for specialty crops. The information we are now obtaining shows that we also need to market to the growers the need to increase production of these crops.

Creating school gardens offers the opportunity for students to learn about and experience healthy, fresh food options. Empowering them with the knowledge to grow their own food is a lesson that will resonate with them throughout their lives. Instilling within them an appreciation for their food and those that grow it will create a more health-conscious adult consumer and a healthier society.

Lastly, the momentum generated by this program creates an influx of people trying to create more mandates for the schools. Trying to keep this a grassroots effort remains challenging.

Contact:

Tammy Stotts,
Farm to School Coordinator
Iowa Department of Agriculture and Land Stewardship
502 E 9th Street
Des Moines, IA 50009

Training Professionals to Provide Technical Assistance for Fruit and Vegetable Farmers in Food Safety Practices and GAP Certification

Northeast Iowa – Specialty Crop Program

Iowa State University Extension and Outreach, Region 4

Winneshiek County

Specialty Crop Block Grant Program

Iowa Department of Agriculture and Land Stewardship

Final Report

October 31, 2012

Submitted by:

Teresa Wiemerslage, ISU Extension and Outreach

wiemer@iastate.edu, 563-794-0599

Project Title

Training Professionals to Provide Technical Assistance for Fruit and Vegetable Farmers in Food Safety Practices and GAP Certification

Project Summary

Food safety is high on the national agenda. Fruit and vegetable growers are facing pressure to comply with food safety standards, known as Good Agricultural Practices (GAPs), and wholesale buyers are increasingly requiring a third-party GAPs certification. Although certification is technically still voluntary, nearly everyone in the produce industry agrees that mandatory certification is on the horizon for those who sell wholesale.

Iowa farmers identify two barriers with the current third party audit system: 1) certification is expensive for small-scale farmers and 2) the certification is by crop versus a “whole farm” certification. Farmer members of the NE Iowa Food & Farm Coalition (NIFF) have experienced the challenges of food safety certification first-hand in their negotiations with a national company who manages food service at a local private college.

Creating a farm safety plan is only the first step toward certification status. Having the proper documentation in place does not guarantee a successful audit. We have learned that the technical assistance provided by an outside agency or group is extremely important in preparing for an audit. Participating in a mock audit increases the chance of a successful audit.

The NE Iowa Food & Farm Coalition (NIFF) received a Specialty Crop Block grant of \$15,700 from Iowa Department of Agriculture and Land Stewardship in 2011 to develop a training program for professionals to provide technical assistance to farmers to implement Good Agricultural Practices and prepare them for food safety certification.

Funding was also used to create a GAP cost-share program to assist farmers with the cost of an audit from a certifying agency of their choice. Thirteen farms received assistance with their annual audit costs through this project.

Project Approach

Objective 1. Train On-Farm Food Safety Coaches who will provide on-farm consultations to prepare farmers for GAPS or third-party audits.

We successfully launched a training program for “food safety coaches” to assist Iowa fruit and vegetable farmers with food safety certification needs.

ISU Extension and Outreach staff created a training outline to meet this objective. Trainees were asked to participate in a foundational course or workshop to give them a basic understanding of GAP principles. The educational delivery methods for this requirement included online training, to train-the-trainer sessions and workshops hosted by state food safety specialists.

To give the coaches the opportunity to apply their learning in a farm setting, we brought in a food safety consultant from Primus to train the group. The day-long training took place on three vegetable farms with the consultant demonstrating the process of an audit and identifying areas of interest for food safety concerns. Trainees included ISU Extension staff, RC&D staff, food distributor staff and farmers. The trainees reported this training as “very good” in preparing them to consult with local farmers.

Results

Thirteen food system professionals received training in food safety practices and participated in three on-farm mock audits with a food safety trainer. Half of those attending training expressed an interest in being a food safety coach for farmers in their region. These trainees were surveyed about the effectiveness of the training program and the results are shown in Table 1.

The other participants work with farmers in a different capacity and were interested in learning more about implementing GAPs on a farm for their professional development.

Table 1. Evaluation of food safety coaches training program. Activities were rated on a scale of 1-5 where 1 = Poor and 5 = Excellent.

| | Average rating |
|--|----------------|
| Satisfaction with training | 4.6 |
| Knowledge of GAPS before training | 3.2 |
| Knowledge of GAPS after training | 4.3 |
| Knowledge of audit before training | 2.5 |
| Knowledge of audit after training | 4.3 |
| How well did this training prepare you to help farmers with self-audits? | 4.3 |
| | |

The following experiences were reported as most beneficial by the trainees:

- Expertise of the presenter
- First hand farm visits
- All was helpful and interesting
- Examples of "scanning" techniques for farm assessment
- The trainee-led audit was a beneficial exercise.
- Walking around the farms and having logs and sample check lists.
- Group discussion

Key Findings:

- Trainees reported this training as "very good" to "excellent" in preparing them to consult with local farmers.
- All trainees report an increase in understanding of Good Agricultural Practices.
- All trainees report an increase in understanding of a GAP audit.
- All trainees reported the training adequately prepared them to assist farmers with self-audits.

Objective 2. Launch a GAP cost-share program for Iowa fruit and vegetable growers.

In the original proposal, the grant committee applied for funds to train people in Iowa to be GAP auditors. The rationale behind this decision was that by having 1-2 people in the state trained, it would reduce the travel costs associated with an audit and therefore, reduce the entire cost of the audit and make certification more feasible.

We researched the training programs for the different audit schemes. An official from NSF Davis Fresh posed a critical question that altered our thinking. He asked, "Why are you looking for just one audit scheme? Shouldn't your growers be allowed to choose the scheme that works best for them?"

Due to changing factors in the industry and requirements by food buyers and distributors, it was not clear which food safety standard should be pursued to reach the overall goal of affordable foods safety audits for Iowa farms (i.e. USDA, Primus, GlobalGAP, etc). Every grower is different, and their buyers may require different audits.

As a result, we decided to take a different approach to the barrier of affordable audits and requested to change the focus of this aspect of the project. One of the intended outcomes of training auditors in Iowa was to lower the cost and have a more affordable certification option for farmers. A GAP cost-share program reaches the same outcome. It also allows the farmers to choose a certification program that will fit them best. Therefore, we submitted a new project budget to put more funding toward assistance from the food safety coaches and to assist with certification costs.

ISU Extension staff in northeast Iowa coordinated the cost-share project.

Results: GAP Cost-Share Evaluation

Twenty-one Iowa fruit and vegetable farms received a mock audit through this program. 11 farms (52%) of the farms followed through and requested a USDA GAP audit for their farm. 100% of the farms receiving a mock audit passed their USDA audit.

Twelve farms received cost share assistance. Seven farms had been audited previously; five farms were audited for the first time.

To determine the value of the mock audits and the cost-share to the participating farmers, we conducted an on-line post survey of audited farms with a 67% percent response rate. Farmers were first asked to report the importance of the technical assistance activities to their operation for the current audit. Farmers were then asked to consider the importance of the same activities for future audits.

Table 2. Importance of food safety technical assistance activities for the current audit and for future audits. Activities were rated on a scale of 1-5 where 1 = Not Important and 5 = Very Important.

| Technical Assistance Provided | Average Rating | | |
|--|----------------|---------------|--------|
| | Current Audit | Future Audits | Change |
| Coordination of several audits on the same day | 5.00 | 5.00 | 0.00 |
| Availability of cost-share dollars | 5.00 | 5.00 | 0.00 |
| Completion of the USDA audit template each year* | 4.63 | 4.13 | -0.50 |
| Annual review of your food safety plan* | 4.50 | 4.50 | 0.00 |
| Walk-through of your production and packing areas* | 4.38 | 4.13 | -0.25 |
| Visit to your farm by food safety coaches each year* | 4.13 | 3.75 | -0.38 |
| Presence of coaches at your audit | 3.50 | 2.63 | -0.88 |

*Activities performed as part of a mock audit.

The cost of USDA GAP audits subsidized with this program ranged from \$523 to \$1154. The lower rates were due to audit coordination between farms: farmers worked together to arrange audits on the same day to share transportation costs. Follow-up, unannounced audits were \$276. Farmers were asked about their willingness to pay for an audit in the future. Responses ranged from \$100-600 with an average of \$313.

Farmers were asked about continuing their certification. 7 of 8 farms will continue their certification as long as cost-share dollars are available. One farm is willing to be certified without cost-share dollars as long as the total audit cost is less than \$600.

Farmers were asked about the most beneficial part of this process. Farm Safety Plan review and mock audit were reported as most beneficial by 63% of the farmers; the cost-share dollars were listed next by 25% of the farmers; and coordination of the audit visits were most beneficial to 13% of the farmers.

Farmers were asked about any changes to their farm business will be made as a result of this process. Most reported no changes (38%). 25% will revise their policies based on audit feedback; 25% will do a better job with documentation; and 13% are going to switch to products that don't require GAP certification.

Key Findings:

- All farmers surveyed indicated that audit coordination and availability of cost-share dollars were very important to their operations. One farmer commented, "I could not have completed a GAP audit without the help from the grant. It's simply too expensive."
- Technical assistance is most beneficial to farms preparing for their first audit.
- Audit coordination between farmers can result in significant cost savings – up to 50%.

Goals and Outcomes Achieved

Goal 1. Increase the number of resource people (food safety coaches) trained in Good Agricultural Practices to serve as advisors and educators for specialty crop farmers from the current 0 to 10 in two years.

Thirteen food system professionals received training in food safety practices and participated in three on-farm mock audits with a food safety trainer. Seven expressed an interest in being a food safety coach for farmers in their region. The other participants work with farmers in a different capacity and were interested in learning more about implementing GAPs on a farm for their professional development.

Goal 2. Increase the number of specialty crop farmers who are following Good Agricultural Practices from the 3 to 15 in two years measured by the number of GAP audits passed.

On 5/9/10, the number of USDA GAP certified farms on the USDA AMS website was 3. According to the website on 10/31/12, thirteen (13) Iowa farms were GAP certified. Twelve of those farms benefited from this project. (Figure 1.)

The drought during the summer of 2012 significantly impacted the number of farms pursuing GAP certification. At least six other farms were considering certification before the drought conditions caused them to reconsider.



Figure 1. Locations of Iowa farms benefiting from the cost-share program.

Beneficiaries

The fruit and vegetable growers listed above benefited directly from this project. Those farms who received technical assistance to prepare their farm for GAP certification have been given the knowledge, tools and resources to maintain their certification in the future.

Producers have reported increased sales volume and new accounts. They also report that mentioning "GAP certification" puts new buyers at ease and moves the discussions forward quickly. Producers also report contacts from distribution companies interested in carrying more local product.

In addition to the producers benefiting from the program, retail and wholesale customers will benefit from this effort. Several of these farmers have schools as customers. These buyers can be confident that proper food safety is happening at the farm level. Ultimately, the consumer is an important beneficiary as well.

State partners and organizations like ISU Extension and Iowa Fruit and Vegetable Growers Association have benefited from this experience and are taking steps to provide support for on-farm food safety training and certification.

Lessons Learned

Cost-share assistance is critical. Iowa specialty crop farmers are willing to become GAP certified, but assistance is needed to help with audit costs and coordination of audits.

Technical assistance needed. Ongoing efforts for workshops and trainings are beneficial to teach farmers about the need for implementation of GAPs on their farm. However, this project also demonstrates the ongoing need for individualized assistance for farmers in the form of on-farm mock audits. This need is especially pronounced for those farms undergoing their first audit. Once the farm has participated in an audit, the need for assistance decreases.

Food system professionals will need to investigate the feasibility of charging a fee for mock audits as part of farm preparation. Feedback from coaches in this project indicate that \$100-150 is a reasonable charge for a 2-3 hour mock audit.

We increased our knowledge about the most effective way to train coaches. Here are our recommendations for the further development of an On-Farm Food Safety Coach Training Program.

- 1) Trainees will demonstrate basic GAP knowledge. Possible venues:
 - a) Attend the Cornell GAPS Online Course
 - b) Attend an On-Farm Food Safety Train-the-trainer event
 - c) Attend the 6-hour On-Farm Food Safety Workshop for growers delivered by ISU Extension
- 2) Trainees will demonstrate basic understanding of Farm Safety plans. (2 hour course; live or webinar)
- 3) Trainees will demonstrate basic understanding of GAP audit. (2 hour course; live or webinar)
- 4) Trainees will participate in mock audit on Iowa farms (field day setting, 3 hours)
- 5) Trainees will visit two Iowa vegetable farms to complete an on-farm assessment/consultation. (Complete an audit summary.)

State Auditors are not warranted at this time. The cost-share program is an acceptable method to reduce the burden of certification for Iowa farmers. It also allows the flexibility for the farmer to choose

the audit scheme requested by their buyers. When coupled with the added service of coordinating audits of farmers in an area, additional cost savings are realized.

Contact Person

Teresa Wiemerslage, ISU Extension Program Coordinator
wiemer@iastate.edu, 563-794-0599

Additional Information



Food safety expert Juan Muniz talks to trainees about a farm safety plan.



Trainees visit an Iowa vegetable farm for a mock audit.



Practical Farmers of Iowa

137 Lynn Ave. Suite 200
Ames, Iowa 50014
Ph: (515) 232-5661
Fax: (515) 232-5649
www.practicalfarmers.org



October 27, 2011

Iowa Department of Agriculture and Land Stewardship Final Report

Project Title: Enhancing the Competitiveness of Specialty Crops Marketed through Community Supported Agriculture

Project Summary

Community Supported Agriculture (CSA) is a food distribution model popular with both farmers and consumers. With CSA, farmers sell their shares prior to the growing season. Shareholders then receive a distribution of food (typically fruits and vegetables, the focus of this project) from the farmer at a regular interval during the growing season.

CSA offers farmers several benefits, from receiving income up front, to sharing the risk with their customers, and allowing for the bulk of marketing to occur before the season commences. In addition, CSA farmers get to know their customers and educate them about the origins of their food, and customers receive healthy food on a regular basis throughout the growing season.

Despite CSAs' benefits, there are certain risks. CSA operations are complex and require good planning and execution to be successful. Farmers need to raise a variety of crops in succession for the duration of the CSA to provide suitable quantity and variety for each distribution. Determining share price is not clear-cut. Community outreach and marketing can prove difficult.

The purpose of this project was to enhance the competitiveness of specialty crops in Iowa marketed through CSAs. The project funded a Mini-School, a workshop, and a webinar, all led by farmer experts, that aimed equip farmers with knowledge to create quality, sustainable CSA operations.

Project Approach

CSA Mini School

Sixty-six people attended a CSA mini school Practical Farmers of Iowa held near Boone December 2-3. Attendees ranged from farmers considering CSA as a farm model to those who had

operated a CSA for 15 years. Presenters included Chris Blanchard from northern Iowa, Margaret Marshall from southern Minnesota, and Rebecca Graff from northern Missouri. The first day of the mini school included discussion on: each presenter's operations; the definition of CSA; how to get started; how to define a share; and production. Day one ended with a question and answer session, and then participants networked over dinner. Day two presenters covered: labor, marketing, member discovery and retention, member core groups, distribution, recordkeeping, and emerging topics for CSA growers. The mini school rounded out with a question and answer session.

The presenters for the mini school included two farmers and one CSA manager for a larger-scale farm. Sally Worley, PFI coordinator for the project, received input from the presenters, based on their first-hand experiences, to detail the agenda and presentation schedule. The farms represented a nice variety of size of operations, ranging from 120 to 800 CSA members, and business structures. They emphasized the need for sound production skills so members who invested in the program received an average of eight fruits or vegetables per week for approximately twenty weeks. The presenters did a great job detailing endless possibilities for CSA offerings, from extended season shares to herb, flower, and non-horticulture add-ons such as bread or poultry.

Presenters explained many strategies to involve CSA members in decision-making and farm operations. They also explained how to determine profitability, and stressed that a CSA that does not turn a profit will not sustain itself as a business.

Attendees received valuable links to production and recordkeeping resources as well as detailed handouts to help plan for succession planting, farm structure, harvest and post-harvest handling procedures, employee job logs, and share delivery structure.

During the marketing session, presenters discussed numerous plans to find and retain new members. They discussed the benefits and strategies of both low and high budget marketing tactics. New ideas were presented that none of the farmer attendees had tried.

Distribution workshop

Thirty-nine people attended a workshop centered on CSA distribution. Two farmers, Rob Faux from northeast Iowa, and Stacy Hartmann from central Iowa, explained to the attendees how they structure their weekly distribution. One farm operates a "buffet style" distribution system where CSA members selected their own products as instructed each week. For instance, the white board at the distribution site will instruct the members to take one bag of lettuce, one bunch of carrots, five

tomatoes, etc. The other CSA fills boxes with their products and members picked up ready to go weekly offerings. Each presenter discussed the pros and cons of their setup along with improvements and lessons learned about distribution efficiency along the way.

“CSA Members as Partners” Farminar

Practical Farmers of Iowa held a member involvement “farminar,” or webinar March 15. Elizabeth Henderson from New York presented to 34 live attendees. There have been 48 views of the archived farminar on Practical Farmers of Iowa’s webpage.

Elizabeth talked about different member/CSA farmer relationship structures. Traditional CSAs like Elizabeth came to be because community members asked a farmer to provide them with products via a CSA model. “Subscription” CSAs involve those farms that decide to start a CSA, then go recruit members. In both models, member participation can be an asset to the operation.

Elizabeth gave examples from her farm as well as several others around the country on how CSAs involve members. Some ways to involve members include: required labor hours each season; facilitate distribution; organize farm parties; and writing newsletters. CSAs often develop a core group that help the farmers make decisions like price increases, structural changes, and member recruitment. Core groups can act as spokespeople for the CSA, justifying the need for a price increase to fellow members, and explaining the reasoning why the CSA plans to start one week later the next season. All CSA members act as the face of the CSA, networking in their communities and spreading the word about how their lives have been impacted by the CSA movement.

Goals and Outcomes Achieved

These outcomes were collected within 30 days of the attended event.

Participants of the mini school will complete a survey at the end of the workshop. Ninety percent of survey results will show a projected change in production, distribution or recordkeeping as a result of attending the workshop. Ninety percent of survey results will show plans to change their marketing strategy due to participating in the workshop.

80.7% survey respondents said they were going to change production practices, 77.4% reported a projected change in marketing practices, and 83.4% reported a predicted change in recordkeeping.

The average effectiveness and usefulness of information presented at these events will each average a score of at least 4 on a ranking scale to 5.

Attendees of the CSA mini school reported an average usefulness ranking of 4.3/5 and effectiveness of 4.24/5.

Attendees rated the distribution workshop session information presented 4.07/5 ranking scale. One attendee said that it was “Useful to hear about two different models and changes they’ve adopted over time.” Between the CSA mini school and distribution workshop, 32 farmers are planning improvements for their distribution systems.

Live attendees rated Elizabeth’s effectiveness as a speaker for the farminar an average of 4.83 out of 5.

Information to gauge the following outcomes was collected after the commencement of the 2011 CSA season.

The post survey was sent to find out how these events impacted CSA operations. It was sent after the CSA season for 2011 started. We sent the survey numerous times, but received only 19 responses from 139 attendees (14% response rate). This survey was sent after the season started in order to gauge success recruitment and changes implemented, but the timing of sending the survey negatively impacted the number of respondents, as these farmers are extremely busy this time of year.

Of our follow up survey respondents, 42% were in their first season of CSA operation, 14.2 % had been operating a CSA for two to five years, and 42.9% had been operating a CSA for six or more years. The wide range in experience indicates that new and existing CSAs are all looking to improve their operations. We did not distinguish between new and experienced CSA farms when asking the outcome questions, so know information for both collectively.

Ten farmers will create or enhance member core groups.

28.6% of those who attended a CSA event funded by this grant created or enhanced member core groups. If this percent is representative of the entire group that attended these events, 39 attendees enhanced member core groups.

Thirty farmers will audit their distribution system and make improvements based on the audit process.

73.3% made improvements to their CSA distribution. If this percent is representative of the entire group that attended these events, 101 attendees made improvements to their distribution systems.

Twenty beginning farmers who attend the production workshop will create a plan for succession planting prior to the 2011 season.

86.7% created succession planting plans. If this percent is representative of the entire group that attended these events, 120 attendees created succession planting plans.

Thirty farmers who attend the marketing workshop will make improvements to their marketing campaign.

73.3% made improvements to their marketing efforts. If this percent is representative of the entire group that attended these events, 101 attendees improved their marketing efforts.

Of the beginning farmers involved in the marketing workshop, 20 will achieve 75% of their target shareholder number for the 2011 season. Of the existing CSA farmers who attend the marketing workshop, 10 will achieve 100% of their target shareholder number in the 2011 season.

Of those who responded to the survey, 33% reached 100% of their goal for shareholder size. If this percent is representative of the entire group that attended these events, 45 farmers reached 100% of their share size goal. 42% reached 75-86% of their goal. If this percent is representative of the entire group that attended these events, 58 farmers reached 75-86% of their share size goal. 25% reached 40-60%. If this percent is representative of the entire group that attended these events, 34 farmers reached 40-60% of their share size goal. Twenty-five percent of participants who attended events funded through this grant decided they were not yet ready to start CSAs.

CSAs participating in this program will collectively recruit 400 new members in the 2011 season.

Respondents reported 867 shares sold this year, with 307 of these being new recruits. If it is assumed the recruitment numbers of those who responded are representative of all who attended, it is estimated that farms attending these events sold 6342 CSA shares, 2245 of these shares to new customers.

Lessoned Learned

While CSA farms learned a lot and rated these events highly, there is much more for them to learn. They repeatedly asked for continuing help to improve their operations. Here are a few areas they have asked for help in:

CSA farms are committed to the structure of their operation for a multitude of reasons. A CSA combines risk management, profit, and community-building into one model. The tough question to answer is, are CSA operations truly turning a profit? Participants in this project appreciated the education they received through these events, and repeatedly asked for more help to create sound CSA operations.

These farms want to learn more about the profitability of their operations, including how to increase efficiencies to turn a profit, and what size of CSA would be most profitable for their situation.

In addition, CSA is far from being a household name. If you talk with the general public, many have never heard of this type of farm offering and don't know it is available in their area. CSAs have asked for increasing the awareness of CSAs to an audience beyond locavores.

CSAs are seeing reduction in retention. They don't have clear answers to why this is happening. They want to find out more information on why their retention numbers have been decreasing in recent years.

There is a lack of consistency between CSAs. While this is an asset at times, it is also a huge liability when quality and quantity of products distributed for a comparable price differ greatly. CSA farmers have asked for more training on quality control, and how to create a consistent and fair supply.

Thank you for your support to provide our members with CSA programming. Funding for this project has resulted in improvements in Iowa CSAs. This is not just a success for farmers, but for communities as a whole: Successful CSA farms equates to more access to healthy, local produce for these farmers' communities. We are grateful for the opportunity you provided, and are committed to continuing to provide needed support to this contingent of farmers.

Contact Person

Sally Worley

(515)232-5661

sally@practicalfarmers.org

USDA Annual Performance Report

Farm to ISU: Increasing Purchases of Iowa Specialty Crops at Iowa State University

IDALS Specialty Crop Block Grant Program

Iowa Department of Agriculture and Land Stewardship

PROJECT SUMMARY

- Within the duration of the grant, Farm to ISU has completed 8 GAP (Good Agricultural Practices) workshops in partnership with ISU Extension, training a total of 77 producers. Farm to ISU has also held multiple informational booths to sponsor the program to ISU students and staff, including participation at events such as Food Day, Sustainability Day, the Sustainability Symposium, VEISHEA (Veterinary Medicine, Engineering, Industrial Science, Home Economics, and Agriculture). We have also incorporated specialty events: 'Meet Your Farmer Event' and the Green Umbrella's Sustainability Day event on central campus, Farm Crawls and a Compost Day. At all of these events we have spoken about IDALS and our specialty crop grant in order to bring recognition to the accomplishments of the program because of IDALS support. Approximately 1600 students have been spoken to directly about Farm to ISU and our initiatives, and around 20,000 additional students, if not more, have come into contact with our information via facebook, signage in our dining locations, and other marketing incentives. We have attended 10 conferences regionally, and numerous others around the nation to speak to how the program is implemented. The local and regional conferences were attended to connect with local producers around Iowa and increase our connections with producers, retailers, and wholesalers. The following is a grant timeline:

- **December 9, 2010:** Farm to ISU survey: 65% students willing to pay 1-15% more in meal plan for local
- December 9: Informational booth: UDM
- December 16: Informational booth Conversations
- **January 2011:** update website, speak at Unitarian church, Iowa Public Radio and began contract with Hank Taber for green peppers, cabbage, and cucumbers
- *February 4: GAP training workshop at Linden Training Center*
- February 11: Informational both at Conversations
- February 18: Informational booth at Conversations
- February 21-22: Sustainability Symposium
- March 5: INCA Conference; Perry, Iowa
- March 21: break-out session at NACUFS (National Association of College and University Food Services)
- March 31: presentation at Leopold Center Marketing and Food Chain Partnership workshop
- April 16: Farm to ISU booth at VEISHEA
- April 18: tour of Salama's greenhouse farm
- April 19: Roundtable
- April 22: ISU Earth Day
- May 18: Chef Training workshop
- May 23: BFBL (Buy Fresh Buy Local) movie screening
- May 25: ISU Dining chef workshop
- *June 23: GAP workshop Horticulture Station*
- July 19: visit Armstrong research farm
- July 23: visit cultivate Kansas city
- August 1: Farm to ISU farm crawl- Wilber's Northside Market, ISU Horticulture Station, ISU Student Organic Farm, ISU Dining Food Stores
- August 3-6: SAEA (Sustainable Agriculture Education Association) Conference; Kentucky
- August 9: presentation in Dubuque
- August 26: meeting with graphic design class for signage
- September: Informational booths
- October 4: English class presentations
- October: Informational booths
- November 9: Farm to Fork Panel Event
- *November 18: GAP workshop; Bettendorf, IA*
- *December 1: GAP workshop, Linden Training Center, Ames, IA*

- December 8: RFSWG (Regional Food Services Working Group) meeting
- **January 2012:**
- January 4-7: attended Great Plains Growing Conference
- January 13-14: attended PFI (Practical Farmers of Iowa) Conference
- February 15: Farm to ISU interview on local radio station KJAN
- February 17: Met with honors student about Iowa State's effort in purchasing local
- *February 23: GAP workshop- Harlan, Iowa*
- *March 27: GAP workshop- Lynn County Extension Office*
- *March 28: GAP workshop- Council Bluffs*
- April 3: Local Food Summit
- *April 5: GAP workshop- Ames, IA*
- April 14: Cultivating Opportunities Workshop: Indian Hills Community College
- April 16: Story County Local Food workshop
- April 21: info booth at VEISHEA village
- April 30: presentation for Extension in Creston, Iowa on edible landscapes
- June 11: Local Foods Meeting
- June 12: Farm visit with NACUFS Intern: Wilber's Northside Market and Table Top Farm
- June 19-23: Permaculture Conference in Hartford, MA
- July 19: Local Foods Meeting Story County
- July 21: Informational Booth at Wheatsfield
- July 23: Farm Crawl
- July 26: Compass Green Event
- July 30: Food Safety and Defense Class: Polk County Extension Office
- August 14: Food Day meeting
- August 15: RFSWG Local Food meeting
- August 16: Steering Committee Meeting
- August 28: Meet with volunteers
- September 6-9: Growing Power Conference; Milwaukee, Wisconsin
- September 12: Farmer Entrepreneur Panel
- September 13: RFSWG meeting
- September 26: Bio-bus presentation
- September 28: Affordable Healthy Foods webinar
- October 12: Food Access and Health Work Group Meeting: Nominated Nourish Iowa Award
- October 15: Greenhouse Group presentation
- October 18: Meet your Farmer Event
- October 18: Local Meal
- October 24: Food Day at Conversations
- October 24: Sustainability Day Event with Live Green!
- October 30: Food Waste Crisis webinar
- November 1: Presentation English class
- November 7: Presentation Sustainability Learning Class
- November 10: Compost Day

PROJECT APPROACH

- Our project began taking shape by meeting with ISU Extension and planning out times for the GAP workshops. The first year we worked with a timeline to have our workshops during the summer months, however, this was not an ideal time for farmers, so the second year we moved all workshops to the spring months after harvest and during off season. This was much more conducive to scheduling and allowed us to have 77 producers go through the program.
- GAP workshops were a way for us to promote on farm food safety, and we required that all producers that sell to ISU Dining to go through the program. Also, as part of our match for the grant, we paid for the workshop for those producers that sold to ISU Dining. We also were able to connect to new growers interested in selling to a University, and tailored the GAP workshop to include a brief section on how our operation works at ISU. This allowed for conversation at the end of the workshop for those that were interested in increasing their operations.
- In order to increase purchases of specialty crops we increased our number of contracts. Our first of the grant we had one contract with Hank Taber. The second year we increased and had four contracts.

- **Farmer 1**
 - 2,000lbs peppers
 - 175lbs red cabbage
 - 800lbs zucchini
 - **Farmer 2**
 - 700lbs green cabbage
 - 2,500lbs red onion
 - 10,000lbs yellow onions
 - 500lbs yellow squash
 - 1,500lbs cucumber
 - 5,750lbs baker potatoes
 - 3,750lbs red potatoes
 - **Farmer 3**
 - 2,500lbs carrots
 - **Farmer 4**
 - 3,000lbs peppers
 - 1,500lbs cucumbers
 - 2,400lbs tomatoes
- In addition to contracts we also purchase regularly from over 25 producers, 15 of which are specialty crop producers. Our purchasers are in regular conversations during the growing season about purchases and what is available. ISU Dining has also begun working with many growers that are working with season extension through the use of hoop houses and green houses which has allowed us to continue purchases from local producers throughout some winter months. This has increased our capacity to purchase locally, as during many summer months we are unable to use produce because students are not in session.
- In addition to increasing the number of contracts that we have, we also increased the number of producers that we purchase from. Over the last two years, we now purchase from an additional 7 specialty crop producers. These producers grow various fruit, vegetables, popcorn and mushrooms for the dining centers: Michael Salama: Greenhouse production, Hank Taber, New Shoots, Table Top Farm, Wills Orchard, Brandmeyer, and Anything but Green Gardens.
- Conferences were attended each year for both promotion of Farm to ISU as well as connecting with local producers that were interested in increasing their production and working with a university. Many of these connections were made at conferences regionally such as the MOSES conference in La Crosse, Wisconsin, or the Great Plain Growers Conference in St. Joseph, Missouri.
- Our approach to informational booths revolved around dining center holidays and events. This allowed for us to greet the most amount of people and discuss Farm to ISU and ways to get involved, and activities that were occurring.

GOALS / OUTCOMES

- **Outcome #1: *Increased numbers of specialty crop growers eligible to sell to ISU Dining by obtaining GAP/GHP certification, and protocol training regarding selling to a state institution.***
Throughout the grant, we began purchasing from 7 new producers, all of which were GAP trained. All of our ISU Dining producers also went through our GAP training with ISU Extension. Along with our producers going through the GAP workshops, 77 total producers attended these workshops. Greatly increasing the amount of producers trained. Through this program many people have become aware of the importance of GAP and the need for the training for on farm food safety. We are pleased with the outcome of this program, and look forward to our continued efforts in working with GAP programming in the future.
- **Outcome #2: *Increase the purchases of Iowa specialty crops for utilization in ISU Dining facilities by December 2012.***
We introduced 4 contracts to our 2011-2012 fiscal year, and have been implementing them for 2012-2013. These contracts included: 37,000 pounds of local produce at \$24,500. Our fiscal year of 2011-2012 ended at \$35,759 in local specialty crop purchases. This is a 30% increase from our previous year at \$23,831. Although our goal for the fiscal year was to reach \$45,000 in local produce purchases, we were unable to meet this due to weather constraints and unmet contracts. This issue is discussed in more detail in the *lessons learned* portion of the report. However, we are still pleased with the ability to increase our purchases from local producers even with the extreme weather conditions and the unmet contracts.

BENEFICIARIES

Over 70 producers were GAP trained through our workshops over the last 2 years. Additional producers and staff received information regarding the farm to ISU program. We also partnered with ISU Extension and many other regional food system groups that were able to market their programs at our workshops. We presented across the state of Iowa, and met many new people with similar initiatives in increasing local food production. We had over 30 staff attend cooking demonstrations in regards to local specialty crops, and over 90 staff and students attend farm crawls and our compost day event. In addition, we outreached to numerous classes, held informational booths and holiday and special events and conferences, reaching well over 20,000 people and directly talked to approximately 1600. We have had increased student interest in our program, and now have two Farm to ISU volunteers that attend meetings and regularly assist with events.

LESSONS LEARNED

- Over the last two years we have learned many different things regarding our programming and about purchasing locally in Iowa. This year we experienced a major drought, and this has in turn caused for many challenges in sourcing local products. Our contracts have not been completely fulfilled as a result of the drought, and we are working to understand appropriate measures to write into our grants in case situations and weather continue to provide hurdles.
 - A major hurdle was the spring freeze in 2012 that completely wiped out a majority of the apple source that we receive each year.
 - Our only contract that was fulfilled was by Hank Taber, who fulfilled 140% of his contract. We believe that this in part is due to the availability of irrigation on his farm and his experience working with ISU Dining. All other contracts were not fulfilled in great amounts, which is a large reason for our unmet goal of \$45,000 for local produce purchases.
 - The onion crop by one producer failed due to the drought.
 - Potatoes were not the right size and then froze in the ground with weather changes
 - All other contracts have not been fulfilled, but reasoning is not known
- Due to the lack of fulfillment in contracts, ISU Dining has had to re-consider the best methods for procuring local produce and having adequate supply of products for students. Because of this, many contracts may not be available in future years
- We have found that by trying to increase our purchases of local specialty crops, there is also an increase in coordination that is needed. By working with local, small producers, we are continuously talking on the phone and working through scheduling of delivery times, weather issues, and other various constraints. This has been a learning experience, and as we continue to grow, we have fostered relationships with our producers that have made for a more steady and cost-effective procedure to obtaining local products.
- There has also been a need for continued education in why we support local producers. We have learned that in order to continue this program, we need the buy in of our community, our students, and our staff in ISU Dining. Without their support, the program will not continue. With this awareness, there is also need for education in how to use the specialty crops, and which crops are most appropriate for a University setting. Because of the need for a quick and safe way to prepare foods, some produce is not appropriate to be used in dining centers or cafes, but may be used in catering situations. Over the last two years we have begun to figure out the best local items that students want to eat and that staff can serve.
- Other lessons learned involved the timing of GAP workshops. We began offering GAP workshops during summer months, but this was not timely for producers. During the second year of GAP workshops, we offered all workshops during the winter and early spring months in order to ensure availability for farmers. We had a much larger audience with these time frames and were able to coordinate with ISU Extension to offer the workshops in many different locations around Iowa.

CONTACT PERSON

Nancy Levandowski: nancyl@iastate.edu ; 515-294-7578

**USDA Final Performance Report
IDALS SCBGP 2010-11**

Project Title

Expanding Educational Programming and Professional Development for Iowa's Green Industry

Project Summary

The Iowa Nursery and Landscape Association (INLA) is a non-profit organization that represents the interests of Iowa's 154 nursery and landscape companies. An important part of INLA's mission is to provide educational and professional development opportunities for their membership as a means to enhance their competitive advantage in the market place. Grant funds from the IDALS SCBGP were used in two project areas directly related to educational programming and professional development in the nursery and landscape industry. Project A was the development of a four-part webinar series on the Sustainable Sites Initiative, storm water management, rain gardens and innovative marketing approaches. Project B provided funding support to secure nationally recognized speakers for a two-day winter educational event that is attended by 500-600 green industry professionals each year. The educational programming associated with both of these projects helped improve the competitive advantage of green industry professionals involved with specialty crops.

Project Approach

Project A:

Between November 2010 and April 2011 the four webinar topics were selected and then subsequently delivered using the Adobe Connect software so they could be archived and accessed asynchronously by INLA members after the live presentation. After the live presentations, each webinar archived on a server at Iowa State University and a link to each webinar was posted on the INLA webpage. The webinars were marginally attended but response from the participants was positive. Development and delivery of the webinar series was managed by Dr. Ann Marie VanDerZanden, Iowa State University Department of Horticulture with technical assistance from the ISU Extension distance communication department. The INLA Executive Board was involved in the selection of webinar topics as well as promoting the webinar series to members.

Project B:

In October and November 2010 members of the INLA Executive Board worked with ISU Department of Horticulture personnel to develop the speaker list for the educational event, contact speakers and helped develop registration materials. February 23-25, 2011 the educational event was held in Ames and the attendance was 20% higher (~730 attendees) than it has been in past years. Many participants commented on their final event evaluations that the speakers were some of the best the event has ever had.

Goals and Outcomes Achieved

Project A:

The webinar series was completed by March 30, 2011. The measureable outcomes included: participants having a better understanding of the topic covered in the webinar; participants implement one or more practices/concepts discussed in the webinar; and the nursery or landscape company the participant represents is able to increase their profitability by better meeting customer needs or adding new

customers. Due to a technical error, a complete set of data to answer these three questions was not collected from all of the participants at the end of each webinar. (Figure 1 at the end of this report includes the complete survey.) However, through surveying a sample of webinar participants (5 of the 20 participants) it was clear that they did have a better understanding of the topic (Question 1) and that they would be able to implement one or more practices (Question 2) after participating in the webinar. These conclusions are based on an average rating of 4.3 out of 5 to Question 1 and an average rating of 4.1 out of 5 to Question 2. The scale for both questions is 1=strongly disagree; 5=strongly agree. The last outcome, on increasing profitability for the employer/company did not provide any clear results. Responses to the profitability question in the September 2011 follow up survey were either 'neutral' (3 responses) or 'unable to rate' (2 responses).

Project B:

Funds from the IDALS SCBGP were used to secure nationally recognized speakers. The expected measureable outcomes for this project include: 1) More green industry professionals attending the Shade Tree Short Course and INLA Conference and Tradeshow event. This was accomplished with at 20% increase in attendance over past years. 2) Participants being able to fulfill their annual educational recertification requirements for industry administered certifications (i.e. International Society of Arboriculture, Pesticide Applicators). Over 20 professionals completed annual educational recertification requirements. Of the ~730 registered participants, 153 returned program evaluations. In addition to a high level of overall satisfaction with the speakers we wanted feedback on two other measureable impacts: 1) will participants implement one or more practices/concepts discussed in the educational sessions they attend; and 2) will the company the participant represents be able to increase profitability by better meeting customer needs or adding new customers.

A number of participants (16%) reported being able to implement what they learned from attending the sessions. A sample of written comments include:

- *Real interesting. Material I can use in the real world.*
- *Good new information I can use.*
- *Good information on new shrubs that I will consider in my park landscaping projects.*
- *Great. Learned a lot and will use the information I used.*
- *Very good. Will use this information again.*

None of the participants reported being able to increase profitability by better meeting customer needs or adding new customers.

Beneficiaries

The 50 INLA members who participated in the webinars and the ~730 green industry professionals at the February 2011 educational event all furthered their knowledge and expertise in areas related to specialty crops (mainly nursery and landscape related). The direct longer term economic impact is difficult to measure at this point but an additional survey will be distributed to webinar participants in September 2011 asking if they have been able to parlay information covered in the webinars into new or increased revenue.

Final Report

Specialty Crop Block Grant # 12-25-B-1068

Expanding the Local Foods Market in the Great River Region

Project Summary:

The purpose of this project is to expand the local food market opportunities in the Great River Region (GRR) of Lee, Louisa, Des Moines and Henry Counties in Southeast Iowa by connecting specialty crop growers with schools and institutions in this area. Interest in acquiring locally grown foods for consumption in the GRR can be documented in the growth of area farmers markets which have expanded from 5 markets in 2005 to 11 in 2010. The Burlington Community School District (BCSD) has approached the Buy Fresh Buy Local Southeast Iowa Chapter (BFBL SE) on ways to incorporate local foods into both school lunch and summer feeding programs within the district.

The timeliness of this project was critical. The local food movement in Southeast Iowa is credited with the establishment of the BFBL SE chapter in 2005. Over the past 5-years, this initiative has heightened the awareness of “locally grown” foods in the 4-county region and has led to schools, institutions and restaurants to seek suppliers for locally grown goods. Based on these efforts and the tremendous strides over the last 5 years, the local food movement, fostered by local producers, supported by Geode Resource Conservation and Development, Inc. (RC&D) and the Lee County Economic Development Group (LCEDG) has outgrown its capacity to continue this initiative without expertise and guidance. Accessing of the regional local foods market in the GRR will remain stagnated without the placement of a local coordinator to foster networks and partnerships between consumers and producers.

Project Approach:

In December of 2010 a local foods coordinator was secured through Geode RC&D and began making connections with the local school districts. The Burlington Community School District (BCSD) was still greatly interested in purchasing locally grown fruits and vegetables. After several meeting with the Food Service Supervisor and Superintendent, the School District made a decision to apply to become a Farm to School Chapter. The Food Service Director completed and submitted this application on behalf of BCSD in an effort to secure statewide recognition and a \$4000 grant toward the purchasing of locally grown fruits and vegetables. In March the BCSD received an invitation letter to join the Farm to School Program. The BCSD is currently one of fifteen chapters in the state of Iowa. The BCSD was also awarded an additional \$200 through the “Wrap Your Own Iowa Grown” initiative funded by the Iowa Farm to School Program. The \$200 was used to procure enough specialty crops to feed approximately 300 students at Corse Elementary during one day. \$4000 was used toward the purchase of building materials/tools to create a school garden that will in turn feed the students during their summer feeding program and the beginning of the 2011-2012 school years. The local foods coordinator assisted the BCSD by networking them with local specialty crop growers who had extra produce to sell. All Farm to School funds were paid directly to the BCSD. The local food coordinator received no benefits from the Farm to School funds. All Specialty Crop Block Grant Funds were used for the local food coordinators salary.

The local foods coordinator also assumed responsibilities of the BFBL SE Chapter in April. The BFBL Campaign was strictly a marketing campaign targeted at developing a local foods brochure to raise awareness of local foods. This project had previously been completed by a volunteer as no funding for the initiative was available. The establishment of this project with a designated staff person has

provided a conduit for local food dialogues and opportunities between schools interested in local foods and growers within the area. Without a coordinated facilitated dialogue between consumers (school districts) who had a strong interest in procuring local foods and producers looking for opportunities to increase production, yet may not have an end user, local foods continues to be the chicken and the egg scenario.

The local foods coordinator initiated contacts with existing specialty crop producers and those interested in becoming producers. This allowed for measuring the interest in increasing production or aggregating with other growers to meet the growing demands of large school districts and institutions. Interested growers were brought together to further discuss needs by the group and of the buyers.

The dialogue and task completed by the local foods coordinator with BCSD resulted in discussions regarding serving size, packaging, and processing. As a result of the strong relationship formed by the local food coordinator, BCSD revealed that due to the construction of new school facilities, the BCSD would have a certified processing center in an old elementary school that they would allow local producers of specialty crops to add value to their products.

The efforts of the local food coordinator has complimented Farm to School and Buy Fresh Buy Local marketing activities that have resulted in opportunities to increase production and a shared processing facility for specialty crops.

Goals and Outcomes Achieved:

Goal # 1: Establish a method for the School Districts (15) in the Great River Region to purchase locally grown foods from specialty crop growers.

- BCSD with a 52% free and reduced lunch program, has been purchasing locally grown foods from three specialty crop growers: Kathy's Pumpkin Patch, Mogo Organic, and Bloom and Bark, for consumption at Corse Elementary. The specialty crops that were purchased were used to make wraps that were served at Corse Elementary and fed approximately 300 school children. BCSD has also started a school garden at Corse Elementary with three 6x12 raised beds and a 50 feet squared tilled garden that will help feed approximately 100 children during the summer feeding program. BCSD has plans to establish gardens at 3 additional schools within the district. Once all school garden plans are implemented, the BCSD has the potential to save about \$22,000 in food costs according to Alan Mehaffy, Food Service Director.
- The local food coordinator contacted Kathy's Pumpkin Patch, Mogo Organic, Bloom and Bark, and Gerst Family Gardens about selling to the BCSD. Every business was interested in selling but lacked the extra produce to sell due to the difficult growing season this past year. The local food coordinator contacted several other growers but all lacked the ability or the desire to increase production to meet the demand. The interested growers listed above now have an established relationship with the BCSD and should benefit from future purchases planned by BCSD.
- When produce was not immediately available for purchase for the BCSD, the local food coordinator helped establish a relationship with Local Harvest Supply (LHS). LHS is a buyer and distributor of specialty crops and currently buys from Kathy's Pumpkin Patch, Mogo Organic,

Gerst Family Gardens, and Growing in Grace Farm. These growers had previous arrangements to grow for LHS and did not have the extra produce to sell to BCSD. But by buying through LHS, the BCSD could secure the specialty crops grown by these producers through LHS aggregation. This arrangement could easily be duplicated by other school districts and specialty crop producers. LHS is currently increasing their grower and consumer directories.

Goal # 2: Identify state inspected facilities that can be used for light processing of locally grown foods.

- Currently two light processing facilities have been identified within the GRR. The Fellowship Cup, located in Mt Pleasant, IA is in the planning stages of building a certified kitchen with the purpose to serve meals to the needy. The director has expressed interest in partnering with local specialty crop producers who would be interested in using their facility for light processing to add value to their specialty crops. In return, the director is asking for producers extra product to help supplement the meals they serve. Blueprints and kitchen equipment were discussed with the director and these notes were shared with interested parties. State inspection on this property has not been completed because it has not been completed.
- The second identified processing facility is the James Madison Elementary School in Burlington. Scheduled to be completed in 2012, this school will contain the new bread baking facility that will be supplying the entire BCSD with fresh bread. The bread baking facility will only require half the kitchen space that is currently available. Alan Mehaffy, Food Service Director for BCSD, has offered the other half of the kitchen to create a certified space that would be used to enhance the value of locally grown specialty crops. The local food coordinator has toured this facility and believes it will be a key to the future expansion of specialty crops in Southeast Iowa. The opportunity to further this value added potential for local producers may be hindered significantly due to the early termination of this grant which is resulting in elimination of the local foods coordinator position. Termination of this grant took place only weeks after the local food coordinator was able to tour the facility. This facility was unable to be state certified due to kitchen being under renovation.
- Having a certified kitchen to add value to their specialty crops would greatly benefit a high number of local producers. During a meeting to gauge interest of a certified kitchen, 10 of the 15 specialty crop producers in attendance expressed a high interest in having such a kitchen to enhance their specialty crops.

Goal # 3 – Develop a system/network for aggregation and distribution of locally grown foods.

- In conjunction with the BFBL SE chapter, the local food coordinator was able to identify four growers that were interested and able to meet the quality and demand of wholesaling specialty crops to Local Harvest Supply: Gerst Family Gardens, Growing in Grace Farm, Kathy's Pumpkin Patch, and Mogo Organic. By aggregating the products of all growers at one location, we were able to secure a pick-up point from Local Harvest Supply. Product is picked up weekly from Kathy's Pumpkin Patch and taken to the Local Harvest Supply Warehouse. Current talks with Local Harvest supply include using Kathy's Pumpkin Patch as a larger regional aggregation point.

Goal # 4 – Develop a producer guide for addressing liability issues associated with light processing and safe handling of locally produced goods

- State and federal regulations for light processing are extremely overwhelming and complicated. Completion of this goal was unsuccessful due to time constraints and lack of funding. One training session was held with the Lee County Health Department and was attended by Kathy's Pumpkin Patch and Heartland Fresh Family Farm. Safe handling procedures, labeling, HAACP Planning were all discussed in detail. Additional sessions were in the planning stages for the latter part of 2011. Local foods coordinator; in conjunction with Great River Alliance of Southeast Iowa, were planning to secure a Good Agricultural Practices (GAP) training session to be held in the GRR. GAP training sessions prepares the grower for the reality of state and federal regulations in regards to light processing by walking you through a GAP audit.

Beneficiaries:

BCSD children were the greatest beneficiary of this project. Approximately 300 school children from Corse Elementary are now consuming specialty crops from local producers and helping in growing them as well. By becoming a Farm to School chapter and receiving the \$4000 grant, Corse Elementary installed a garden to grow specialty crops and the BCSD has plans to duplicate success at 3 other elementary schools within their district potentially affecting several hundred elementary students. Beneficiaries would also include any future specialty crop growers interested in growing for the BCSD.

4 local specialty crop producers also greatly benefited from these projects. Gerst Family Gardens, Growing in Grace Farm, Kathy's Pumpkin Patch, and Mogo Organic have established new sources for their specialty crops in BCSD and LHS. Both buyers have expressed interest in purchasing large volumes of specialty crops in 2012 and all four producers plan to increase production of their specialty crops to meet the demand. With this increased demand, the future goal is to find more local specialty crop producers willing to meet the challenge of up-scaling. With an aggregation infrastructure now in place, the difficulty of moving fresh fruits and vegetables is becoming much more manageable.

Lesson Learned:

Making sure there are available and interested growers in the area is the biggest lesson learned. It takes time to bring like-minded growers together. The majority of growers in the Great River Region are aged >50 years of age. Many of these growers do not have the interest or the manpower to upscale their production to meet the demands of large institution buyers. The remaining growers in the area are content with their current operations, i.e.; selling at farmers markets or managing their Community Supported Agriculture (CSA) program.

A local food coordinator was to be hired in the month of October. The local food coordinator for Geode RC&D was not hired until December. Being hired in October would have given the coordinator additional time to complete the goals and may have had an easier time connecting with producers being October is still a growing season. Acting in a timelier manner would have had a greater impact on achieving the set goals.

Finding kitchens that could be state certified for light processing of value added products is extremely hard. After many phone calls and visits to closed restaurants/institutions, it was determined that this goal was going to be harder to achieve than originally thought. The lack of available kitchens in Southeast Iowa that could become state certified in their present state presented a huge roadblock.

The scope of this grant was too large for one coordinator to handle. With the lack of support staff to help, the proposed goals were too monumental to meet in the established time. Additional staff and a longer time period to complete the goals would have been greatly beneficial.

Contact Person:

Adam Hohl – Local Foods Coordinator
Geode Resource Conservation and Development, Inc.
308 N. Third St.
Burlington, IA 52601
319-752-6395

Additional Information:

Buy Fresh Buy Local Southeast Iowa Chapter Facebook page
www.facebook.com/pages/Buy-Fresh-Buy-Local-Southeast-Iowa/166355566756150?ref=ts
Grower profiles with Local Harvest Supply
<http://localharvestsupply.com/pages/our-growers/our-grower-directory.php>



AG;:;(/;/:/URE~'. ___ IOWA: ADEP-~RT,MENT OF AGRICULTURE AND LANDS, T,EW:4RDSHIP

i.

Bill Northey, Secretary of Agriculture

March 30, 2011

Burlington Community School District
Alan Mehaffy
1020 Market St
Burlington IA 62601

Dear Alan:

Congratulations on the successful submittal of your Farm to School Chapter Packet. Your Chapter request for \$4,000 to implement the goals and objectives as established in your Iowa Farm to School Program Chapter Project Plan has been approved. Please note the deadline for this project will be **November 15, 2011**.

Attached is a copy of the contract along with four signature pages. Please have the chapter representative sign these forms and return them to our office. A copy will be returned to you after all signatures have been obtained. Upon completion of this project, a Chapter Financial and Performance Report will also be required. A copy of this form is attached for your reference. A **check along with a certificate recognizing your Farm to School Chapter will be issued as soon as all required documents have been signed, submitted and approved.**

We look forward to working with you and sharing your success story with others across the state as well as across the nation. A crucial component to increasing the Farm to School Program objectives is the promotional campaign that we will embark on. Please forward pictures depicting your program as well as all copies of press and printed material that relate to your Farm to School Chapter.

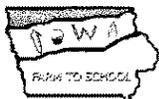
Don't forget your school is also eligible to participate in any of our other initiatives as well. The "Wrap Your Own-Iowa Grown" initiative deadline is April 8, 2011. The "A is for Apple" initiative will be implemented this fall.

Again, we commend you for your efforts and the dedication you have for the health and well being of the children and residents of your community.

If you have any questions regarding this process, please do not hesitate to call us. You may reach me by phone at 515-281-7657 or by e-mail at tammy.stotts@iowaagriculture.gov.

Sincerely,

Tammy Stotts
Farm to School Program



Adam Hohl

From: Stotts, Tammy <Tammy.5totts@iowaagriculture.gov>
Sent: Wednesday, April 06, 2011 10:49 AM
To: Adam Hohl
Subject: FW: 15 Farm to School chapters now working to get more fresh, local foods in schools

Hot off the press!

From: Vande Hoef, Dustin
Sent: Wednesday, April 06, 2011 10:47 AM
To: Vande Hoef, Dustin
Subject: 15 Farm to School chapters now working to get more fresh, local foods in schools

For Immediate Release
Wednesday, April 6, 2011

Contact: Dustin Vande Hoef
515/281-3375 or 515/326-1616 (cell)

NORTHEY: 15 FARM TO SCHOOL CHAPTERS ACROSS IOWA NOW WORKING TO GET MORE FRESH, LOCAL FOODS ON STUDENTS' PLATES

Four new chapters have just been/armed

DES MOINES - Iowa Secretary of Agriculture Bill Northey today welcomed four new Iowa Farm to School Chapters. With today's announcement, there are now fifteen chapters located across Iowa dedicated to developing and implementing efforts to raise awareness and increase consumption of locally-grown Iowa food in schools.

The new Farm to School chapters are located in Burlington, West Liberty, Clear Creek Amana and Marshalltown. Chapters are eligible to receive up to \$4,000 to support their activities and can request promotional items, brochures and grower directories to find local fruit and vegetable farms in their vicinity.

"The existing chapters have been the leaders in developing new and creative ways to increase the amount of fresh, local fruits and vegetables available to students and we are excited to have four new chapters joining them," Northey said. "There are great opportunities to expand the amount of local foods available in our schools and we are excited to partner with these chapters."

The four new chapters join existing farm to school programs operating in Independence, Atlantic, Clear Lake, Amana, Cedar Falls, Oelwein, Decorah, Van Buren, Iowa City, Eldridge, and Windsor Heights.

The Farm to School Chapter program was implemented to allow communities and individual school districts the opportunity to create a local food procurement program that is personalized to meet the district's individual needs. Chapter funds are to be used for the purposes of nutritional education as well as the purchase of local fruits and vegetables.

Existing chapters have used the funds for locally-grown Iowa food procurement, creating school gardens, field trips to local farms and orchards, purchase of kitchen equipment to better serve needs of students, educational presentations and materials, food fairs, and classroom activities. To date, 25,000 students have been served local fruits and vegetables as part of the program.

The Iowa Farm to School Program began in 2007. The goal of the program is to link elementary, secondary, public and non-public schools with Iowa farmers; provide schools with fresh and minimally processed Iowa-grown food for inclusion in schools meals and snacks and encourage children to develop healthy eating habits.

Northey has also recently invited Iowa schools to participate in the "Wrap Your Own-Iowa Grown" initiative that is being offered through the Iowa Farm to School Program. The initiative will promote the purchase of locally-grown vegetables and products to create Iowa grown wraps.

More information on all the programs offered through the Farm to School initiative, including information on how to form a Farm to School Chapter, is available on the Iowa Department of Agriculture and Land Stewardship's website at www.IowaAgriculture.gov and then clicking on the "Farm to School" link under "Hot Topics."

BURLINGTON -- Spring in Iowa means planting time, but crops aren't the only things growing here. Iowans are growing Farm to School. In fact the newest chapter being cultivated in your neighborhood is the Burlington Area Farm to School Chapter.

On April 6, the Iowa Department of Agriculture and Land Stewardship announced the award of a \$4,000 grant to the Burlington School District for the establishment of a 50'x 50' garden at Corse Elementary School. According to Alan Mehaffy, Food Service Supervisor for the Burlington Community School District, "We plan to establish a school garden that will grow fruits and vegetables to be used in the school lunches. We have a tremendous group of volunteers that will be integral to making this project happen. The opportunity to create a learning opportunity for students that they can be a part of will create a great educational environment," states Mehaffy.

The Iowa Farm to School Program began in 2007 and currently has 15 chapters that include the 4 new chapters designated in April. The goal of the program is to link elementary, secondary, public and non-public schools with Iowa farmers; provide schools with fresh and minimally processed Iowa--grown food for inclusion in schools meals and snacks and encourage children to develop healthy eating habits.

As a means to accomplish this goal, IDALS has implemented several programs to encourage the consumption and procurement of locally grown and produced food. The Farm to School program is being implemented to allow communities and individual school districts the opportunity to create a local food procurement program to be personalized to meet their own individual needs. Charter funds are to be used for the purposes of nutritional education as well as the purchase of local fruits and vegetables.

"The demand for locally grown foods in schools is increasing." Adam Hohl, Local Foods Coordinator with Geode RC&D, Inc. "Connecting growers with consumers has been a common challenge and we are hoping projects such as these can help remove those barriers. Programs like Farm to School create an environment to introduce buying direct from farmers and creating gardens for education and consumption at the schools.

"Implementing state initiatives like Farm to School, Wrap Your Own Iowa Grown and an A is for Apple are easy to implement when you have key willing partners like Alan Mehaffy who is enthused about the benefits from all viewpoints--those include nutrition, education and economics," states Hohl.

More information on all the programs offered through the Farm to School initiative, including information on how to form a Farm to School Chapter, is available on the Iowa Department of Agriculture and Land Stewardship's website at www.iowaAgriculture.gov and then clicking on the "Farm to School" link under "Hot Topics."

The Burlington Farm to School Chapter is supported by the Burlington Community School District, Geode Resource Conservation and Development, Inc., Des Moines County Master Gardner's, Des Moines County Extension, MoGo Organics, and Kathy's Pumpkin Patch. For additional information about this project please call Alan Mehaffy at (319)-753-0624 or Adam Hohl at (319)-752-6395.

THE HAWKEYE

Corse starts garden venture

Fruits and vegetables grown in school garden to be used in lunches.

By JERMAINE PIGEE jpigee@thehawkeye.com

Students at Corse Elementary School soon will have their own source of fresh fruits and vegetables for their school lunches.

As part of the Iowa Farm to School Program, the Iowa Department of Agriculture and Land Stewardship recently gave the Burlington School District a \$4,000 grant for the establishment of a 50- foot-square garden at the elementary school.

"We plan to establish a school garden that will grow fruits and vegetables to be used in school lunches," said Alan Mehaffy, food service supervisor for the school district. "This is a way to get the kids involved in the locally grown and fresh fruits and vegetables."

The garden will be placed in the courtyard of the elementary school, and it will be covered by a high tunnel, which is an unheated, plastic-covered structure that provides an intermediate level of environmental protection and control compared to open field conditions and heated greenhouses.

"The students will be able to see the garden from their classrooms, " Mehaffy said. "It's secure, so people, deer or rabbits won't be able to get in there."

Mehaffy said roughly 20 volunteers will maintain the garden, which will grow a variety of fresh fruits and vegetables including tomatoes, cabbage and green onions, and also will grow herbs such as cilantro.

Shirley Wiley, a volunteer and master gardener - an individual who learns about the art and science of horticulture and shares that information with others - is hoping to begin planting at the elementary school by early May.

"Most things take anywhere from 60 to 80 days to mature," Wiley said. Wiley also said none of the food grown in the garden will be ready to eat this school year. She said,

however, it will be ready to serve to the students participating in the summer feeding program, which begins July 6.

Mehaffy said the garden was placed at Corse as a starting point because the elementary school has the smallest enrollment, at about 300 students.

"I was worried if we started big at Sunnyside or Black Hawk (elementary schools), we wouldn't be able to supply everyone," he said.

Mehaffy said other schools in the district eventually could have a garden, depending on how successful the one at Corse is.

"We serve right at 3,000 meals a day, and unless something comes up where we get a field three times the size of a football field, we won't be able to grow our own fruits and vegetables for the whole school district," Mehaffy said. "We can make 300 gallons of salsa out of tomatoes that we grow at Corse. But as far as growing 3,000 servings of broccoli, we won't be able to do that."

Students will benefit from eating healthier food with no added sugar, salt or preservatives, though, and one teacher at the elementary school will incorporate the garden into her lesson plan.

"Starting next week, I'll be starting a seed unit where we will examine what a seed needs in order for it to grow," said Linda McCartney, a second-grade teacher at the elementary school. "Hopefully, the students will learn the importance of taking care of their environment. I hope it will show them that there are good things to eat out there that are homegrown."

Mehaffy said the \$4,000 grant is for dirt or other supplies needed to get the garden started. Money from the food service funds will support the garden when the grant money runs out.

Mehaffy also said having a garden will reduce the amount of food costs for the school district.

"We have the potential to save about \$22,000 in food costs," Mehaffy said.

The Iowa Farm to School Program has 15 chapters that include the four new chapters designated in April, including the Burlington Farm to School chapter. The goal of the program is to link elementary, secondary, public and non-public schools with Iowa farmers, provide schools with fresh and minimally processed Iowa-grown food for inclusion in schools meals and snacks and encourage children to develop healthy eating habits.

TEAM Nutrition Mini-Grant Summary

Dear Team Nutrition Mini-Grant Recipient,

After completing the grant, a summary report of how you spent your grant dollars is required. Also, please share your activities on how you made a difference in helping children eat healthier and become more physically active! Sharing of success stories helps motivate others to make similar healthy changes in school environments. A sampling of success stories will be posted on the Bureau's website.

Summary of Activities

Document activities using the attached form:

- The number of students that took part in a Team Nutrition activity (classroom or school wide).
- The number of adults that participated in a Team Nutrition activity or event (include parents, teachers and other community members).
- A description of the activities completed.
- Summarize the outcome of the activity or event. **Please** include pictures, news articles, or other supporting documentation that help document the activity.
- Provide any anecdotal comments from students, parents, school members or community members that provide an overview of the success of the activity.

Mini-Grant Payment Procedure

To receive reimbursement for expenses, document how awarded grant dollars were spent: List the expenses incurred and attach the receipts to the attached form.

- Include original signature of person preparing the summary report.
- All invoices or payments made must show a zero balance due for reimbursement to be made by the Department of Education.
- If payments were made on a credit card, please include the check number used to reimburse the payment, the amount of the payment and the date the reimbursed payment was issued.

This report should match the items purchased you requested in your mini-grant application.

The summary report and request for reimbursement should be received in the Bureau of Nutrition, Health and Transportation Services by July 30, 2011.

All funds should be expended by June 30, 2011.

Upon receipt, I will complete additional forms to submit to the state for payment. If you have additional questions, please email me at: pattLdelger@iowa.gov or call me at 515-281-5676.

Mail summary report of Team Nutrition activities, request for payment and receipts to:

Patti Delger, Team Nutrition 2007 Grant Project Director
Department of Education, Bureau of Nutrition, Health and Transportation Services
400 East 14th St., Grimes State Office Building Des Moines, IA 50319-0146

USDA Final Performance Report of “Aronia Berry Marker Identification for Aronia Berry Food and Beverage Products”

Project Title

Aronia Berry Marker Identification for Aronia Berry Food and Beverage Products

Project Summary

The goals for this project were to analyze Aronia Berry’s sugar to acid ratios and compare them to other juices in order to predict their acceptability in the market. Another goal was to determine the best quantification methods to measure Aronia berry concentration in other products. High-Performance Liquid Chromatography (HPLC) and Thin Layer Chromatography were the methods used for this purpose, and were tested on the berries that were received after harvest (mostly frozen). Finding an effective quantification method is essential for the future commercialization and regulation of Aronia products. This is especially true now that ongoing research is finding many alternative uses for Aronia berries besides being an adequate colorant. This project is the continuation of last year’s project completed in November, 2010. The previous project focused on the nutritional analysis and antioxidant composition of Aronia berries in comparison to other berries and the effect of processing on its phenolic compounds.

Project Approach

This project consisted of analyzing Aronia berry juice along with other single and blended commercially available juices. The degrees brix, pH, titratable acidity and sugar acid ratios were measured. Further analysis was done to determine unique characteristics of Aronia berry such as signature phenolic components represented as peaks in HPLC analysis and specific pigments that could be separated using TLC.

In the attached report, there is a much more detailed description of the findings from this project, but some significant results that should be noted include:

Accomplishments

- HPLC analysis identified the signature peaks of to be between minutes 8 and 10 at a detection wavelength of 272nm (for the 2011 crop).
- Possible efficient quantitative methods (HPLC) and qualitative methods (TLC) for Aronia berry were determined.

Conclusions

- A sugar acid ratio comparison between Aronia berry juice and other juices predicts that future Aronia products may be well received by consumers due similar ratios found in already well liked products.
- TLC resulted in being a possible method to detect Aronia berry pigments in other products with the exception of cranberry cocktail juice.
- HPLC resulted in a clear quantification of Aronia berry in single juices with low phenolic compounds. Mixed results were obtained from Aronia berry in darker juice blends when using Aronia berries harvested in 2 different years.

Recommendations

- Further research is necessary to conclude the efficiency of HPLC and TLC as adequate methods for the quantification of Aronia berry in products.

- Determining an optimal harvest time for Aronia berries would facilitate further research. During this project, inconsistent results were found between different harvest years. In order to provide reproducible results Aronia berries composition needs to be consistent throughout each year.

Goals and Outcomes Achieved

The findings of this project are can be considered preliminary results. As a long term project many more samples would need to be analyzed in order to come to a well-supported conclusion. During this project, significant progress was made in development of analytical methods of Aronia berry in other products but this research needs to continue for more significant results. The goals set out for this reporting period were met, but due to inconsistency in the Aronia berry composition from different harvest years results were not as conclusive as expected. The results of this study have been shared with the Midwest Aronia Association through their Website, and annual meetings. The finalized report will be given to all attendee at the upcoming meeting March 29-30, 2012. The previous report was shared last year. Approximately 300 attendees (growers) were, and well be, given copies of these results. In addition, the results were presented at the Institute of Food Technologists meeting last summer in New Orleans. Manuscripts are in preparation for submission to the Journal of Food Science, HortSci, and an Extension Bulletin. Once the compound of interest has been identified by HPLC-MS, the manuscripts will be submitted to these peer-reviewed journals. Copies of the results will also be sent to the Aronia Berry Associations, and Aronia plant breeders. An ISU Extension workshop/symposium is also in the planning stages.

Beneficiaries

Some of the groups that would benefit from the project's findings include:

- University plant breeders and Aronia Berry Associations since this data can provide substantial data for creation of advertising materials that could potentially facilitate the commercialization and promotion of Aronia berries.
- Regulatory Agencies such as the USDA and FDA can use the data provided to help them establish guidelines for the use of Aronia berries in different products.

The results obtained in this project indicate that Aronia berry can potentially be quantified using both HPLC, and also identified using TLC analysis. HPLC can be considered an expensive choice particularly for smaller scale producers. On the contrary, TLC can be an economical alternative especially when using chromatography paper in place of high-priced cellulose plates.

Lessons Learned

While working on this project it was determined that the Aronia berries were very inconsistent in composition and size, making some of the data difficult to interpret due to variable results. It is imperative that the Aronia berry samples are retrieved from the same location so that the berries are exposed to similar climates and soils. Harvesting methods, harvesting dates, growing conditions/locations and storage should also remain consistent for better results in future projects.

Contact Person

Lester Wilson, 515-294-3889, lawilson@iastate.edu

Additional Information: Scientific report is attached.

Aronia Berry Marker Identification for Aronia Berry Food and Beverage Products

Lester Wilson, Samuel Moore, Angelica Gutierrez

Iowa State University Department of Food Science and Human Nutrition

2312 Food Sciences Building, Ames, IA 50014

Additional Information: Scientific report is attached.

Aronia Berry Marker Identification for Aronia Berry Food and Beverage Products

Lester Wilson, Samuel Moore, Angelica Gutierrez

Iowa State University Department of Food Science and Human Nutrition

2312 Food Sciences Building, Ames, IA 50014

Table of Contents

| | Page |
|--|------|
| Part A: Sugar/Acid Ratios and HPLC Analysis of Aronia Juice..... | 5 |
| Part B: Thin-Layer Separation of Juices Containing <i>Aronia Melanocarpa</i> | 12 |
| General Conclusions..... | 21 |
| Acknowledgements..... | 21 |

Part A: Sugar/Acid Ratios and HPLC Analysis of Aronia Juice

Introduction

The Aronia berry, a native fruit to the North central region of United States, is currently part of our food system as a natural anthocyanin colorant. However, ongoing research suggests that there are many other potential uses for this berry. As a result many companies are seeking more in-depth research related to its phenolic composition, pigments and antioxidant properties. Many fruit juices currently sold already contain small amounts of Aronia berry juice, but a method for determining the quantity of Aronia present in these juices is still to be determined. Once a method is found and once further research can quantify the amount of Aronia berries needed for specific health benefits, regulatory agencies can begin establishing guidelines for its use. Nutritional claims can also be developed so that food producers can profit from the incorporation of this berry into their products. Another issue facing Aronia berry producers is determining how this berry compares to other regularly consumed fruit and how its composition can affect its reception in the current food market.

The purpose of this project is to identify unique compounds in Aronia which can be quantified to confirm the presence of Aronia in a product using High Performance Liquid Chromatography (HPLC). Another goal of this project is to compare sugar: acid ratios of Aronia berry to similar fruits such as pomegranates, grapes, cherries and cranberries in order to predict its acceptance as it becomes more available to consumers.

Materials and Methods

The Aronia 2011 samples were harvested on September 13, 2011 and sent to our lab, where there were labeled and placed in a -20°C freezer for storage. Once the Aronia berries were ready to be analyzed, they were washed and juiced using a Breville juicer located in Dr. Wilson's lab. The juice was collected in a 2000 ml beaker and the pulp was squeezed in order to extract additional juice using 4 layers of cheesecloth. The resulting juice was of thick consistency and needed to be filtered for analysis. The juice was filtered using a coffee filter, and the juice was stored in a 2000 ml beaker and labeled.

Sugar: Acid Ratio

The pH and the degrees brix of the Aronia juice and all other juices used during the following months were measured and recorded. The titratable acidity of each of these juices was also determined. A beaker was filled with 200 ml of deionized water and its pH was increased to 8.2 using a sodium hydroxide solution. A 5 ml sample of juice was added and subsequently titrated with a solution of standardized 0.1 M sodium hydroxide until the pH reached 8.2. The initial and final volumes were recorded to obtain the acid content in the samples. The titratable acidity is expressed as the malic acid content.

High Performance Liquid Chromatography (HPLC)

Samples were prepared with two methods, a phenolic extraction using method using a C-18 Sep-pak and a filtration method using a $0.45\ \mu\text{m}$ syringe filter. After HPLC analysis it was determined that the filtration method was sufficient for accurate results.

Phenolic Extraction using a C-18 sep-pak

Using a syringe, the sep-pak was conditioned by passing 10 ml of distilled water through it followed by 10 ml of Methanol and then 10 ml of distilled water. The air was pushed through the sep-pak to remove any residual water. Then 6 ml of juice was passed through the sep-pak and discarded. Lastly, 1.5 ml of Methanol was passed through the sep-pak and collected into a 2 ml HPLC vial.

Filtration Method

Using a 10ml plastic syringe and a 0.45 µm syringe filter, 2 ml of juice were passed through and collected into a 2ml HPLC vial.

Finding Unique Peaks in Aronia Berry Juice using HPLC

Aronia juice and 9 other juices which included apple, cherry, cranberry cocktail, grape, pomegranate, cranberry blueberry, apple raspberry, blueberry pomegranate and apple kiwi strawberry were filtered and analyzed with HPLC. An Aronia berry chromatogram was obtained and unique peaks were determined. All the juice blends used contained an unknown amount of Aronia berry juice. The chromatograms from the single juices, excluding the Aronia berry, were compared to chromatograms from the blended juices in order to rule out the peaks found in common. The remaining peaks were compared against the Aronia berry peaks for similarities.

Determining Detection Levels of Aronia Berry in Juices

Samples of Aronia berry juice in water, apple juice and a 1:1 juice blend of cranberry cocktail and grape juice were analyzed with HPLC. The samples included an Aronia concentration at 1%, 5%, 10%, 15%, 20%, 25% and 30%. The juice blend was chosen due to the fact that each single juice's chromatograms did not include any significant peaks in the same region that the signature peaks of Aronia berry were found.

Results and Discussion

The sugar/ acid ratio contributes to the overall flavor of fruit juices. Most importantly it is a determining factor in predicting the how well a product will be accepted by current consumers. This can be achieved by comparing the sugar/ acid ratio of the product being evaluated to the sugar/acid ratios of similar products. A higher ratio corresponds to a sweeter product, while a lower ratio corresponds to a more acidic or sour product. Table 1 shows Aronia berry juice as having a sugar/acid ratio of 20.98. The sweetest single fruit juice analyzed was apple juice, which is characteristically sweet. The most acidic single fruit juice tested was cherry juice which is known to be very tart and sour. Out of the single juices tested, Aronia placed in the middle below apple juice and grape juice but above pomegranate juice and cherry juice. Six Juice blends were also analyzed and compared to Aronia berry juice. The sweetest juice blend analyzed was a grape and black cherry blend while most acidic juice blend analyzed was a cranberry and blueberry blend. The sugar/acid ratio of Aronia once again placed in the middle of all the commercial blended juices.

These results place Aronia berry's flavor in between commonly consumed sweet and acidic fruit juices, making it a potentially well received product if introduced in today's market.

Table 1- Analysis of 100% Aronia Berry Juice, Commercial Fruit Juices and Juice Blends

| Juice | pH | Brix | Titrateable Acidity (g*/100mL) | Sugar/ acid ratio |
|------------------------------------|------|-------|--------------------------------|-------------------|
| Aronia Berry (100% Juice) | 3.52 | 21.00 | 1.00 | 21.00:1 |
| Apple (100% Juice) | 4.08 | 13.80 | 0.42 | 32.86:1 |
| Pomegranate (100% Juice) | 3.55 | 16.50 | 1.28 | 12.89:1 |
| Cherry (100% Juice) | 3.62 | 14.60 | 1.32 | 11.06:1 |
| Grape (100% Juice) | 3.02 | 16.00 | 0.57 | 28.07:1 |
| Cranberry Cocktail | 3.15 | 14.50 | 0.65 | 22.31:1 |
| Cranberry Blueberry | 3.25 | 8.30 | 0.45 | 18.44:1 |
| Apple Raspberry | 2.82 | 8.80 | 0.47 | 18.72:1 |
| Blueberry Pomegranate (100% Juice) | 3.65 | 12.40 | 0.58 | 21.38:1 |
| Grape Black Cherry | 3.67 | 15.60 | 0.58 | 26.90:1 |
| Apple Kiwi Strawberry | 2.82 | 8.80 | 0.48 | 18.33:1 |

*expressed as malic acid

All the samples from Table 1 were analyzed with HPLC with the exception of the grape and black cherry blend. Figure 1 shows the chromatogram of Aronia berry juice at a detection wavelength of 272nm. The signature peaks of Aronia berry can be found in the hydrophilic peaks, between minutes 8 and 10. Similar chromatograms were found in the article titled "Separation, Identification, Quantification, and Method Validation of Anthocyanins in Botanical Supplement Raw Materials by HPLC and HPLC-MS" published in the Journal of Agricultural and Food Chemistry and in the book The Power of Nature- Aronia Melanocarpa written by Professor Iwona Wawer. Both sources identified the main peaks to be the following compounds: 1- cyd-3-galactoside, 2- cyd-3-glucoside, and 3- cyd-3-arabinoside.

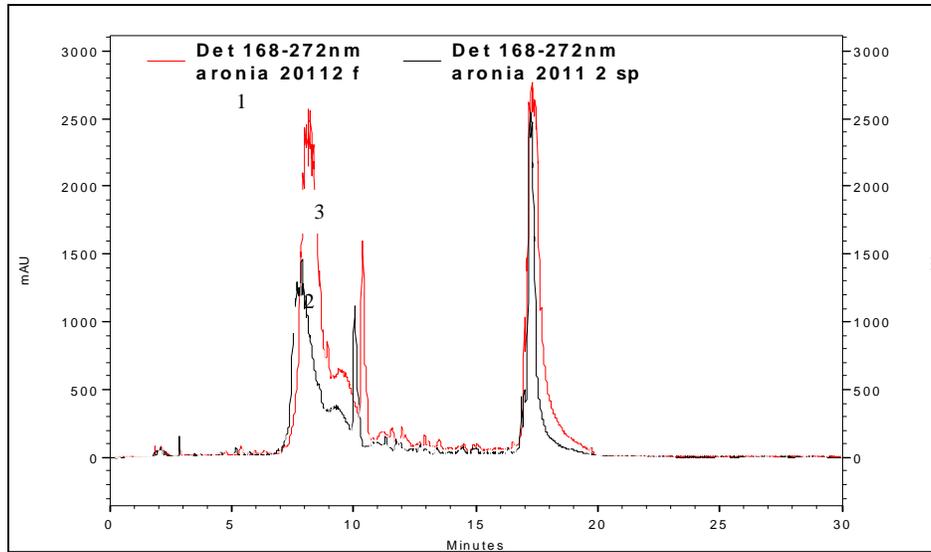


Figure 1- Aronia Berry Chromatogram. A detection wavelength of 272 nm was used.

The commercial juice blends analyzed all contained an unknown amount of Aronia berry. Their chromatograms shown in figure 2 show some peaks in the same region that the Aronia peaks were located in. It was difficult to distinguish between some of the peaks found in pomegranate and cranberry blend juices and Aronia juices since similar peaks were found in these single juices, although more similarities were found in pomegranate than in cranberry. However, the apple juice blends show activity in that same area, which is not usual for apple juice. This type of blend may indicate the presence of Aronia berry more clearly than the other juices used. These apple juices were a lighter red color compared to the other blends containing pomegranate and cranberry which were a darker red color.

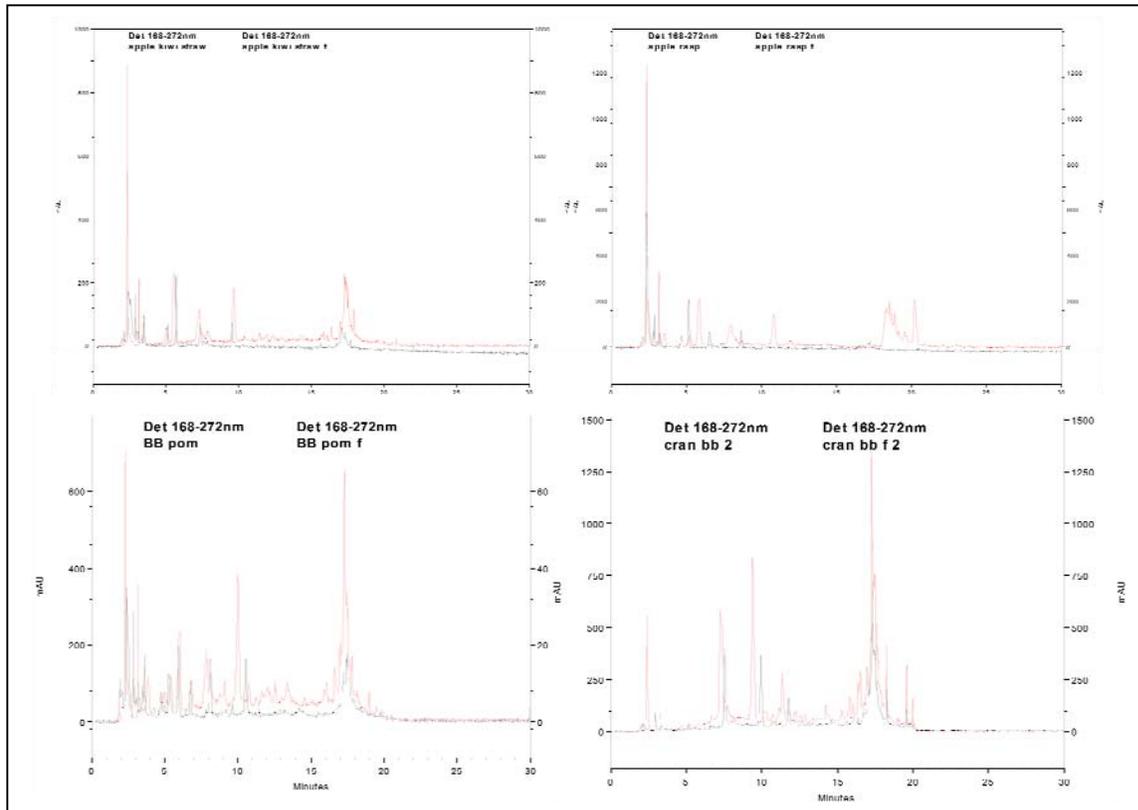


Figure 2- Chromatograms of Fruit Juice Blends. Top from left to right: Apple Kiwi Strawberry and Apple Raspberry. Bottom from left to right: Blueberry Pomegranate and Cranberry Blueberry. A detection wavelength of 272nm was used.

The detection level of Aronia berry in other juices was investigated using HPLC. Figure 3 shows the chromatogram of a 30% Aronia berry juice concentration in distilled water. The signature Aronia peaks are clearly visible. These peaks begin to appear at 10% Aronia berry concentration and they continue to move forward and become further defined as the concentration of Aronia berry increases.

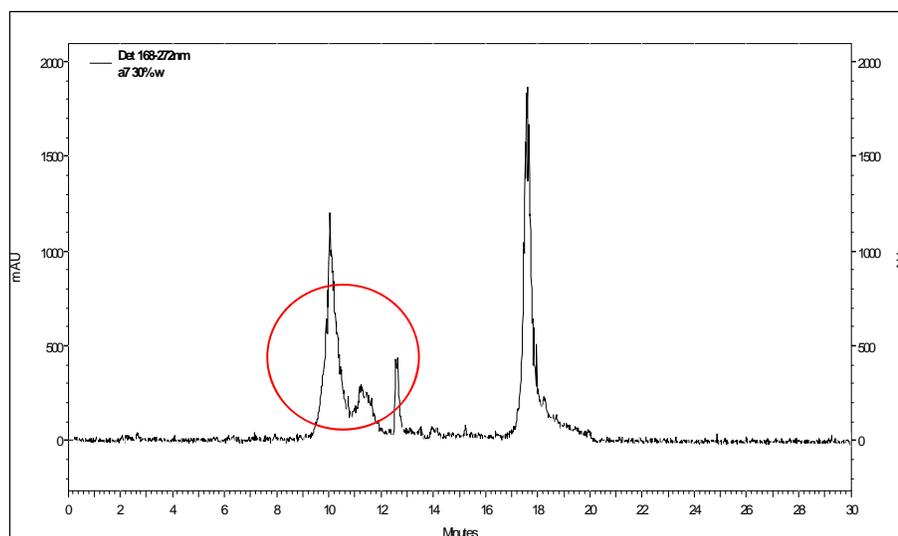


Figure 3- Chromatograms of 30% Aronia Berry Juice Concentration in Distilled Water. A detection wavelength of 272 nm was used.

Figure 4 shows a 15%, 20%, 25% and 30% Aronia berry concentration in 100% Apple juice. The same signature Aronia peaks are also visible in these chromatograms.

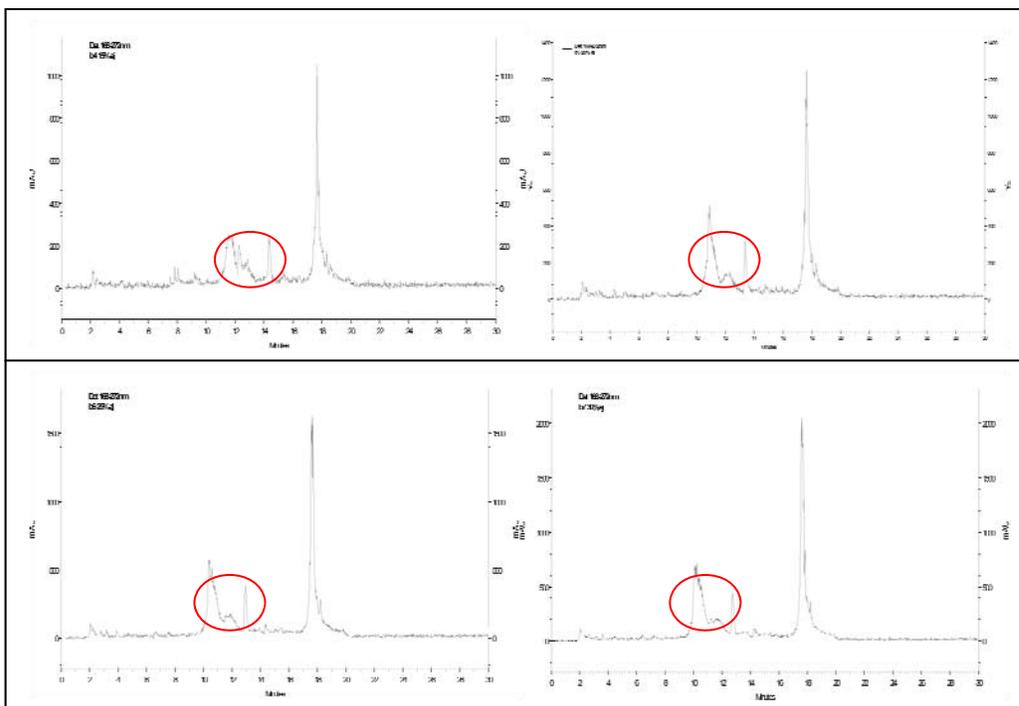


Figure 4- Varying Aronia Berry Concentration in 100% Apple Juice. Top from left to right: 15% and 20%. Bottom from left to right 25% and 30%. A detection wavelength of 272 nm was used.

However, when using the same procedure with a blend of 1:1 cranberry cocktail juice and grape juice with varying concentrations of 2011 Aronia berry juice as seen in figure 5, no consistent Aronia peaks were found. On the contrary, the samples that used Aronia berry juice harvested in 2010 did confirm the presence of the signature Aronia peaks as seen in the samples with apple juice. This could be caused by the interactions of other phenolics already present in these juices or differences in weather that could have affected the composition of the berries. Variation in storage time and harvest methods along with soil composition could have also played a role in these results. Due to these outcomes we can conclude that using HPLC to determine the detection level of Aronia berry in blended juices may not be the best approach, mainly because of varying conditions during growing, harvesting and storage of Aronia berries. Additional samples of this blend as well as samples mixed with other juice blends would need to be analyzed in order to confirm these findings.

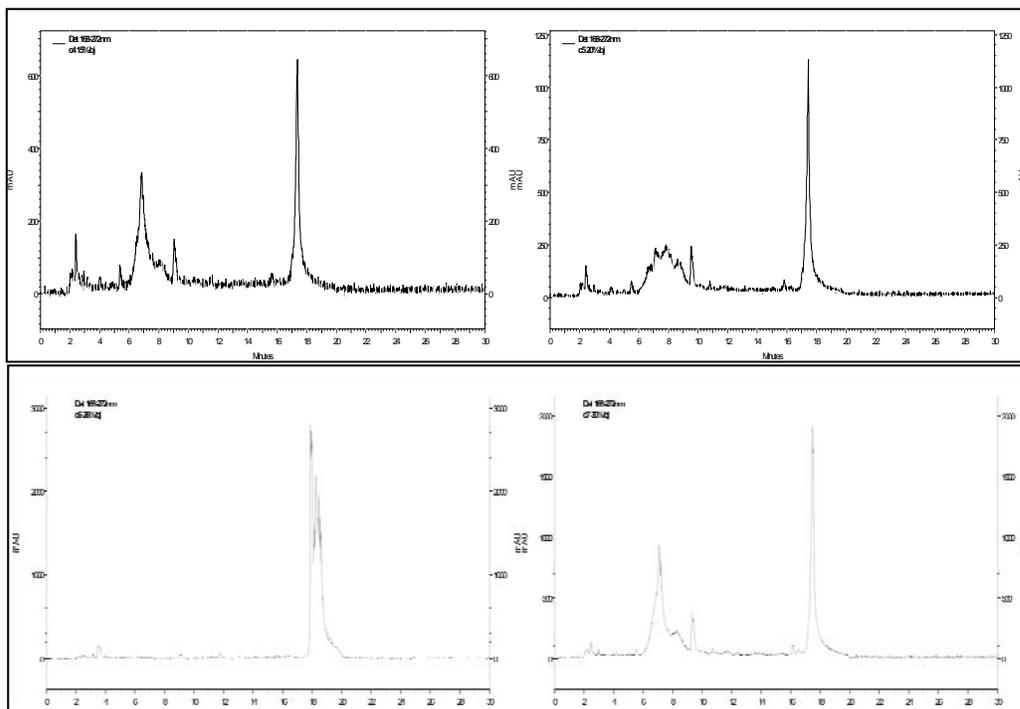


Figure 5- Varying Aronia Berry Concentration in 1:1 Blend of Cranberry Cocktail Juice and Grape Juice. Top from left to right: 15% and 20%. Bottom from left to right 25% and 30%. A detection wavelength of 272 nm was used.

Conclusion

In conclusion, it was determined that the Aronia berry's sugar to acid ratio is within the normal range of the sugar to acid ratio of other regularly consumed single fruit juices and blended juices. Since this ratio indicated the sweetness of the juices, it can help predict how consumers might react to Aronia juice if it was readily available. From the data obtained, it is very likely that this type of product will be well received.

Using HPLC analysis, the signature Aronia peaks were found to be in the hydrophilic peaks between 8 and 10 minutes. These peaks were clearly visible in blends of Aronia and Apple juice but mixed results were obtained from blends of Aronia, Cranberry cocktail and grape samples that were harvested in two different years. This indicates that further research needs to be completed and more consistent samples should be obtained for further projects.

References

1. Amitabh Chandra, Jatinder Rana, Yingqin Li. 2001. Separation, Identification, Quantification, and Method Validation of Anthocyanins in Botanical Supplement Raw Materials by HPLC and HPLC–MS. *J. Agric. Food Chem.* 49 (8), pp 3515–3521
2. Wawer, Iwona. 2010. *The Power of Nature*. Omaha, NE. Mae's Health and Wellness LLC. 42-61

Part B: *Thin-Layer Separation of Juices Containing Aronia Melanocarpa*

Introduction

Anthocyanins are a family of plant pigments commonly found in many fruits and vegetables and are of common use to the food industry as a natural vegetable colourant.¹ Recently, there has been much interest in anthocyanins as potent antioxidant materials for the prevention of carcinomas and other diseases typically associated with oxidative damage [1], and thus the potential use of these compounds in functional foods or additives to impart health benefits has attracted much attention. The general form of the anthocyanin is a glycoside or acylglycoside of the corresponding base anthocyanidin aglycone structure, lending the basic scaffolding to many possible variations.¹

Among common anthocyanin-containing foods in North America, the berry of *Aronia melanocarpa*, commonly known as the “chokeberry” or simply “Aronia berry” (hereafter “Aronia”) has the highest anthocyanin concentration per fresh weight (approx. 1480 mg / 100 g).⁵ Aronia juice is used as a colourant in fruit juice blends, which frequently employ relatively colourless apple juice as a filler, and as consumer interest in Aronia grows, it becomes necessary to determine whether products purporting to incorporate Aronia, such as the juices in which the berry is already employed.

Typical quantitative methods for anthocyanin analysis require freeze-drying followed by pulverization of the sample to a powder [1,5,6], which may be too demanding of operator time or energy in the case of systems containing chiefly water, such as fruit juice blends. In addition, these methods frequently employ high-pressure liquid chromatography (HPLC) as an analytical finish, placing further demand on the analyst for instrumental time and obviously necessitating the purchase of an instrument that may not be necessary to the day-to-day operation of a laboratory.^{5,6} Thin-layer chromatography (TLC) on cellulose plates has been reported to successfully separate anthocyanin pigments using mildly acidic aqueous extracts of solid whole or freeze-dried fruits [2,3], but we are not aware of any reports that attempt to extract anthocyanins directly from fruit juices. In addition, the attendant cost of cellulose TLC plates is another prohibitive aspect of this method. This report presents our most recent work toward a facile method for qualitative determination of Aronia content with minimal costs in terms of operator time and monetary resources using low-cost chromatography paper.

Materials and Methods

Acetone and methanol (HPLC grade), hydrochloric and acetic acid, and n-amyl alcohol were used as received from Fisher Chemical. Commercial juice blends and a selection of whole fresh and frozen fruits were purchased from a local supermarket. Fuji apples, cranberries, grapes (black and red), and pomegranates were obtained fresh, while blackberries, blueberries, cherries, strawberries, and raspberries were obtained frozen. All applicable pigmented components of commercial juice blends are included in Table 1. Aronia juice was used as needed from a stock of frozen juice from the 2011 harvest of Aronia purchased from a local grower.

| Juice | Brand / Advertised Blend Components | Pigmented Components |
|-------|---|--|
| 1 | Old Orchard 100% Grape Juice | Grape |
| 2 | Old Orchard 100% Blueberry Pomegranate Juice | Apple, Aronia, Blueberry, Grape, Pear, Pomegranate |
| 3 | Old Orchard Cranberry Juice Cocktail | Cranberry, Grape, Plum |
| 4 | Old Orchard Apple Kiwi Strawberry | Apple, Aronia, Grape, Kiwi, Strawberry |
| 5 | Old Orchard Apple Raspberry | Apple, Aronia, Grape, Raspberry |
| 6 | Old Orchard Cranberry Blueberry | Aronia, Cranberry, Blueberry |
| 7 | Old Orchard "Very Cherry" (Tart Cherry Juice) | (Tart) Cherry |
| 8 | Old Orchard 100% Pomegranate Juice | Grape Seed Extract, Pomegranate |
| 9 | Musselman's 100% Apple Juice | Apple |

Table 1. Commercial juices and juice blends used in thin-layer studies. Pigmented components are listed in order of alphabetization, rather than label inclusion.

Whole fruits were prepared for analysis by slicing lengthwise and were placed into foil packets and frozen prior to freeze-drying. Apples were sliced into eighth portions and pomegranate seeds were removed from hull and pith before freezing. Frozen fruits were not treated prior to freeze-drying. Fruits were ground to powder using a commercial blender, which were sifted to remove seeds and large particulates. Whole fruits were juiced using a commercial juicer and filtered through cheesecloth to obtain fresh fruit juices. Residual pulp was collected and additional juice was extracted through cheesecloth by exerting light manual pressure. Fresh juices were collected in glass jars and frozen prior to freeze-drying. Samples were freeze-dried over six days until no coldness remained to the touch and were placed under refrigeration until use.

Mixtures of methanol or acetone with hydrochloric acid (100:8.6) v/v were prepared to extract anthocyanin pigments from juice, juice powder, or fruit powder samples. 100 mg of freeze-dried fruit and fruit juice powders were extracted with 10 mL of acidified solvent mixtures, shaking approximately twenty times. Fruit powder and juice powder samples were filtered using a 0.45 μm Teflon syringe filter (Corning) before spotting onto chromatography paper. Freeze dried juices were not ground, but were shaken until dissolved in solvent before filtering. Commercial juices and juice sample mixtures for method sensitivity determination were diluted 10:1 with acidified solvent and spotted directly onto chromatography paper. Initial experiments used a 3:1 acidified methanol-commercial juice dilution ratio instead and are indicated as such in the appropriate data table. Approximately 5 μL of all extracts were spotted onto a 13-in strip of chromatography paper at 0.25 in from the base, two per strip and equidistant from left and right edges.

Plates/strips were developed in a glass TLC chamber using a 2:1.1:1 (v/v/v) mixture of n-amyl alcohol, acetic acid, and water after the method of Cisowski *et al.*⁷ A standard development time of 6 h was used for all experiments described in this report, which yielded solvent boundaries about 8.00 ± 0.25 in.⁷ Plates/strips were dried overnight and analyzed using a 254 nm UV lamp and ruler. Data were recorded as center and range of visible spots or bands under UV light in one dimension and whether the fluorescence could be described as "light-field" or "dark-field". Spots/bands were characterized as strong, medium, or weak according to their saturation to the arbitrary metric of the human eye. The solvent boundary recorded for all strips was taken from the base of the paper, while distances recorded for spot centers were taken from the point of spotting.

The 100:8.6 v/v mixtures of acetone or methanol to hydrochloric acid were adopted after the methods of Cisowski *et al* for successful extraction of freeze-dried fruit powders.⁷ These solvents are sufficiently polar to extract anthocyanin compounds from a solid matrix, and the acidified solvent denatures cellular walls of solid food matrices for more efficient extraction.⁸ Higher anthocyanin extraction yields are reported in the literature for acidified methanol than acidified acetone.⁹ However, direct extraction of anthocyanins from an aqueous medium like juice was initially thought to be problematic due to the high miscibility of water in both of these systems. Because no discrete organic layer is formed, the organic solvents employed instead dilute the system such that the solvent will rapidly volatilize when spotted onto the plate or chromatography paper.

Serial Dilutions of Aronia for Method Limit Determination

Diagnostic bands for one-dimensional TLC separation of Aronia pigments were established using a five-fold serial dilution scheme (5:1, 25:1, 125:1, 625:1 water/Aronia v/v). Aliquots of 1 mL of the preceding dilution were quantitatively transferred into a new glass vial, to which 5 mL of water were then added.

Visibility of the diagnostic bands in juice systems incorporating Aronia juice as a colorant was determined using a ten-fold dilution scheme (5:1, 50:1, 500:1, 5000:1 juice/Aronia v/v). Apple juice and commercial juice blend 3 were selected for this study. Apple juice is frequently used as a base for juice blends due to its neutral color and flavor, and cranberry juice is known to share some principal anthocyanin pigments in common with Aronia, namely the arabinoside, galactoside, and glucoside substituents of the cyanidin base, albeit in different proportions.⁶ Commercial juice 3 therefore serves as a model to determine the suitability of the method presented here for mixtures in which confounding pigments may be present.

Results and Discussion

The goal of this work was to determine whether a diagnostic characteristic of Aronia associated with the extraction and development systems described might be found that could qualitatively determine the presence or absence of an Aronia component in a commercial formulation. Toward this end we have had some successes.

Methanol Extraction of Commercial Juices Display Common Features

Extraction with acidified methanol gives rise to a common motif seen among most juice samples of a “main” bright-field spot preceded by a smaller band of dark-field fluorescent material (“Main” bright-field band: R_f Mean = 0.418; St. Dev. = 0.026; Dark-field band: R_f Mean = 0.0359; St. Dev. = 0.036). However, acidified methanol dilutions tend to present a multiplicity of spots or bands, many of which may not be visible to the human eye (Table 2). This is likely due to the more efficient extraction of pigments using acidified methanol compared to acidified acetone as described above. Corroboration of results of these initial extractions of commercial juices with acidified methanol to those made with acidified acetone remains forthcoming.

| Juice | Band | Width (in) | Center (in) | L/D | R _f | Comments |
|----------------|------|------------|-------------|-----|----------------|---------------------|
| 1 | 1 | 0.75 | 3.375 | L | 0.432 | Main band. |
| Sol. Bnd (in): | 2 | 0.75 | 3 | D | 0.384 | Overlaps main band. |
| 7.8125 | 3 | 0.125 | 0.75 | D | 0.096 | |
| | 4 | 0.0625 | 2 | D | 0.256 | |

| | | | | | | |
|-----------------------|----|--------|---------|---|--------|-------------------------------|
| | 5 | sm | 5 | D | 0.640 | |
| | 6 | sm | 5.0625 | D | 0.648 | |
| | 7 | sm | 5.1875 | D | 0.664 | |
| | 8 | sm | 5.625 | D | 0.720 | |
| | 9 | sm | 5.75 | D | 0.736 | |
| | 10 | 0.0625 | 6.5 | D | 0.832 | |
| | 11 | sm | 6.8125 | D | 0.872 | |
| | 12 | sm | 7.25 | D | 0.928 | |
| | 13 | sm | 7.375 | D | 0.944 | |
| | 14 | sm | 7.5 | D | 0.960 | 4x, at solvent boundary. |
| 2 | 1 | 0.5 | 3 | L | 0.384 | Main band. |
| <i>Sol. Bnd (in):</i> | 2 | 0.75 | 2.5 | D | 0.320 | Overlaps main band. |
| 7.8125 | 3 | 0.125 | 1 | L | 0.128 | |
| | 4 | 0.125 | 7.5 | D | 0.960 | Against solvent boundary. |
| 3 | 1 | 0.6 | 3 | L | 0.366 | Main band. |
| <i>Sol. Bnd (in):</i> | 2 | 0.5 | 2.5 | D | 0.305 | Overlaps main band. |
| 8.1875 | 3 | 0.25 | 3.875 | D | 0.473 | |
| | 4 | agg. | 7.5 | D | 0.916 | |
| 4 | 1 | 0.375 | 3.25 | L | 0.397 | Main band. |
| <i>Sol. Bnd (in):</i> | 2 | 0.5 | 2.75 | D | 0.336 | Overlaps main band. |
| 8.1875 | 3 | 0.125 | 5.625 | D | 0.687 | |
| | 4 | 0.0625 | 2 | L | 0.244 | |
| | 5 | 0.125 | 1.375 | L | 0.168 | |
| 5 | 1 | 0.375 | 3.25 | L | 0.400 | Main band. |
| <i>Sol. Bnd (in):</i> | 2 | 0.5 | 2.75 | D | 0.338 | Overlaps main band. |
| 8.125 | 3 | 0.125 | 7.5 | D | 0.923 | |
| | 4 | 0.125 | 7.5 | D | 0.923 | |
| 6 | 1 | agg. | -0.25 | L | -0.031 | Aggregate at base of paper. |
| <i>Sol. Bnd (in):</i> | 2 | 0.625 | 3.5 | L | 0.431 | Main band. |
| 8.125 | 3 | 0.375 | 2.9375 | D | 0.362 | Overlaps main band. |
| | 4 | 0.125 | 2 | L | 0.246 | |
| 7 | 1 | agg. | -0.25 | L | -0.030 | Aggregate at base of paper. |
| <i>Sol. Bnd (in):</i> | 2 | 0.5 | 3.5 | L | 0.421 | Main band. |
| 8.3125 | 3 | 0.625 | 2.9375 | D | 0.353 | Overlaps main band. |
| 8 | 1 | 0.5 | 3.375 | L | 0.432 | Main band. |
| <i>Sol. Bnd (in):</i> | 2 | 0.5 | 2.75 | D | 0.352 | Overlaps main band. |
| 7.8125 | 3 | 0.25 | 7.1875 | D | 0.92 | |
| | 4 | 0.75 | 2 | L | 0.256 | Blue. |
| | 5 | 2 | 6 | D | 0.768 | |
| | 6 | sm | 7.5 | D | 0.96 | |
| | 7 | sm | 4.875 | D | 0.624 | |
| | 8 | 1 | 4 | D | 0.512 | |
| 9 | 1 | 0.5625 | 3.46875 | L | 0.444 | Main band. |
| <i>Sol. Bnd (in):</i> | 2 | 0.875 | 2.8125 | D | 0.360 | Overlaps main band. |
| 7.8125 | 3 | 0.125 | 0.9375 | D | 0.120 | |
| | 4 | 0.1875 | 1.125 | D | 0.144 | |
| | 5 | 0.25 | 3.4375 | D | 0.440 | |
| | 6 | 0.375 | 4.6875 | D | 0.600 | |
| | 7 | 1.875 | 6.0625 | D | 0.776 | |
| | 8 | 0.5 | 6.75 | D | 0.864 | |
| 10 | 1 | 0.5 | 3.25 | L | 0.416 | Main band. |
| <i>Sol. Bnd (in):</i> | 2 | 0.25 | 2.125 | D | 0.272 | Overlaps main band. |
| 7.8125 | 3 | agg. | 7.25 | D | 0.928 | Aggregate against solv. line. |
| 9, 9:1 dilution | 1 | 0.375 | 3.625 | L | 0.457 | Main band. |
| <i>Sol. Bnd (in):</i> | 2 | 0.25 | 3.375 | D | 0.425 | Overlaps main band. |
| 7.9375 | 3 | 0.1875 | 5.625 | D | 0.709 | |
| | 4 | sm | 7.3125 | D | 0.921 | |
| | 5 | 0.125 | 7.6875 | D | 0.969 | |

Table 2. Spot distances and R_f values for 3:1 dilution of commercial juices with acidified methanol. (Key: Sol. Bnd. = solvent boundary (in inches); L/D = light- or dark-field fluorescence under UV light; R_f = chromatographic retention factor)

Methanol Extraction of Freeze-Dried Fruits

Extraction of pigments from freeze-dried fruit powders shows greater specificity and clarity of spots than that obtained by solvent dilution of commercial juices. Notably, neither blackberry nor blueberry display the “main” with “overlap” motif, a comparatively smaller “main” band is observed in raspberry than in other fruits possessing this band after extraction, and strawberry possesses the “main” band excepting the overlap after extraction. Other diagnostic features are noted for some fruits; for example, a strong band extending approximately two inches with $R_f = 0.762$ exists in pomegranate, and a similar band ($R_f = 0.768$) exists in commercial juice eight, confirming this band as diagnostic for pomegranate. Black and red grape were observed to display a similar band profile using methanol extraction, but their band profile does not correlate well to that of commercial grape juice. This discrepancy is tentatively attributed to differences in grape species or cultivar, for Concord grape is commonly employed in grape juicing operations, and product labels do not list specific cultivars used.

| <i>Sample</i> | <i>Band</i> | <i>Width (in)</i> | <i>Center (in)</i> | <i>R_f</i> | <i>L/D</i> | <i>Comments:</i> |
|---------------------------------|---|-------------------|--------------------|----------------------|------------|---|
| Apple (Fuji) | 1 | 0.625 | 3.5625 | 0.463 | L | Main band. |
| <i>Sol. Bnd (in):</i> 7.6875 | 2 | 0.25 | 3.125 | 0.407 | D | Overlaps main. |
| | 3 | 1.0 | 2.5 | 0.325 | D | |
| | 4 | 0.125 | 6.5625 | 0.854 | D | Singular dark band across whole of paper. |
| | 5 | 0.875 | 6.8125 | 0.886 | D | |
| Cranberry | 1 | 0.875 | 3.4375 | 0.447 | L | Main band. |
| <i>Sol. Bnd (in):</i> 7.6875 | 2 | 0.5 | 3.0 | 0.390 | D | Overlaps main. Somewhat "slanted". |
| | 3 | 0.0625 | 3.5 | 0.455 | D | Within main band. |
| | 4 | 2.125 | 5.9375 | 0.772 | D | |
| | 5 | 0.875 | 5.6875 | 0.740 | D | |
| | 6 | sm | 6.375 | 0.829 | D | |
| | 7 | 0.625 | 6.9375 | 0.902 | D | |
| | 8 | 0.0625 | 7.4375 | 0.967 | D | |
| Grape (Red) | 1 | 1.0 | 3.125 | 0.455 | L | Main band. |
| <i>Sol. Bnd (in):</i> 6.875 | 2 | 0.25 | 2.5 | 0.364 | D | Overlaps main. |
| | 3 | sm | 3.525 | 0.513 | D | 4x |
| | 4 | sm | 3.25 | 0.473 | D | Within main band. |
| | 5 | 0.125 | 2.625 | 0.382 | D | 2x |
| | 6 | 0.5 | 4.875 | 0.709 | D | Very Weak. |
| Grape (Black) | 1 | 1.0 | 3.125 | 0.455 | L | Main band. |
| <i>Sol. Bnd (in):</i> 6.875 | 2 | 0.125 | 2.5625 | 0.373 | D | Overlaps main. Somewhat "slanted". |
| | 3 | sm | 3.525 | 0.513 | L | Adjacent to main band |
| | 4 | sm | 4.0 | 0.582 | D | 4x |
| | 5 | 0.75 | 4.525 | 0.658 | D | Very Weak. |
| Raspberry | 1 | 0.25 | 3.375 | 0.391 | L | Main band. |
| <i>Sol. Bnd (in):</i> 8.625 | 2 | 0.125 | 3.125 | 0.362 | D | Overlaps main. Medium. |
| | 3 | 2.0625 | 3.71875 | 0.431 | D | Medium. |
| | 4 | 2.0 | 7.0 | 0.812 | D | Weak. |
| | 5 | 0.25 | 6.75 | 0.783 | D | Weak. |
| | 6 | 0.25 | 7.375 | 0.855 | D | Weak. |
| | 7 | 1.0 | 7.75 | 0.899 | D | Weak. |
| | 8 | 0.625 | 7.8125 | 0.906 | D | Weak. |
| | 9 | 0.0625 | 7.5 | 0.870 | D | Medium. |
| | 10 | 0.25 | 7.875 | 0.913 | D | Strong. |
| Blackberry | 1 | 0.5 | 1.875 | 0.217 | D | Weak. |
| <i>Sol. Bnd (in):</i> 8.625 | 2 | 3.5 | 5.5 | 0.638 | D | Strong. |
| | 3 | 1.0 | 4.5 | 0.522 | D | Weak. |
| | 4 | 2.0 | 7.0 | 0.812 | D | Medium. |
| Pomegranate | 1 | 1.275 | 2.888 | 0.379 | L | Main. Strong. |
| <i>Sol. Bnd (in):</i> 7.625 | 2 | 2.875 | 5.813 | 0.762 | D | Very Strong, characteristic. |
| | (Very large number of small spots within main band form an aggregate impractical to list here.) | | | | | |

| | | | | | | |
|-----------------------|---|--------|--------|-------|---|---|
| Sweet Cherry | 1 | 1.275 | 2.888 | 0.379 | L | Main. Strong. |
| <i>Sol. Bnd (in):</i> | 2 | 0.25 | 2.375 | 0.311 | D | Weak. Overlaps main. |
| 7.625 | 3 | 0.25 | 1.625 | 0.213 | L | Strong. Red, highly characteristic. |
| | 4 | 0.0625 | 2.5 | 0.328 | D | Medium. |
| | 5 | sm | 3.125 | 0.410 | D | 3x similar spots, very weak, may not be diagnostic. |
| Strawberry | 1 | 1.375 | 3.0625 | 0.383 | L | Main. Strong. |
| <i>Sol. Bnd (in):</i> | 2 | 1.5 | 3.0 | 0.375 | D | Overlaps main. Somewhat "slanted". Strong. |
| 8.0 | 3 | sm | 3.0625 | 0.383 | D | Weak. |
| | 4 | 0.0625 | 3.375 | 0.422 | D | 2x, weak. |
| | 5 | 0.438 | 4.594 | 0.574 | D | Medium. |
| | 6 | 2.75 | 5.625 | 0.703 | D | Medium. |
| Blueberry | 1 | 1.0 | 2.5 | 0.308 | L | Possibly not analogous to "main". Strong. |
| <i>Sol. Bnd (in):</i> | 2 | 0.25 | 2.125 | 0.262 | L | Red. Strong. |
| 8.125 | 3 | 0.375 | 7.313 | 0.900 | D | Weak. |

Table 3. Spot distances and R_f values for acidified methanol extraction of freeze-dried fruits. See Table 2 for Key.

Methanol Extraction of Freeze-Dried Fruit Juices

Acidified methanol extraction of pigments was performed for freeze-dried juices of raspberry, blueberry, cranberry, pomegranate, and black and red grape. Results for the freeze-dried juice dissolved in acidified methanol correspond to those observed in freeze-dried whole fruits to a limited degree, as in the diagnostic pomegranate band (Juice: $R_f = 0.708$, Range = 2.0 in; Solid fruit: $R_f = 0.762$, Range = 2.875). The “main” and “overlap” motif as described previously is also present. However five additional and two fewer visible bands are observed in freeze-dried juices of red and black grape compared to freeze-dried whole fruit. Further work is needed to determine whether freeze-dried juices yield results analogous to freeze-dried whole fruits and solvent-diluted commercial juices for all fruits examined in this study.

| Juice | Band | Width (in) | Center (in) | R_f | L/D | Comments: |
|-----------------------|------|------------|-------------|-------|-----|---------------------------------|
| Pomegranate | 1 | 0.85 | 2.95 | 0.363 | L | Main band. Strong. |
| <i>Sol. Bnd (in):</i> | 2 | 0.875 | 2.4375 | 0.300 | D | Overlaps main. Medium. |
| 8.125 | 3 | 0.25 | 1.9375 | 0.238 | D | Medium. |
| | 4 | 0.125 | 2.5 | 0.308 | D | Weak. |
| | 5 | 0.0625 | 7.525 | 0.926 | D | Medium. |
| | 6 | 2.0 | 5.75 | 0.708 | D | Weak. |
| Raspberry | 1 | 0.5 | 2.825 | 0.359 | L | Main. Strong. |
| <i>Sol. Bnd (in):</i> | 2 | 0.1875 | 2.78125 | 0.353 | D | Overlaps main. Medium. |
| 7.875 | 3 | sm | 2.25 | 0.286 | D | Weak. |
| | 4 | 0.25 | 4.0 | 0.508 | D | Weak. |
| Strawberry | 1 | 3.125 | 2.9375 | 0.373 | D | Weak. |
| <i>Sol. Bnd (in):</i> | 2 | 0.25 | 7.5 | 0.952 | D | Medium. |
| 7.875 | | | | | | |
| Red Grape | 1 | 1.0 | 1.25 | 0.156 | D | Weak. Wide |
| <i>Sol. Bnd (in):</i> | 2 | 0.125 | 2.5 | 0.313 | D | Weak. |
| 8 | 3 | 1.125 | 2.9375 | 0.367 | L | Strong. Main. |
| | 4 | 0.125 | 3.25 | 0.406 | D | Strong. Within main. |
| | 5 | 2.625 | 4.6875 | 0.586 | D | |
| | 6 | 2.75 | 4.75 | 0.594 | D | |
| | 7 | 2.25 | 4.625 | 0.578 | D | Weak. Bands 5 – 8 are parallel. |
| | 8 | 2.125 | 4.9375 | 0.617 | D | |
| | 9 | 0.375 | 6.9375 | 0.867 | D | Weak. |
| | 10 | 0.125 | 7.375 | 0.922 | D | Very weak. |
| | 11 | sm | 7.25 | 0.906 | D | Very weak. |
| Black Grape | 1 | 0.375 | 1.0625 | 0.133 | D | Very weak. |
| <i>Sol. Bnd (in):</i> | 2 | 0.25 | 2.625 | 0.328 | D | Medium. Overlaps main. |
| 8.0 | 3 | 1.0 | 3.0 | 0.375 | L | Strong. Main. |
| Cranberry | 1 | sm | 0.875 | 0.111 | D | Medium. |
| <i>Sol. Bnd (in):</i> | 2 | 1.875 | 2.3125 | 0.294 | L | Red. Strong. |
| 7.875 | 3 | 0.875 | 2.8125 | 0.357 | L | Strong. Main. |

| | | | | | | |
|-----------------------|---|--------|---------|-------|---|------------------------|
| | 4 | 0.1875 | 2.53125 | 0.321 | D | Medium. Overlaps main. |
| | 5 | 0.625 | 3.9375 | 0.500 | L | Weak. Blue. |
| | 6 | 0.375 | 4.6875 | 0.595 | D | Weak. |
| | 7 | 0.25 | 6.125 | 0.778 | L | Weak. Orange. |
| Blueberry | 1 | 0.25 | 2.25 | 0.286 | L | Medium. Red. |
| <i>Sol. Bnd (in):</i> | 2 | 0.875 | 2.9375 | 0.373 | L | Strong. Main. |
| 7.875 | 3 | 0.25 | 2.875 | 0.365 | D | Medium. |

Table 4. Band distances and R_f values for freeze-dried non-commercial juices. See Table 2 for Key.

Serial Dilution of Aronia Juice Reveals a Characteristic Set of Spots with High Selectivity

Preliminary experiments showed that acidified methanol presented poorly reproducible results for serial dilution of Aronia juice with water, while extraction with acidified acetone produced a consistent band profile, thus leading to the adoption of acidified acetone for serial dilution trials to determine method sensitivity. Table 3 presents results for serial dilution of Aronia juice with water, apple juice, and commercial cranberry juice cocktail extracted with acidified acetone. A set of spots within the "main" bright-field fluorescent band was found to be characteristic of Aronia juice diluted with water and commercial juices (R_f Mean = 0.432; St. Dev. = 0.010). The dilution limits at which these diagnostic spots may be detected by the human eye are estimated to be between 125-625:1 for dilution with water and between 500-5000:1 for commercial apple juice. Based on diagnostic R_f values established in aqueous and apple juice systems, Aronia cannot be conclusively distinguished from cranberry juice cocktail by sight alone, although HPLC may be a better method for distinguishing various fruit pigments than TLC.

| <i>Juice</i> | <i>Band</i> | <i>Width (in)</i> | <i>Center (in)</i> | <i>L/D</i> | <i>R_f</i> | <i>Comments:</i> |
|---|-------------|-------------------|--------------------|------------|----------------------|--|
| <u>Aqueous Aronia 5:1 Serial Dilutions</u> | | | | | | |
| (5:1) | 1 | 0.5 | 5.0 | D | 0.678 | Weak to Medium, broad. |
| <i>Sol. Bnd (in):</i> | 2 | 0.125 | 2.438 | D | 0.331 | Weak, overlaps main. |
| 7.375 | 3 | 1.0 | 3.0 | L | 0.407 | Strong. Main. |
| | 4 | 0.125 | 3.063 | D | 0.415 | Within main. Strong. |
| | 5 | 0.125 | 3.125 | D | 0.424 | Within main. Strong. |
| | 6 | sm | 3.188 | D | 0.432 | Weak. |
| | 7 | sm | 3.25 | D | 0.441 | Very weak. |
| | 8 | 0.4375 | 5.594 | D | 0.758 | Medium. |
| (25:1) | 1 | 0.125 | 2.638 | D | 0.358 | Medium. Overlaps main. |
| <i>Sol. Bnd (in):</i> | 2 | 1.0 | 3.25 | L | 0.441 | Main. Strong. |
| 7.375 | 3 | sm | 3.25 | D | 0.441 | Medium. Within main. |
| | 4 | sm | 3.25 | D | 0.340 | Medium. Within main. |
| (125:1) | 1 | 0.3125 | 2.656 | D | 0.386 | Overlaps main, strong. |
| <i>Sol. Bnd (in):</i> | 2 | 1.125 | 3.013 | L | 0.416 | Strong. Main. |
| 7.8125 | 3 | 0.0625 | 3.25 | D | 0.416 | Within main. Weak. |
| (625:1) | 1 | 1.15 | 2.95 | L | 0.378 | Main. |
| <i>Sol. Bnd (in):</i> | | | | | | |
| 7.8125 | | | | | | |
| <u>10:1 Commercial Apple Juice Serial Dilutions</u> | | | | | | |
| (5:1) | 1 | 0.85 | 3 | D | 0.381 | Overlaps main. Reddish hue due to visible pigments on paper. |
| <i>Sol. Bnd (in):</i> | 2 | 1.0 | 3.75 | L | 0.476 | Main. Strong. |
| 7.875 | 3 | sm | 3.5 | D | 0.444 | Within main. Weak. |
| | 4 | sm | 3.5 | D | 0.444 | Within main. Weak. |
| | 5 | sm | 3.375 | D | 0.429 | Within main. Weak. |
| | 6 | 0.0625 | 7.875 | D | 1.000 | Strong. |
| (50:1) | 1 | 1.0 | 2.95 | L | 0.375 | Main. |
| <i>Sol. Bnd (in):</i> | 2 | sm | 3.375 | D | 0.429 | Within main. Weak, but visible |
| 7.875 | 3 | sm | 3.375 | D | 0.429 | Within main. Weak, but visible |
| (500:1) | 1 | 0.125 | 3.0625 | D | 0.386 | Overlaps main. Medium. |
| <i>Sol. Bnd (in):</i> | 2 | 1.0 | 3.525 | L | 0.444 | Main. Strong. |
| 7.9375 | 3 | sm | 3.375 | D | 0.425 | Within main. Weak. |

| | | | | | | |
|---|---|--------|--------|---|-------|---|
| | 4 | 0.125 | 3.438 | D | 0.433 | Within main. Weak. |
| (5000:1) | 1 | 0.125 | 3.188 | D | 0.402 | Overlaps main. Medium. |
| <i>Sol. Bnd (in):</i> 7.9375 | 2 | 0.875 | 3.688 | L | 0.465 | Strong. Main. |
| Com. 9 Blank 1 | 1 | 1.0 | 2.75 | D | 0.338 | Red. Visible to naked eye. Overlaps main. |
| <i>Sol. Bnd (in):</i> 8.125 | 2 | 1.0 | 3.5 | L | 0.431 | Main. Strong |
| | 3 | 0.5 | 4.75 | L | 0.585 | Blue, very weak. |
| | 4 | 0.375 | 5.813 | D | 0.715 | Weak. |
| | 5 | sm | 7.875 | D | 0.969 | Weak. |
| | 6 | sm | 7.875 | D | 0.969 | Weak. |
| Com. 9 Blank 2 | 1 | 1.125 | 3.938 | L | 0.474 | Main. Strong. |
| <i>Sol. Bnd (in):</i> 8.3125 | 2 | 0.5 | 7.375 | D | 0.887 | Weak. |
| | 3 | 0.25 | 7.5 | D | 0.902 | Weak. |
| 10:1 Commercial Cranberry Juice Cocktail Serial Dilutions | | | | | | |
| (5:1) | 1 | 0.0625 | 2.125 | L | 0.272 | Medium. |
| <i>Sol. Bnd (in):</i> 7.8125 | 2 | 0.25 | 3.5 | D | 0.448 | Overlaps main. Medium. |
| | 3 | 0.875 | 4.063 | L | 0.52 | Strong. Main. |
| | 4 | 0.125 | 3.813 | D | 0.488 | Weak. Within main. |
| | 5 | sm | 3.938 | D | 0.504 | Weak. Within main. |
| | 6 | 0.4375 | 5.031 | D | 0.644 | Medium. |
| | 7 | 0.125 | 5.188 | D | 0.664 | Weak. Broad band. |
| (50:1) | 1 | 0.25 | 3.125 | D | 0.400 | Overlaps main. Medium. |
| <i>Sol. Bnd (in):</i> 7.8125 | 2 | 0.6875 | 3.848 | L | 0.492 | Strong. Main. |
| | 3 | sm | 3.75 | D | 0.480 | Very weak. Within main. |
| | 4 | 0.625 | 4.813 | D | 0.616 | Medium. |
| | 5 | 0.125 | 5.563 | D | 0.712 | Weak. |
| (500:1) | 1 | sm | 2.438 | D | 0.310 | Overlaps main. Medium. |
| <i>Sol. Bnd (in):</i> 7.875 | 2 | 1.188 | 3.469 | L | 0.440 | Strong. Main. |
| | 3 | 0.188 | 2.781 | D | 0.353 | Overlaps main. Weak. |
| | 4 | sm | 3.375 | D | 0.429 | Very weak. Within main. |
| | 5 | sm | 3.625 | D | 0.460 | Very weak. Within main. |
| | 6 | 0.125 | 5.438 | D | 0.690 | Weak. |
| (5000:1) | 1 | 0.125 | 1.813 | D | 0.230 | Weak. |
| <i>Sol. Bnd (in):</i> 7.875 | 2 | 0.313 | 2.910 | D | 0.369 | Medium. Overlaps main. |
| | 3 | 1.0 | 3.375 | L | 0.429 | Strong. Main. |
| | 4 | 0.938 | 3.281 | L | 0.417 | Medium. |
| | 5 | sm | 3 | D | 0.381 | Weak. |
| Com. 3 - Blank | 1 | 0.0625 | 1.188 | L | 0.154 | Medium. |
| <i>Sol. Bnd (in):</i> 7.6875 | 2 | 0.25 | 2.438 | D | 0.317 | Overlaps main. Weak. |
| | 3 | 1.0 | 3.0 | L | 0.390 | Strong. Main. |
| | 4 | sm | 3.0 | D | 0.390 | Medium. At base of main. |
| | 5 | 1.125 | 3.3125 | D | 0.431 | Medium. |
| Table 5. Band distances and R_f values for serial dilution of Aronia juice with water and commercial apple juice and cranberry juice cocktail followed by acidified acetone extraction. See Table 2 for Key. | | | | | | |

Conclusions

We have demonstrated a potential method for facile qualitative analysis of Aronia, and potentially other fruits for which a diagnostic pigment may be found, in commercial juice products using thin-layer chromatography employing chromatography paper in place of high-priced cellulose plates. Method sensitivity was observed as a least-detectable limit between 125:1 – 625:1 for purely aqueous dilutions of Aronia juice followed by acidified acetone extraction and as between 500:1 – 5000:1 for dilution of Aronia juice with commercial apple juice using two diagnostic Aronia bands. Aronia juice was unable to be distinguished from native cranberry juice cocktail based on the band profile following dilution with acidified acetone.

Future Work

Further comparison of the analysis of freeze-dried whole fruits, juices, and freeze-dried fruit juice samples compared to fresh samples after processing and storage can be studied. Significant improvements remain to be made to this TLC method so that it can be used as an attribute (yes/no) detection method of Aronia pigments. Further work with TLC may allow this less expensive method to become more quantitative. HPLC can be used to quantitatively separate these pigments. HPLC work was originally planned as the analytical technique to be employed in this study, but instrumental breakdown of both HPLCs prevented this work from being completed. Further study could examine a means of anthocyanin ratio comparison by HPLC to quantitatively determine anthocyanin content contribution from Aronia berry. Furthermore, the determination of optimum harvest date is necessary to for optimum identification, comparison and concentration of pigments, antioxidants, vitamins, etc in Aronia berries.

References

1. Castañeda-Onando, A.; Pecheco-Hernández, Ma. de L.; Páez-Hernández, Ma. E.; Rodríguez, J. A.; Galán-Vidal, C. A. Chemical studies of anthocyanins: A review. *Food Chemistry*. 2009, 113, 859-871
2. Oka, H.; Ozeki, N.; Hayashi, T.; Itakura, Y. Analysis of Natural Colorings in Food by Thin-Layer Chromatography. *Journal of Liquid Chromatography and Related Technologies*. 2007, 30, 2021-2036
3. Forgacs, E.; Cserhati, T. Thin-Layer Chromatography of Natural Pigments: New Advances. *J. Liq. Chrom. & Rel. Technol.* 2002, 25, 10 & 11, 1521-1541
4. Yawaido, R.; Morita, N. Color enhancing effect of carboxylic acids on anthocyanins. *Food Chemistry*. 2007, 105, 421-427
5. Wu, X.; Beecher, G. R.; Holden, J. M.; Haytowitz, D. B.; Gebhardt, S. E.; Prior, R. L. Concentrations of Anthocyanins in Common Foods in the United States and Estimation of Normal Consumption. *J. Agric. Food Chem.* 2006, 54, 4069 – 4075
6. Wu, X.; Gu, L.; Prior, R. L.; McKay, S. Characterization of Anthocyanins and Proanthocyanidins in Some Cultivars of *Ribes*, *Aronia*, and *Sambucus* and Their Antioxidant Capacity. *J. Agric. Food Chem.* 2004, 52, 7846 – 7856
7. Cisowski, W.; Dembinska-Migas, W.; Krauze-Baranowska, M.; Luczkewicz, M.; Migas, P.; Matysik, G.; Soczewinski, E. Application of Planar Chromatography to the Analysis of Secondary Metabolites in Callus Cultures of Different Plant Species. *J. Planar Chromatogr. Mod. TLC*. 1998, 11, 441-446
8. Honhová, B.; Štádíková, L.; Karásek, P. Determination of Anthocyanins in Red Grape Skin by Pressurized Fluid Extraction and HPLC. *Czech J. Food Sci.* Special Issue, 26, S39-S42
9. Awika, J. M.; Rooney, L. W.; Waniska, R. D. Anthocyanins from black sorghum and their antioxidant properties. *Food Chemistry*. 2004, 90, 293-301

General Conclusions

Measurement of degrees brix appeared to be an appropriate method of measurement for Aronia juice, and the two other methods of Aronia juice analysis described in this report both show some promise in the industry as well as quantitative (HPLC) and qualitative (TLC) methods of measurement for this particular juice. However, both require some additional research.

HPLC analysis of the juice produced from berries harvested in 2011 showed that juice from this year/growing conditions yielded characteristic hydrophilic peaks between 8 and 10 minutes under these testing conditions. This was useful in distinguishing Aronia juice from apple juice, however because growing year appeared to affect the peaks observed, and the characteristic peaks did not appear when blended, more research is required to improve this method.

Thin Layer Chromatography proved to be a useful way of determining whether or not Aronia juice is actually present in a sample, but unfortunately had some difficulty in distinguishing Aronia juice from cranberry juice using the method testing. Therefore further research should be pursued to determine the appropriate modifications to this method which could help to distinguish Aronia pigments from cranberry pigments.

Acknowledgements

Merike Seaman, Catherine Hauck, Julianne Drury

**High Tunnel Production, Business Development and Marketing Workshop for
Fruit and Vegetable Producers in Southeast Iowa**
Final Progress Report
Pathfinders RC&D, Inc.
November 2011

Project Title

High Tunnel Production, Business Development and Marketing Workshop for Fruit and Vegetable Producers in Southeast Iowa

Project Summary

Local food producers in southeast Iowa have an increasing positive climate for marketing their locally-grown fruits and vegetables. Recent years have shown sharp increases in demand from farmers market customers, restaurant chefs, Community Supported Agriculture subscriptions as well as from wholesale and retail channels.

Another development is the establishment of a fulltime local food coordinator position in southeast Iowa to help coordinate the producers and their supply of fresh produce into the market. Additionally, there is the development of new local food infrastructure. **Growers are increasingly interested in expanding their season to meet growing demand and many looking at high tunnel production as a way to expand (motivation and timeliness).**

Several producers applied for funding from the Natural Resources Conservation Service (NRCS) Environmental Quality Incentive Program (EQIP) to purchase high tunnels and many cost-share applications approved. **As producers became more interested in or committed to purchasing high tunnels, many producers wanted information about differences in production techniques in the high tunnel system (need addressed by this project).**

Additionally, many producers were interested in learning how to decide which crops to raise and how to market those crops. **This project addressed the multitude of questions and growing interest by providing a 2-day training on high tunnel production, business planning and marketing for fruit and vegetable producers in the region of southeast Iowa in December 2010.**

Project Approach

Planning committee members met via teleconference and in person to plan a two-day workshop for the IDALS specialty crop block grant project. Pathfinders RC&D staff, Detra Dettmann, and Elisabet Humble, met with Marsha Laux and Linda Naeve to go over the workshop content and tailor content to the specific needs of area producers. Committee members also conversed with various producers to gather their interests on the topic.

**High Tunnel Production, Business Development and Marketing Workshop for
Fruit and Vegetable Producers in Southeast Iowa**

*Final Progress Report
Pathfinders RC&D, Inc.
November 2011*

A two-day workshop was held in Mount Pleasant, Iowa on December 3 and 4, 2010. The workshop sold out quickly with a total of 37 registered participants.

Participants came from the following communities in Iowa: Anamosa, Ames, Batavia, Burlington, Carroll, Danville, DeWitt, Donnellson, Fairfield, Farmington, Keosauqua, Keystone, Knoxville, Maquoketa, Middletown, Monticello, Mount Pleasant, Ottumwa, Packwood, West Burlington, and Winterset. Additionally, there were two out-of-state participants: one from Peabody, Kansas and one from Lawrenceville, Georgia.

The 2-day workshop was held at the Henry County Extension office in Mount Pleasant from 9:00 a.m. to 4:00 p.m. both days. This was a Friday/Saturday format. The all-day, two-day format, encompassing one workday and one weekend day, seemed favorable according to the producers polled by the planning committee.

The committee worked with Iowa State University Extension Value Added Agriculture program staff to tailor the workshop to the local needs expressed by the producers. Workshop content examined the differences in growing in open field settings compared to the high tunnel system approach, and to a large extent, what types of production techniques would be needed to be utilized within each system. Business planning and marketing topics were selected to help producers think through the feasibility of their business ideas, and how they could develop those ideas into more formal business plans. Additionally, workshop topics discussed various marketing considerations related to the different production systems.

Workshop presenters included staff from the Iowa State University Extension Value Added Agriculture program, Ray Hansen, Linda Naeve, and Marsha Laux. Additional presentations were made by Local Food Coordinator Elisabet Humble, and Natural Resources Conservation Service Area Conservationist Bruce Trautman.

Specific content included in the two-day workshop included:

- high tunnel production and what can be grown in high tunnels
- high tunnel selection
- key components to developing your business
- NRCS EQIP high tunnel program
- soil preparation and soil management/fertility
- high tunnel construction
- business development and Market Maker overview
- marketing and markets,
- combining high tunnels with field production for season-long production

**High Tunnel Production, Business Development and Marketing Workshop for
Fruit and Vegetable Producers in Southeast Iowa**

*Final Progress Report
Pathfinders RC&D, Inc.
November 2011*

- mulches and irrigation in high tunnels
- pest management in high tunnels
- bringing the marketing plan and business plan together

Additionally, participants were brought up to date on the latest food safety legislation and what that could mean for them, as well as other current topics of interest, including the growth of the local food interest, the interest in a developing a local cooperative and light processing requirements.

Workshop attendees were each given the 95-page “High Tunnel Fruit and Vegetable Production Manual” including a CD with additional resources, a Minnesota Institute for Sustainable Agriculture publication entitled “Building a Sustainable Business: A Guide to Developing a Business Plan for Farms and Rural Businesses,” and other handouts relating to each topic discussed in the workshop. The marketing materials distributed included a customer analysis and a news release checklist useful for developing a marketing plan for their business.

An evaluation was completed the day of the workshop and a follow-up evaluation is currently being finalized.

Additionally, one of the workshop participants, Cary Spray, who was funded for a high tunnel on her farm after the December workshop, agreed to host a high tunnel construction workshop at her farm. The two-day workshop was held August 8 and 9, 2011, near Packwood, Iowa. A local farmer, Claude Nicholson, who had previously constructed a high tunnel on his own farm, led the construction and demonstration process. Iowa State Extension developed news releases and 10 participants were on hand to learn about the high tunnel construction process. Extra handouts from the December workshop and the 95-page manuals that were funded with this project were provided to the participants at the construction workshop, along with a publication from the Iowa NRCS on high tunnels. The participants were able to experience first-hand the process of putting together a high tunnel from beginning to end, starting with the piles of parts and the instruction booklet as they came shipped, to the actual experiential process of putting all the pieces together.

Goals and Outcomes Achieved

This project provided a 2-day training on high tunnel production, business planning and marketing for fruit and vegetable producers in the region of southeast Iowa in December 2010. In addition, a high tunnel construction workshop was conducted in August 2011 giving participants hands-on experience in the physical construction of a high tunnel structure.

**High Tunnel Production, Business Development and Marketing Workshop for
Fruit and Vegetable Producers in Southeast Iowa**
Final Progress Report
Pathfinders RC&D, Inc.
November 2011

Expected Measurable Outcome Stated in Grant Application: *An expected outcome will be at least 50% of participants adding high tunnel production to their business, increasing their farm income and the supply of locally-grown produce.*

After compiling results from participants who attended the workshop in December along with producers who attended the high tunnel construction workshop in the summer, a total of 52% of the producers either already added a high tunnel or showed commitment to adding high tunnel production by ordering a high tunnel, or planning to submit an EQIP application to the NRCS for a high tunnel (and plan to construct a high tunnel regardless of receiving EQIP funds.)

Beneficiaries

Beneficiaries of this project are fruit and vegetable growers who have or who are interested in having a high tunnel as part of their agricultural operation. **There were a total of 44 beneficiaries between the business and marketing workshop held in December and the high tunnel construction workshop held in August.**

Lessons Learned

The originally unplanned construction workshop revealed that planning and organizing the construction process was critical to a successful high tunnel build. For example, the workshop leader showed participants how to make a jig out of a board, in which he drilled holes and used it as a pattern to determine the spacing of the posts. This alleviated problems with waiting on a measurement from a tape for each post and also served as a good quality control. Holes were marked, dug, and posts inserted and tamped in place by the workshop participants. The process took two full days, with most participants returning for the second day of hard, hot work to learn how to construct the high tunnel.

One of the participants commented it became evident there couldn't be enough driver/drill batteries on hand, and that multiple sets of each tool allow participants to continue working simultaneously.

This construction workshop was unplanned in the early stages of this project, yet it had great significance to the participants. They enjoyed learning from doing and felt that the process helped alleviate the fears they had from constructing the high tunnel on their farm. Marsha Laux, one of the presenters at the December workshop, also participated in the construction project. She distributed materials to those who were not at the workshops and met one on one with those who had questions related to high tunnels. Laux provided them with contact

**High Tunnel Production, Business Development and Marketing Workshop for
Fruit and Vegetable Producers in Southeast Iowa**

Final Progress Report

Pathfinders RC&D, Inc.

November 2011

information of local, state and national service providers who could assist them in their high tunnel project development.

Being flexible to react to unexpected demands are important. Having experienced staff meant that the project could be built upon and volunteers were located to conduct the high tunnel construction workshop, that was unplanned, but a natural development as participants followed through on their plans to build their businesses by adding high tunnels to their operations.

Contact Person

Detra Dettmann, Pathfinders RC&D Executive Director

Telephone: 641-472-6177

E-mail: detra@pathfindersrcd.org

Additional Information

No additional information to include.