SPECIALTY CROP BLOCK GRANT PROGRAM – FB

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USDA Good Agricultural Practices & Good Handling Practices (GAP/GHP) Third Party Food Safety Program

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Project Summary:

In the state of Connecticut, specialty crop producers have come under heavy pressure from wholesale customers (restaurants, hotels, schools, institutions, and wholesalers) to implement on-farm food safety programs and pass an on-farm food safety audit based on Good Agricultural Practices (GAP) or risk losing their business. GAP is based on FDA's recommended practices to minimize the risk of microbial contamination during the production of fresh fruits and vegetables. GAP audits are performed by a third party auditor and offered by both public agencies and private firms. The third party auditor reviews the farms procedures, food safety manual, and records to determine whether the producer is following GAP. GAP training is offered to specialty crop producers by University of Connecticut Cooperative Extension utilizing SCBG funds.

Prior to the inception of DoAg's GAP Audit Program, Connecticut specialty crop producers did not have an in-state source to get a GAP audits. This led to frustration and confusion as farmers struggled to get valid information about GAP audits and their guidelines. DoAg recognized this and established this USDA – Specialty Crops Inspection Division accredited GAP audit program while collaborating the education component with the University of Connecticut Cooperative Extension Food Safety Educators. Without this program, the state's specialty crop producers would have limited access to GAP information and an accredited audit program. They'd be forced to consult out of state educators and out of state auditing firms resulting in additional costs and ultimately making them less competitive in today's marketplace.

This program has assisted Connecticut specialty crop producers to remain competitive through education, training, and providing of a key service (the audit) to satisfy customer demands. Without this program, specialty crop producers that wish to engage in sales on the wholesale level would be at a disadvantage due to the accessibility of information, quality education, and a local auditing firm.

Project Approach:

The GAP/GHP project requires extensive planning, coordination, preparation and maintenance to continue to offer this service to specialty crop producers. The undertaking of this project required DoAg to partner with several other agencies to ensure a successful project to enhance the states specialty crops.

Much of the success of this project can be linked to DoAg's partnership with the University of Connecticut Cooperative Extension Food Safety Educators (UConn). DoAg worked with UConn to tailor a curriculum that would aid the state's specialty crop producers in understanding on-farm food safety practices, incorporating on-farm food safety practices, and preparing for an on-farm third party food safety audit. In addition

to aiding in the development of the curriculum, DoAg staff also played a key role at the following GAP training meetings offered by UConn:

GAP School Classes - January 2012, February 2012, January 2013, February 2014, March 2014, February 2015
Food Safety Plan Writing Workshop - February 2014
GAP Lite Workshop - February 2013
Packing House Food Safety Workshop - February 2014, March 2015, June 2015
FSMA/Third Party Audit Workshop - November 2013

These meetings provided an excellent opportunity for DoAg assist in educating the state's specialty crop producers and promote the GAP audit program. To date, all participants in UConn's GAP training meetings have successfully passed the USDA GAP/GHP audit. This program's success would have been severely impaired without the good working relationship and common goals of DoAg and UConn.

In addition to working with UConn, several others welcomed DoAg staff to promote the state's audit program and answer GAP audit related questions at their events. Other promotional events which the DoAg GAP Audit program was promoted:
Connecticut Small Fruit and Vegetable Growers Conference - January 2013
Ahold Annual Meeting - June 2015
State of Connecticut - Department of Administrative Services & Department of Education / USDA Unprocessed Produce Pilot Program Meeting - February 2015
Produce Marketing Association's Local Grower Food Safety Workshop – Hosted by Sysco & Fresh Point - March 2014
Connecticut Pomological Society Annual Meeting December 2012, December 2013, December 2014
Connecticut Pomological Society Twilight Meeting May 2014

In total 20 meetings/workshops were attended that enabled DoAg staff to both present to the crowd and engage with all participants. The number of participants at all the meetings was not attainable. Several of the meetings had well over one hundred attendees and the best guess estimate for total attendees at these meetings would be around one thousand.

Through these efforts, DoAg staff continues to be sought out by the state's specialty crop producers seeking assistance when it comes to understanding on-farm third party GAP/GHP audits. Information regarding the program is available 24 hours a day, seven days a week at DoAg's website.

During this three year grant period, DoAg also became a member of Association of Fruit and Vegetable Inspection and Standardization Agencies (AFVISA - membership fee not paid with SCBG Funds). This association is comprised of other states throughout the country that also offer GAP/GHP audits. The members of this association have assisted DoAg staff in program development and technical assistance in meeting

USDA-SCI's requirements. The group holds regular conference calls and DoAg staff was able to attend one annual meeting in San Diego, CA in May 2014.

DoAg staff attended a USDA-SCI State Program Managers Workshop in Fredericksburg, VA in June 2014. This meeting brought together the states and the USDA-SCI Division staff to identify issues of critical concern and collaboratively develop ways to improve the Federal-State program.

DoAg's licensed auditor is also required by USDA-SCI Division to maintaining a minimum number of continuing education training. The auditor licensing standards require a minimum of 80 hours every three years. Many of the meetings listed above, allowed DoAg's auditor to gain valuable insight into on-farm food safety and use that time to meet USDA's requirements.

DoAg auditor underwent three annual reviews by USDA-SCI Division Federal Program manager. This is done to verify DoAg's licensed auditor is properly administering the USDA GAP audit program.

During the three year grant program, DoAg offered USDA GAP audits to any Connecticut Specialty Crop Producer. DoAg performed audits on a wide array of specialty crops. The required tasks included:

- Point of contact for all GAP audit related questions within DoAg
- Schedule audits with requestor
- Performing the specified audit
- Completed USDA documents for submittal
- Monitor audit's status while under review by USDA
- Notify auditees of audit status
- Perform unannounced audits when applicable
- Distribute invoices for auditing services rendered
- Monitor financial accounts
- Submit monthly and years financial reports to USDA

The GAP audits performed include both field grown and greenhouse grown crops. The following is a summary of Connecticut Specialty Crop Producers that met the minimum USDA GAP/GHP Audit Standards:
FY 2013/2014 = 14
FY 2014/2015 = 16
FY 2015/2016 = 11
TOTAL = 41
This number does not reflect the total number of participants in the program, it only reflects the number of specialty crop producers that met the minimum requirements of the audit (passed).

Goals and Outcomes Achieved:
The initial "Goal" of the project was to "Provide an accredited third party food safety audit for Connecticut's Specialty Crop Producers".

This goal was accomplished through working with its key partners – UConn and USDA-SCI Division. USDA-SCI Division provided the requirements needed to offer a Federal-State Partnership program such as the GAP audit program. Upon completion of the required training and review by USDA staff, DoAg staff was awarded and continues to maintain a USDA-SCI auditing license. This license allows DoAg to perform USDA audits to the state's specialty crop producers. In addition to the licensing component, DoAg has worked extensively with UConn to develop and maintain the education needed by specialty crop producers to implement on-farm food safety practices. DoAg has also promoted this program through educative workshops, speaking engagements, and through DoAg's website.

The initial target of DoAg's GAP audit program was to audit 25 specialty crop producers with the performance measure being the farms/business requesting and passing a GAP audit. At the beginning of the grant period, the program was in its infancy and DoAg had very little amount of baseline data available. The target was an estimate. This target was intended to be a big step, an estimated increase of 500% from 2011 audit numbers (see below). The state's specialty crop producers showed a favorable response and the target was met in the second year of the project.

Over the three years of this grant period, 41 farms have passed a USDA GAP audit performed by DoAg. This is a 165% increase in the original target of 25. This accomplishment exceeded the initial expectations and shows there is a demand for this program. The performance measure also indicates the number of specialty crop producers that would likely take advantage of this program on a yearly basis. Participating specialty crop producers varied from a low of 11 to a high of 16 in the past three years. The success of this program reinforces the need for the USDA GAP audit program.

Baseline Used:
2009 – 0 Connecticut Specialty Crop producers passing a USDA GAP Audit
2011 – 5 Connecticut Specialty Crop producers passing a USDA GAP Audit

Comparison for Baseline Data Accumulated / Performance Measures during the three year project:
2013 – 14 Connecticut Specialty Crop producers passing a USDA GAP Audit
2014 – 16 Connecticut Specialty Crop producers passing a USDA GAP Audit
2015 – 11 Connecticut Specialty Crop producers passing a USDA GAP Audit

Beneficiaries:
Participants that benefited from this program include:

DoAg – This program allowed DoAg to provide a valuable service and enable specialty crop producers to sell their products to customers requiring a USDA GAP audit.

USDA-SCI Division – This program enabled them to offer their audit program to participants in Connecticut.

Strawberry Growers – 2 Participants - Participation enabled these growers to sell products to customers requiring a USDA GAP Audit. This allowed further diversification of their business by expanding their customer base, creating a more competitive environment for their crops.

Orchards – apples/pears/peaches – 6 Participants - Participation enabled these growers to sell products to customers requiring a USDA GAP Audit. This allowed further diversification of their business by expanding their customer base, creating a more competitive environment for their crops.

Vegetable Growers – 12 Participants - Field and Greenhouse Growers – Participation enabled these growers to sell products to customers requiring a USDA GAP Audit. This allowed further diversification of their business by expanding their customer base, creating a more competitive environment for their crops.

Wholesalers – Enabled them to purchase Connecticut Specialty Crops from participants in the USDA GAP Audit Program. DoAg is aware of <u>four</u> wholesale produce companies that require GAP audits from all of their suppliers. Without this program, it is not known whether specialty crops grown by Connecticut farmers would be available through these wholesalers.

Retail Stores – Enabled them to purchase Connecticut Specialty Crops from participants in the USDA GAP Audit Program. DoAg is aware of <u>four</u> statewide retail chain stores that require GAP audits from all of their suppliers. Without this program, it is not known whether specialty crops grown by Connecticut farmers would be available at these retail stores.

Connecticut Consumers – Connecticut consumers are the end user for the majority of the state's specialty crops. The demand for local specialty crops continues to grow, forcing restaurants, hotels, schools, institutions, retailer and wholesalers to respond to this demand. By consumers purchasing specialty crops produced by participants of the USDA GAP audit program, they are reducing the risk of food borne illness and allowing the states specialty crop producers to be more competitive and diversified.

Lessoned Learned:

The most notable lesson learned is that the success of this program is determined by the customers of the specialty crop producers. Specialty crop producers will only participate in this program when required to by a customer. Each farmer that requested an audit stated it was because a customer would not buy from them unless they passed

a GAP audit. In Connecticut, there was not one audit request from a farm/business that wasn't required to have an audit.

Some farmers choose to participate every other year. This trend was viewed among farmers whose customers only checked for GAP audit compliance once per year. By only checking once a year, it allowed the farmers to be audited every other year. This trend can throw off the baseline figures for the program.

Quantitative numbers for this project are difficult to obtain. Weather has played a factor in harvest amounts. GAP audit components do not request for a total amount of crops harvested or sold.

This is a service-based program and the USDA GAP audit is not accepted by all customers. One auditee chose not be participate a second year because their customer wanted an audit from different auditing firm. The USDA GAP audit is not a Global Food Safety Initiative (GFSI) approved audit. Some customers are asking their farmers to get an audit done by GFSI approved audit. It is unclear whether this will affect the long-term success of the program. It is important for USDA and its partners to work with the industry and try and maintain large customers that recognize the USDA GAP audit program or risk losing their auditees to private auditing firms. DoAg has actively participated in meetings and workshops offered by food safety educators and private industry (Sysco-FreshPoint, Ahold) in an attempt to market the USDA GAP audit program and build a relationship with specialty crop producers customers.

DoAg found this program is not self-sustaining under the current fee structure (dictated by USDA-SCI Division) and could not be offered without SCBG funds. USDA has plans on amending the fee structure but to date this program could not be offered without this funding.

At this point it is difficult to predict the future of this program. New federal legislation has just gone into effect that will regulate fruit and vegetable growers – FDA's FSMA-Produce Safety Rule. Many farmers stated they hope these new laws will do away with GAP audits. Auditing firms believe this is an important service due to the lack of FDA inspectors. It is unlikely FDA will accept a GAP audit in lieu of a FDA inspection.

Additional Information:
Additional information regarding DoAg USDA GAP Audit Program can be found at www.CTGrown.gov.

Additional information regarding the USDA Audit Programs, including farms/businesses that have met the minimum requirements of an audit can be found at http://www.ams.usda.gov/services/auditing/gap-ghp

CT Grown Agricultural Directional Signage Program Cost Share Reimbursement Program

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Project Summary

The CT Department of Agriculture, in cooperation with the CT Department of Transportation (DOT) provides the CT Grown Agricultural Directional Signage Program. The program assists producers in the sale of their products by advertising the location of their farms located off state roadways. The program was recently modified to provide a 50% then 100% cost share reimbursement to specialty crop growers only who quality for the program. The program was offered to Connecticut specialty crop producers from October 2012 through September 2015.

Project Approach

DoAg promoted the CT Grown Agricultural Directional Signage Program Cost Share Reimbursement Program to specialty crop producers through agency publications, emails, and through one-on-one contact with specialty crop producers. The previously established program was modified to specifically serve specialty crop producers; DoAg updated the current application to incorporate questions regarding the specialty crops a farm produces.

Interested applicants were required to submit a program application. DoAg, in conjunction with the Connecticut Department of Transportation, assessed the applicant to determine eligibility for the program. Once accepted into the program, DoAg sent an approval letter to the applicant to notify them of their status. Along with the approval letter, specialty crop producers were also reminded of the cost share reimbursement program and procedure to take advantage of it.

During the first year, five specialty crop producers received approval for CT Grown Agricultural Directional Signs, but only one of them followed up and participated in the cost share reimbursement program.

At the conclusion of the second year, no additional applications were received from specialty crop producers. There were a number of inquiries but all of them were by non-specialty crop producers that did not qualify. At the start of the third year, two additional applications were received and accepted into the program. Both farms took advantage of the opportunity.

Due to the apparent lack of interest and remaining budget, the agency modified the program to be a 100% reimbursement for speaclity crop producers shortly after the start of the third year. As a result of the programmatic change, we received 11 applications from farms interested in the program.

The following farms received a 50% cost share reimbursement:

Hein's Farm, Farmington
Castle Hill Farm, Newtown
Evergreen Acres Tree Farm, Colchester

The following farms received a 100% reimbursement:

Devon Point Farm, Woodstock
Tikkenen Berry Farm, Killingly
Green Farm, Bloomfield
Sub-Edge Farm, Farmington
Lemek Farm, Tolland
Orchard Hill Farm, South Windsor
Willow Valley Farm, Willington
Wehipittituck Farm, Stonington
Litchfield Blueberry Farm, Plymouth
Wintonbury Land Trust, Windsor
Sam Bridges Nursery, Greenwich

Goals and Outcomes Achieved

GOAL	Increased farm visibility and greater public access to farms located off state roadways throughout Connecticut.	Achieved: Visibility of farms on rural roads was achieved for 15 specialty crop farms
PERFORMANCE MEASURE	Surveys conducted by signage recipients to farm patrons.	This was not completed due to the timeliness of the participants.
TARGET	A 5% increase in sales as a result of participating in the program.	Given the majority of the participants took advantage of the project late in the last year of the program, this information was unable to be obtained and would not be available until the winter of 2016 at the earliest.

We came very close to meeting our goals of having 15 specialty crop farmer utilize the program. 14 specialty crop farmers were able to benefit from the program and nearly the entire budget was spent.

Beneficiaries

In addition to the 14 specialty crop farms that were able to put up permanent signage on a state roadway to increase on-farm traffic, the following entities were also beneficiaries:

- Motorists on state roadways: they now have an increased awareness of a farm offering specialty crops.

- Tourist: the desire to experience a Connecticut farm and rural business is at an all time high. The addition of the signs on state roadways now provides tourists with that opportunity.

Lessons Learned

Despite the efforts of the project manager and agency, it took quite some time for specialty crop producers to see the value in the program, apply for it, and then submit the materials needed to be reimbursed. It wasn't until a more one-on-one outreach approach by the project manager was done did the program begin to succeed.

It was also challenging to assess if there was an increase in sales by the end of the program year considering so many of the specialty crop farms that utilized the program did so in late August and early September, preventing us from collecting sale information.

Additional Info

None

This final report was approved in January 2015

Assessment of Connecticut Grown Specialty Crops Processing Needs and Capacity for Connecticut Institutions

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Project Summary

In December of 2012, the Governor's Council for Agricultural Development issued their first annual report Grow Connecticut Farms: Developing, Diversifying, and Promoting Agriculture. The first recommendation to the Connecticut Department of Agriculture, as laid out in the Council's report, suggested an infrastructure study to determine gaps and opportunities for the aggregation, light processing, and distribution of Connecticut Grown Products.

The urging of the Connecticut DoAg to focus on growing Farm-to-Institution, building the requisite infrastructure including production, aggregation, processing, and distribution and sales of local foods to scale comes at a time of great demand and growing support for local food. Much of the attention to increase locally grown foods to date has focused on direct-to-consumer sales through a growing network of farm stands, farmers' markets, Community Supported Agriculture (CSAs) and retail venues. This focus holds true for Connecticut, which in 2007 had the third highest average per farm of direct-to-consumer sales in the United States[1] and saw a rise in farmers' markets from 125 markets operating in the state up from just 22 in 1986[2]. Similar growth has been seen nationally over the past few decades. In 1970 only about 340 farmers' markets operated in the U.S. compared to 3,155 reported in 2005[3]. As important as direct sales are for state farm viability, however, more than 99 percent of agricultural products consumed nationally are purchased through wholesale channels[4]. While there is no silver bullet for building a vibrant local food and agricultural economy, increasing statewide processing capacity could be an attractive investment as it is linked not only

[1] United States Department of Agriculture (2007). Census of Agriculture.
[2] Planning for Agriculture (2013). American Farmland Trust.
[3] Oberholter and Grow (2005). Producer Only Farmers' Markets in the Mid-Atlantic Region: A Survey of Market Managers. Henry A. Wallace Center for Agricultural and Environmental Policy.
[4] FamilyFarmed.Org and the Illinois Department of Agriculture (2010). Ready to Grow: Increasing Illinois Fruit and Vegetable Production.

to quality job development[5] but also offers the potential for industry expansion[6]. Yet, according to a Connecticut Farm-to-School Baseline Study conducted in 2012, only 30 percent of Connecticut farmers surveyed were actively engaged in Farm-to-Institution sales [7]. Increased state processing could help to fill this gap.

Research began in May 2013, with the express purpose to identify Connecticut Grown fruits and vegetables well suited for production and processing for institutional sales and to determine opportunities and challenges for processing Connecticut Grown fruits and vegetables. Research funding was provided by the John Merck Foundation and the Specialty Crop Block Grant Program of the Agricultural Marketing Service, U.S. Department of Agriculture, awarded and administered by the Connecticut Department of Agriculture. Outcomes outlined in this research were to determine at least five (5) Connecticut grown specialty crops that are best suited for institutional use; to determine institutions and growers interested in beginning or increasing Farm-to-Institution sales; and, where possible, identify the opportunities that exist to develop the infrastructure needed to supply the known institutions with those identified products in a readily available form. Findings will be used by DoAg and the State of Connecticut to guide further research, inform relevant conversations with the GCAD, and to inform decisions regarding a state plan to increase processing infrastructure and the future of the state-owned Hartford Regional Market.

Project Approach

Early research efforts, in partnership with the Franklin County Community Development Corporation and Farm-to-Institution New England (FINE), began by developing a set of comprehensive, state-based databases of suitable Connecticut producers, institutions, and processors to identify appropriate fruit and vegetable crops and market channels for processing and institutional sales. Between December 2013 and April 2014, email surveys were administered to three separate groups of respondents: Connecticut fruit and vegetable producers (123 respondents), Connecticut institutions (44 respondents) and processing facilities (7 respondents). A sum total of 174 respondents, including

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[5] Pansing, Cynthia, John Fisk, Michelle Muldoon, Arlin Wasserman, Stacia Kiraly & Tavia Benjamin (2013). North American Food Sector, Part One: Program Scan and Literature Review. Arlington, VA: Wallace Center at Winrock International.

This recent report from the Good Food Network found that the Food sector represented one of the largest growing economic sectors, "one that continues to develop and provide jobs." Uniquely relevant to the work with the Connecticut Department of Agriculture, food processing positions held the most promise for job development nationally. Furthermore, the findings suggested that these jobs were high quality jobs and that "investing in new ventures within select supply chain segments would generate the greatest local economic benefits in terms of increased local revenues, jobs, wages, and access to healthy food... Processing overall has the largest jobs impact with respect to number of jobs created, their stability and potential career paths, and wages (roughly comparable to foodservice on an hourly basis).... Processing and retail/foodservice provide higher wages overall and have the highest growth potential."

[6] Gautz, Chris (2013). State's Lack of Food Processing Capability Limits Ag Growth. Crain's Detroit Business. Detroit, Michigan.

[7] Connecticut Department of Agriculture and Eastern Connecticut Resource Conservation and Development, Inc. (2012). Connecticut Farm to School Baseline Survey.

producers, processors, and institutions, returned the surveys. The overall response rate was 22 percent. A totally of 112 of the 123 producer surveys were analyzed, representing 112 different farms. Institutional surveys and processor surveys represented 33 different institutions and 7 different processing businesses in the state.

This work was also informed by expert interviews, participation in GCAD meetings and review of meeting minutes, site visits, and targeted literature reviews. Expert interviews were conducted to contextualize the survey research and analysis. Interviews were coded and analyzed and select interview findings were included to add depth and context to the survey results. Relevant topic context and data was also drawn from GCAD meetings and minutes, with a particular focus on GCAD working groups that concentrated on Farm-to-Institution sales and building state infrastructure. Site visits to the Franklin County Food Processing Center in Greenfield Massachusetts, Heart of the Harvest processing center and the Hartford Regional Market were conducted early in the research process. Preliminary research efforts also included a review of existing literature on best practices in food hub development, Farm-to- Institution practices, and a review of relevant policies and state plans that support market development and value-added products.

Goals and Outcomes Achieved

Three goals were outlined in the initial project proposal.

Goal No. 1: Assess institutional wants and existing production of Connecticut Grown produce.

The number of surveys completed served as the performance measure for this goal with a target of identifying five Connecticut Grown fruits and vegetables well suited for production and processing in the state for institutional customers. Beginning with a baseline of zero surveys completed, a total of 44 surveys were collected from institutions to assess demand for Connecticut Grown fruits and vegetables. These surveys represented 33 different Connecticut institutions including K-12 schools, colleges and universities, hospitals, health care facilities, business or corporate cafeterias, and government agencies Institutional surveys helped identify top Connecticut Grown products for institutional demand. As a whole, institutional response regarding Connecticut Grown products in high demand did not specify desire for processing. In fact, more often than not, when specification was made, institutions demanded “fresh” or “in season” Connecticut Grown products. An attempt was made to separate specifically identified processed foods from foods that were unspecified or specified as “fresh” or “whole” or “in season” in order to better assess the kinds of processed product that institutions were most interested in purchasing. Generally speaking, the “fresh,” “whole,” and “in-season” products were identified as having the most interest in sourcing by buyers included lettuce/salad mix, tomatoes, apples, squash, beans, potatoes, and pears.

These top products are depicted in the word diagram below alongside other fruits and vegetables named in the survey.

When adjusted to focus specifically on processed products, the most frequently mentioned were: lettuce/salad mix, sliced apples, frozen green beans, canned tomatoes, and tomato sauce. Other products mentioned included peeled and sliced butternut squash, salsa and frozen corn. It was unclear if demand of locally processed products was impacted by lack of availability or lack of a previously developed market.

Goal No. 2: Identify institutions interested in buying processed Connecticut Grown specialty crops

A letter of interest was indicated as the performance measure for this goal with a target of generating 10 institutional letters expressing interest in buying processed Connecticut Grown specialty crops as identified in Goal No. 1. The starting point was a baseline of zero letters from institutions stating interest in buying from local Connecticut fruit and vegetable producers. Follow-up letters were sent to 30 institutions that, in the initial survey, indicated interest in furthering Farm-to-Institution sales. The stated goal was met and surpassed as 12 institutions submitted letters of interest, indicating products that they were most interested in purchasing either from local farms directly or indicating specifically that they were interested in purchasing local products through distributors (2). Ten (83 percent) of the follow-up letters also stated interest in cultivating relationships with local producers through events and opportunities where they could meet local farmers, and participate in conversations on topics that impact local agriculture and Farm-to-Institution sales. In one case, specific mention was noted on the need for purchasing to reflect quality assurance. Overall, the Connecticut Department of Agriculture received 12 follow-up letters of interest from institutional buyers including: K-12 schools (7), college/universities (3), government agencies (1), independent consultant (1). Specific reference to processed products (tomato sauce or salsa) was mentioned in 6/12 (50 percent) of the institutional letters of interest[8].

[8] Further research is needed to indicate the kinds of processed products most demanded by Connecticut Institutions

Goal No. 3: Identify Connecticut Grown specialty crop producers interested in growing produce specifically to process for institutions

A letter of interest from Connecticut Grown specialty crop producers was identified as the performance measure for this goal. The target was to have at least five Connecticut specialty crop producers submit letters expressing interest in growing crops identified in Goal No. 1 specifically to process for institutions. The starting point for this goal was a baseline of zero letters of interest from local Connecticut producers. Follow-up letters were sent to 78 producers that indicated, in the initial survey, interest in developing Farm-to-Institution channels. This goal of five (5) producer letters of interest was met and surpassed as a total of 25 letters were submitted on behalf of Connecticut producers interested in farm-to-institutions sales. Of the 25 letters submitted, 19 producers identified fruits and/or vegetables for institutional sales. One (1) letter expressed interest but also expressed an inability to produce at the volume necessary for institutional sales. Another producer (1) submitted a letter of interest in producing honey and maple syrup and another (1) still submitted an interest in producing wine for institutional sales. Three (3) letters of support expressed that they would not be able to produce at the level necessary for institutional sales, indicating that their farms and acreage were too small. These final three letters call attention to, and support other survey findings that indicate that farm size and product volume play an important role in addressing Farm-to-Institution sales. Overall, 19 letters of interest were submitted indicating potential in fulfilling Farm-to-Institution sales of fruits and vegetables. Only one letter directly expressed interest in providing processed products (tomato sauce, salsa)[9]to institutions.

Recommendations for next steps in achieving a model that works towards these goals include:

1. Build on existing demand-driven opportunities for market growth through a coordinated effort that addresses producer readiness, ability to meet volume and quality demands, fulfill packaging, handling, food safety, and delivery requirements, accommodates and supports new business models, and builds trusting relationships between producers and buyers.

2. Hold a full-sector convening that focuses on creating a common understanding of the challenges and opportunities for integrating small- and mid-sized producers into wholesale market channels and builds trust across sector players.

3. Hire a centralized person to help coordinate collective efforts; A Farm-to-Institution Coordinator who can advocate for the advancement of built infrastructure and social capital through coordination and linking across the value-chain. The coordinator would assist with existing trust relationships within and can also assist in consumer education and understanding.

4. Create a directory that inventories who is selling, who is buying, and looks to integrate supply and demand.

[9] Further research is needed to determine to what extent producers are interested and able to participate in processing foods for Farm-to-Institutional sales and examining potential profitability for each product line.

5. Complete a focused and comprehensive market analysis and impact study to determine specific products and entry points for infrastructure investment that responds to full sector needs and market expansion. Assess sector capacity, cost of doing business, and potential profitability for product lines. Provide hands-on implementation support to aggregate and move products to market.

6. Assess the feasibility of increasing production substantially enough to encourage the development of food systems infrastructure and utilize the research to implement a state-wide strategic plan.

Recommendations are provided for consideration of next steps for further action building Farm-to-Institution market channels and ramping up processing capacity in the state. Taken together, these recommendations will help to determine research priorities, lay the foundations for furthering built infrastructure and social infrastructure, and could add to the existing building blocks toward creating thriving farm-to-institution sector.

Beneficiaries

In the original grant submission, the Connecticut DoAg indicated that Connecticut has more than 2,500 specialty crop farms, representing more than $67 million of farm income in the state. It speculated that the thoughtful and well-coordinated addition of a centrally located facility that could aggregate, process, and store specialty crops could impact as many of those 2,500 farms as have a desire to enter into this newly opened market. Done strategically, this investment could serve to expand and grow the wholesale market for small and medium sized producers in the state, helping us to grow Connecticut agriculture and opportunities for new and veteran producers.

Wholesale and institutional markets remain an untapped economic opportunity for local agriculture. A 2010 member survey conducted through the Connecticut DoAg's Farm-to-Chef program reported purchasing an average of $60,800 in Connecticut Grown products per institution that year. Surveys recorded from the 38 institutions that responded to the number of meals that they serve averaged 819,958 annually. Currently, very little of that reflects local purchasing.

Lessons Learned

Interest in promoting Farm-to-Institution opportunities in Connecticut comes at a time of great interest and support for strengthening local food systems. Adapting market development to shorter, more localized supply chains indicates a shift from national trends that have, for decades, largely focused on developing a food and agricultural system that tends toward larger farms and longer distance supply chains [10]. Creating a truly thriving local agricultural economy will require rethinking the built and network

[10] Peters, Hansen, Clingerman, Hereford, and Askins (2012). West Virginia Food System: Opportunities and constraints in local food supply chains.

infrastructures of production, processing, and distribution at the state and community level[11] and may even encompass online sales opportunities that are being piloted by successful food hubs, aggregators, and distributors nationally[12]

Lesson 1: Farm and Sector Size Remain a Concern for Meeting Demand and Growing Production Capacity

Farm size plays a role in addressing product volume in Farm-to-Institution sales. Farm size of the producers that responded to the survey ranged from zero to 350 acres in production, representing a cumulative acreage of 2,266 in 2013, reportedly down just over 10 percent from 2,552 acres indicated five years ago. While not the focus of the research, this trend is in line with the preliminary results of 2012 Census of Agriculture made public during this research in February 2014. While the Census boasted a 22 percent increase in number of Connecticut farms since 2007 from 4,912 to 5,977 and an overall increase of acreage in farming from 405,616 acres in 2007 to 436,406 in 2012[13], it also showed that the average farm size in Connecticut was down from 83 acres in 2007 to 73 acres in 2012, suggesting that Connecticut has more farmers but that they are working smaller plots of land. Similarly, the average size of reported acreage in fruit and vegetable production by respondents showed a decrease from 25 to 23 acres. This demographic starting point may help to frame many of the lessons expanded on below, especially the need to address production volume and aggregation possibilities to move toward meeting current and growing institutional demand. Only one farm indicated that they currently serve as an aggregator of product from other farms to meet volume and supply.

Lesson 2: Farm-to-Institution in Connecticut Remains Untapped Despite a Significant and Growing Demand for Local Food

Producers, institutional buyers, and processors, alike, recognize growing demand for locally grown and processed foods. In fact, 92 percent of survey respondents reported that they have seen a growing demand in their industry to include and use local foods. Yet, at this time, only half of those (50 percent) believed that they were unable to meet that current demand. Little formal and strategic effort has addressed developing Farm-to-Institution markets in the state or beyond to reaching neighboring metropolitan areas including New York City and Boston.

The belief that institutional sales offer expansion opportunities for Connecticut farm sales bore out in producer surveys. Seventy-six percent of fruit and vegetable producers reported that Farm-to-Institution sales offered significant growth opportunities for Connecticut growers. As one producer explained,

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[11] Peters, Hansen, Clingerman, Hereford, and Askins (2012). West Virginia Food System: Opportunities and constraints in local food supply chains.

[12] United States Department of Agriculture, Agricultural Marketing Service (2012). Regional Food Hub Resource Guide: Food Hub Impacts on Regional Food Systems and the Resources Available to Support their Growth and Development

[13] http://courantblogs.com/capitol-watch/a-mixed-bag-of-new-connecticut-farm-statistics/

Processing is a huge opportunity to increase sales to institutions. Canning, freezing, dehydrating all represent growth opportunities, especially if a farmer could do that on their own without adding a middle man or extra cost. Other low cost opportunities may also be considered as options.

Lesson 3: Farm and Sector Size Remain a Concern for Meeting Demand and Growing Production Capacity

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[14] http://courantblogs.com/capitol-watch/a-mixed-bag-of-new-connecticut-farm-statistics/

Interview responses detailed the importance of business education and training opportunities as a critically important piece of the puzzle to help producers create successful new business ventures, to accommodate new product development, and to provide requisite sales. Similarly, addressing demands of wholesale and how they differ from retail sales, was mentioned as a needed area of support for producers.

As one producer commented,

> *Many farmers do not have a wholesale mindset. They may be expecting retail prices in wholesale markets. Farmers need to come to understand there are growth limitations to retail and have to want to, and be able to, grow bigger.*

Older generations of farmers may be unable to or uninterested in adapting to new business models or expanding retail sales to include wholesale, even when it could improve competitiveness and profitability. At the same time, significant entry barriers and costs to new farmers may be perceived as daunting and impossible. Business training and education are clearly an important aspect to increased market share in established markets as well as breaking into old markets.

Beyond the call for business education and training, producer surveys indicated that the largest perceived benefit from Farm-to-Institution sales was the marketing and promotional component that came from the customer exposure that institutional sales brought to their farm. Institutional sales were seen as an aspect of brand promotion for individual farms. Very much in line with these findings, producers indicated that the most desired and critical assistance that could be provided to them through the Connecticut DoAg and other support organizations was to provide more promotional, branding, and marketing help.

Lesson 4: Benefits of Farm-to-Institution Sales

Surveys asked about perceived benefits from farm-t0-institution sales as a way to better understand the motivations of producers and institutions to engage in such sales. A full ranking of the benefits of selling to institutions are provided in the table below.

Rate of Producer Response to Benefits of Institutional Sales

Benefits of selling to institutions	Response Percent
Opportunities to merchandize/brand/promote our farm	48.3%
Single point or relationship to maintain/cultivate	41.4%
Higher sales volume	41.4%
Consistent sales volume/Products are continually purchased	37.9%
Reduced or simplified delivery/fulfillment	31.0%
Price advantage	17.2%
Simplified billing/payment/bookkeeping	13.8%
Other (please specify)	24.1%

In order to dig underneath the perceived benefits, surveys also asked: What could an institution do to persuade producers to sell to them? Interestingly, while increased prices ranked high, flexibility requirements for seasonal demand ranked the highest in terms of paving the way for more farm-to-institutional sales. Still, in open-ended comments, producers pointed to concern about whether there was enough production capacity to meet institutional consumer demand. Capacity questions were raised throughout the surveys indicating concern about whether product volume could actually meet demand. Suggestions for flexibility in purchasing were indicated as one way to help alleviate this strain. As one producer commented, “Flexibility in purchasing against the limits of farmers' availability will be key. We are long in something this week and short in it the next.”

Rate of Producer Response to Factors that Would Increase Institutional Sales

What could an institution do to persuade you to sell to them?	Response Percent
Seasonal demand (instead of year round demand)	46.0%
Higher prices	41.0%
Flexibility in volume/diversity of product required	41.0%
Simplified paper work	30.0%
Flexibility in packaging requirements	30.0%
Simplified contract and bidding processing	26.0%
Flexible delivery schedule	25.0%
Other (please specify)	25.0%

Similarly, institutions answering questions about the factors that influence Connecticut Grown products indicated that price, quantity, and consistency all need to be addressed to smooth the way for better and more Farm-to-Institution sales.

Rate of Institution Response to Factors Influencing Purchasing

What are the most important factors that influence whether you buy Connecticut Grown products?	Response Percent
Product quality	72.5%
Price	67.5%
Supporting the economics of Connecticut farms and businesses	62.5%
Consistency of product supply	60.0%
Consistency of product delivery	47.5%
Access to fresher higher quality foods	42.5%
Interest from students/parents/community	32.5%
Internal purchasing policies	25.0%
Relationship with local farmer	27.5%
Packaging and processing requirements	17.5%
Payment terms	10.0%
Other (please specify)	22.5%

These data suggest that tackling the important question about how Connecticut producers can address institutional demand will require a multi-tiered approach that addresses volume, flexibility, and product quality while also keeping a keen eye on pricing. Findings also suggest that some readiness assessment and development for producers may help to prime them to meet the requirements and needs of institutional sales.

Lesson 5: Potential Growth Areas Aligned Between Producers, Processors, and Institutions

More research is needed to indicate specifically what demand exists, to determine where market expansion can occur, and whether the potential return on investment warrants the level of investment necessary to create a robust processing infrastructure.

Lesson 6: Food Safety Certification Remains a Challenge

Food safety certifications pose a significant challenge for Farm-to-Institution sales and require mention. Only 25 percent of producers reported having food safety requirements and there was little overlap or standardization in the certifications that they reported. Good Agricultural Practices (GAP) and ServSafe were the most highly indicated food safety certifications in use by Connecticut farms at eight percent each. Other noted food safety certifications include: Certified food handler, Class 2 Food Facility License, DCP low acid processing, Farmington Valley Health District safety certification, certified organic, and Hazard Analysis and Critical Control Points (HACCP).

A comprehensive approach will balance requirements that help mitigate risks of food borne illness and inappropriate food handling while allowing flexible standards and low enough entries that small and mid-sized farms can also comply to set standards. There are likely no easy answers and it is beyond the scope of this research to find them.

However, as part of the processing capacity inventory section of this study, we did examine how many producers had food safety certifications and what kinds of certifications that they had in place (appendix I). This important issue and recommendations will be covered in more detail in the upcoming GCAD 2014 report.

Lesson 7: Buyer and Seller Obstacles Point to a Coordinated Approach
Producers and buyers prioritized several different concerns and challenges when it came to buying, selling, and growing the Farm-to-Institutional market. The table below shows challenges indicated and ranked by producer and institutional respondents. The two shared challenges that surface at the top of both lists include volume as well as difficulty in initiating relationships.

Obstacles to aggregation and distribution ranked as higher problems than accessing processing. The breadth and variability of the ranking by producer and institution suggests that, instead of a single area to be tackled, a comprehensive and coordinated approach to building the agricultural sector as a response to current and growing institutional need is required.

Lesson 8: Challenges of Seasonality
The short Connecticut growing season is a concern that is worth mentioning at length because it considerably affects volume and variety noted as challenges above. As one producer noted:

> *Aside from a very few products, like apples, pears, and squash, Connecticut's limited growing season is not in alignment between production schedules and purchasing schedules for many institutions, such as schools.*

Seasonality is of particular concern for Farm-to-Institution because K-12 schools, the institutional entity that has perhaps gotten the most attention of any institutional buyers, begin buying in the late summer and fall, just as Connecticut's productive season for most crops is ending. Most of the institutional respondents in this study, 43 percent, represented K-12 schools. So, it is worth mentioning that other institutions—hospitals, elder care, government agencies, and business cafeterias—buy year round but still report problems buying locally grown food. This could be in part because there have not been similar movements in other institutional areas to the extent that we have seen Farm-to-Institution. It also suggests that a coordinated value-chain approach may be most effective. Entry into other institutional markets with less seasonal constraints and more alignment with the Connecticut farm season may be a boon for processing Connecticut Grown foods for institutional needs and for season extension, especially if the product can be processed affordably. A comprehensive plan will need to address volume and seasonality in building processing sector for agriculture.

Lesson 9: Need a Competitive Definition and Product Line of Locally Grown
Another inhibitor mentioned in a number of the expert interviews included the need for a competitive definition of "local." Interviews suggested that Connecticut producers are at a disadvantage because distributors like FreshPoint use a regional definition of local and do not make it clear whether customers are getting Connecticut Grown or a product

in from a nearby state, putting Connecticut farmers at a clear competitive disadvantage and adding to consumer confusion and difficulty knowing what exactly “local” means. Inquiry is needed to determine the scope of definition for local products will provide the most competitive advantage for local producer.

Lesson 10: Need to Build Trust Between Producers and Institutions
Comments emerged from institutions and producers that building trusting relationships between institutions and buyers will be important to successful sector expansion. Producer experiences, such as canceled orders as well as delayed, and unreceived product payment, left a clear gap in developing positive relationships with institutional customers. Similarly an institution noted that it was difficult to find producers that trusted working with institutional buyers. Building relationships is a key aspect in making sure that there is communication to connect producers needs with institutional needs, to confirm alignment of scale, products, and quality, and to address concerns and hurdles on demand and supply. Smaller producers also face ancillary obstacles, such as marketing and developing network relationships[15]. Noted one producer,

> *My seasonal delivery was replaced by a wholesaler that could deliver year round fruits from outside [Connecticut].” Gatherings workshops, and convening that aim to build trusting relationships and determine common goals across the sector will help to establish more productive working relationships between Connecticut producers and institutional buyers. This step, while oftentimes overlooked, could be very beneficial to increasing growing and purchasing opportunities for Connecticut producers.*

Additional Information
There is no additional information.

[15] Regional Food Hub Resource Guide: Food Hub Impacts on Regional Food Systems and the Resources Available to Support their Growth and Development (2012).

Increasing the Competitiveness of the Connecticut Nursery Industry by Management of a New Introduced Pathogen of Boxwood

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Project Summary

Boxwood blight is a new, introduced disease in Connecticut. The impact of the disease has been staggering; boxwood plant losses have been estimated at $3 million in Connecticut since October 2011. In addition, the concern about boxwood has resulted in reduced or lost orders for other plants, resulting in a multiplier effect on economic losses. The research conducted under this proposal was done to determine the concentrations of selected fungicides required to achieve 50% or 85% suppression (EC_{50} and EC_{85}) for at least 20 different fungicides *in vitro.* Efficacious fungicides were then applied alone or in combination to boxwood plants in pots in the greenhouse and at the CAES Valley Laboratory container nursery area. Results were used to develop fungicide management programs with different and complementary combinations of active ingredients to inhibit spore germination and also affect growth of the pathogen in plants while following FRAC recommendations to reduce the development of fungicide resistance. Our research also identified other host plants in the *Buxaceae* family, with an understanding of how they may act as a source of the pathogen, and how best to break the cycle of disease.

Boxwood is an extremely important ornamental plant in Connecticut and elsewhere. The current U.S. wholesale market value for boxwood nursery production is estimated at $103 million annually. Connecticut nurseries produce a large number of boxwoods and need to be a stable wholesale and retail source of healthy plants to continue to produce annual total green industry sales in Connecticut that exceed $1 billion. Boxwood blight is a new, introduced disease in commercial Connecticut production nurseries, garden centers, and wholesale distributers. The impact of the disease has been staggering; boxwood plant losses have been estimated at more than $5 million in Connecticut since October 2011. In addition, the concern about boxwood has resulted in reduced or lost orders for other plants, resulting in a multiplier effect on economic losses.

Boxwood blight, caused by the pathogenic fungus *Cylindrocladium pseudonaviculatum,* was first described in the United Kingdom during the 1990s and is now considered endemic throughout Europe. In the U.S., boxwood blight rapidly emerged as a destructive pathogen of boxwood in Connecticut and North Carolina during the end of 2011, quickly spreading across both major boxwood nursery production regions over a period of less than four months. The rapid spread of boxwood blight caught the nursery and landscape sectors of U.S. agriculture unprepared to effectively manage the disease.

At the time of the project initiation, little was known about the factors that influence the incidence and severity of the disease. Many of the current management recommendations were developed based on what little was published on boxwood

blight research performed in Europe. However, it was unknown if the factors influencing boxwood blight disease in the U.S. have much in common with those experienced outside North America. Effective chemical control methods had not been described. In fact, fungicide treatments were thought to perhaps promote spread of the disease, as fungicide tests performed in Europe were shown to suppress disease symptoms, rather than providing complete eradication of the pathogen, perhaps leading to spread of infected asymptomatic plants. In the absence of suitable management tools, boxwood growers were forced to destroy all diseased plant materials and plant litter, adding further expenses to the losses due to plant disease.

A part of this proposal was successfully submitted as a part of a multistate Farm Bill suggestion. Strong Industry support was evidenced by financial support by the Connecticut Nurserymen's Foundation and the Connecticut Nursery and Landscape Association to partially offset costs of our preliminary research. The success of this research has helped obtain subsequent research support for continued work on additional research topics.

Project Approach

Goal 1. Conduct research to develop effective disease management strategies for control of boxwood blight

Fungicides representing twenty different active ingredients from 13 different FRAC groups were evaluated for their effects on conidial germination and mycelial growth using *in vitro* assays and EC_{85} values were determined. A number of fungicides strongly inhibited mycelial growth of *C. pseudonaviculata*. Four demethylation inhibitor fungicides had EC_{85} values of 1.2 µg ai/ml or less. Thiophanate-methyl, fludioxonil, pyraclostrobin, trifloxystrobin, kresoxim-methyl, mancozeb and chlorothalonil also had activity against mycelial growth. Fludioxonil plus cyprodinil had a lower EC_{85} than the same rate of fludioxonil alone, suggesting that cyprodinil had activity against mycelial growth. Fungicides that inhibited *C. pseudonaviculata* conidial germination include pyraclostrobin, trifloxystrobin and kresoxim-methyl as well as fludioxonil, mancozeb, chlorothalonil and boscalid. Quinoxyfen, etridiazole, fenhexamid, hymexazol, famoxadone and cymoxanil did not inhibit either *C. pseudonaviculata* conidial germination or mycelial growth. In comparison to values found in the literature, EC_{50} values for kresoxim-methyl were up to 10 times higher than reported previously, suggesting that fungicide insensitivity may have developed. Protectant fungicides with activity against conidial germination and systemic fungicides with activity against mycelial growth, such as those identified here, may be complementary to achieve the high levels of pathogen management required for control of this disease. In addition, multiple fungicide active ingredients from different mode of action groups used in mixtures or over time may also act to slow selection for fungicide insensitivity. A manuscript detailing this research was published in PLANT DISEASE (see publication list below).

Greenhouse and nursery experiments, boxwood:

Calonectria pseudonaviculata causes leaf and stem lesions resulting in defoliation and dieback of boxwood. Trials were conducted to evaluate fungicide management of

boxwood blight under greenhouse and container nursery conditions in Connecticut using fungicides previously determined to have *in vitro* activity against conidial germination or mycelial growth. Plants of different boxwood cultivars were inoculated 48 hours after fungicide application. Disease progression was monitored over six weeks and progressed from leaf and stem lesions to defoliation. The level of disease control achieved by fungicides was generally good, with the most efficacious treatments averaging from 95% to nearly 100% control. Products containing propiconazole, myclobutanil, thiophanate-methyl, fludioxonil, pyraclostrobin, kresoxim-methyl, and chlorothalonil had significant efficacy. The combination of systemic plus protectant fungicides in a single application resulted in superior disease control compared to the use of a systemic fungicide. There were no differences between the fungicide treatments that included thiophanate-methyl and those that included propiconazole as the systemic fungicide. Korean and 'Winter Gem' (*B. sinica* var. *insularis*) were the least susceptible of the cultivars evaluated, Common Boxwood (*B. sempervirens*) and True Dwarf (*B. sempervirens* 'Suffruticosa') were the most susceptible, and 'Green Mountain' (*B. sinica* var *insularis* X *B. sempervirens* Suffruticosa) and 'Green Velvet' (*B. sinica* var *insularis* X *B. sempervirens* Suffruticosa' were intermediate. These results suggest that *B. sinica* var. *insularis* may have some level of resistance to boxwood blight. Management of boxwood blight will rely on integrated best management practices that include inspection of incoming plant material, sanitation, cultural controls including use of cultivars tolerant to infection, and fungicide application. A manuscript detailing this research has been published in PLANT DISEASE (see publication list below).

Additional experiments were conducted using a series of protectant fungicides (chlorothalonil, mancozeb and pyraclostrobin) alone or in combination with the systemic fungicides thiophanate methyl, propiconazole or cyprodinil. Fungicide applications were made at either 2 or 3-week intervals. Three boxwood cultivars (Green Gem, Green Velvet and Tide Hill) were used (1-gal pots) and all plants were inoculated with the pathogen after the first spray. After 8 weeks, lesions and dropped leaves were counted. Disease was significantly reduced by fungicide application and sprays at 2-week intervals were more efficacious than at 3-week intervals. The experiment was conducted twice and data were combined and presented below as control of disease as a percentage of untreated. There were significant differences in the susceptibility of the cultivars evaluated. The relative susceptibility of the six and three different cultivars used in these experiments ranked from high to low susceptibility in repeated replicated experiments is: True Dwarf > Common > Green Velvet > Winter Green > Green Mountain > Korean. In additional experiments, Green Gem was more susceptible to disease than Green Velvet, and Tide Hill was the least susceptible. These results indicate that *B. sempervirens* (especially 'Suffruticosa') appear to be the most susceptible and that *B. sinica* var. *insularis* may carry some level of resistance or tolerance to boxwood blight. A wider range of cultivars within these boxwood species should be evaluated to test this hypothesis.

Control with Fungicides (as a percent of untreated)	Lesions	Dropped leaves
Protectant Fungicides alone – 2 week intervals	98	93
Protectant plus systemic – 2 week intervals	99	94

Protectant Fungicides alone – 3 week intervals	78		61	
Protectant plus systemic – 3 week intervals		87		82

Goal 2. Identify other host plants in the Buxaceae family, understand how they may act as a source of the pathogen, and determine how to break the cycle.
Experiments were conducted to evaluate the ability of the pathogen to colonize or infect (symptomatically or asymptomatically) other temperate members of the Buxaceae. Pathogenicity testing (Koch's postulates) was utilized to demonstrate that *C. pseudonaviculatum* can cause a leaf spot disease and leaf drop on *Pachysandra terminalis* (Japanese spurge), *P. procumbens* (Alleghany spurge), and *P. axillaris*. This research was published in peer reviewed journals as listed in publications. The ability of fungicides to control the disease in these plants was also determined.

Evaluate fungicides against disease in Pachysandra:
We conducted experiments with five varieties of *Pachysandra terminalis* (common, crinkled, green carpet, green sheen and variegated) and *P. axillaris* (Windcliff) with and without fungicide application (Thiophanate methyl plus chlorothalonil) to determine differences in varietal and species susceptibility and the ability of fungicides to manage boxwood blight in *Pachysandra*. There were significant differences in susceptibility with *P. terminalis* 'common' most susceptible and other varieties less susceptible. *P. axillaris* became infected, but had the least disease. Fungicide application effectively reduced disease by about 85% in all varieties.

Goal 3. Work with and educate nurserymen about control of boxwood blight under nursery production conditions:
Dr. LaMondia has provided data and information concerning disease in Pachysandra species and management for inclusion in Best Management Practices and educational materials at the CAES Boxwood Blight website:
http://www.ct.gov/caes/cwp/view.asp?a=3756&q=500388&caesNav=|

The results from *in vitro* and *in planta* fungicide testing were used to develop fungicide management programs with different and complementary combinations of active ingredients to inhibit spore germination and also affect growth of the pathogen in plants while following FRAC recommendations to reduce the development of fungicide resistance. This proposed spray regime has been presented to nurserymen and research has been conducted in a cooperating commercial Connecticut nursery. No active disease was observed in this nursery in 2013. An experiment was conducted in 2013 to demonstrate that our best management approach for fungicides did not have phytotoxicity under commercial nursery conditions. Three sprays consisting of 1) Spectro 90, 2) Palladium plus Dithane, and 3) Procon Z plus Cygnus were applied on 25 June, 10 July, and 24 July, 2013 respectively to 12 plants each of Green Beauty, Green Mountain and Winter Gem. No phytotoxicity or disease was observed on any plant throughout the experiment (Figure 1).

Figure 1. Fungicide spray trial conducted at Imperial Nurseries, 2013.

Educational meetings and outreach for nursery and landscape professionals:

- spoke about research on management of boxwood blight with fungicides on the Pesticide Re-Certification Credit Tour on Plant Science Day (Aug 5 2015 – 50 people)
- spoke about boxwood blight biology and management to attendees of the Central Plant Board Meeting held in Lincoln NE (April 15, 2015)
- met with Wisconsin horticulturalist Michael Yanny to talk about boxwood blight research and boxwood breeding (March 4, 2015)
- LaMondia, J. A. Spoke about diagnosis and control of boxwood blight and diseases of nursery crops at Summer Hill Nursery (February 10, 2014).
- LaMondia, J. A. spoke about boxwood blight during the CNLA summer meeting at Van Wilgen's Garden Center in North Branford, CT (July 16, 2014, 75 people).
- submitted posters on 'Management of boxwood blight caused by *Calonectria pseudonaviculata*' and '*Calonectria pseudonaviculata* can cause leaf spot and stem blight of *Pachysandra terminalis* and *P. procumbens*' to the International Plant Propagators Society Eastern Region meeting in Niagara Falls, Ontario Canada (September 2014 17-20).
- spoke about boxwood blight fungicide management to plant inspectors at the SANC (Systems Approach to Nursery Certification) meeting held in Windsor (September 30, 2014 28 people).
- spoke about research on management of boxwood blight with fungicides on the Pesticide Re-Certification Credit Tour on Plant Science Day (Aug 6 2014 – 55 people).
- attended the annual meeting of the American Phytopathological Society in Minneapolis MN to present an invited paper 'Kryptonite for boxwood blight:

Management with fungicides and sanitizers' as part of a symposium "Boxwood Blight: Confronting an emerging disease through collaborative connection' (August 9 – 14, 2014).

- provided boxwood blight management information to Bartlett Tree Research Laboratories for a presentation to the North Carolina green industry at the NC arboretum (August 21, 2014).
- spoke about Boxwood blight research and management options during the Nursery and Landscape Research Tour held at the Valley Laboratory (September 10, 2013, 40 attendees)
- spoke to nursery staff about progress and updates concerning boxwood blight management at Prides Corner Farms in Lebanon (May 10, 2013 10 people) and Imperial Nurseries in Granby (May 14, 2013 3 people)
- participated in a Boxwood Blight Update Webinar conducted by the ANLA to speak about host range and management of the boxwood blight pathogen (February 25, 2013 216 participants)

Publications:

- LaMondia, J. A. 2015. Management of *Calonectria pseudonaviculata* in boxwood with fungicides and less susceptible host species and varieties. Plant Disease 99:363-369.
- LaMondia, J. A. 2015. Management of Boxwood Blight Caused by *Calonetria pseudonaviculata.* Proceedings of the International Plant Propagator's Society 64:203.
- LaMondia, J. A. and S. M. Douglas. 2015. *Calonectria pseudonaviculata* Can Cause Leaf Spot and Stem Blight of *Pachysandra terminalis* and *P. procumbens.* Proceedings of the International Plant Propagator's Society 64:205-206.
- LaMondia, J. A. 2014. Fungicide efficacy against *Calonectria pseudonaviculata*, causal agent of boxwood blight. Plant Disease 98 (1):99-102.
- Ganci, M., D. M. Benson, J. A. LaMondia and K. L. Ivors. 2014. The show must go on: Boxwood and beyond. http://www.apsnet.org/meetings/Documents/2014_meeting_abstracts/aps2014abS106.htm
- Douglas, S. M., D. M. Benson, J. A. Crouch, N. Dart, M. Daughtrey, C. Hong, K. Ivors, J. A. LaMondia, R. E. Marra, C. L. Palmer and N. Shishkoff. 2014. Boxwood blight and the dawn of a research collaboration. http://www.apsnet.org/meetings/Documents/2014_meeting_abstracts/aps2014abS102.htm
- LaMondia, J. A., S. M. Douglas, K. Ivors, and N. Shiskoff. 2014. Kryptonite for boxwood blight: management with fungicides and sanitizers. http://www.apsnet.org/meetings/Documents/2014_meeting_abstracts/aps2014abS103.htm
- LaMondia, J. A., D. W. Li. 2013. *Calonectria pseudonaviculata* can cause leaf spot and stem blight of *Pachysandra procumbens* . Plant Health Progress http://www.plantmanagementnetwork.org/sub/php/brief/2013/allegheny
- LaMondia, J. A., D. W. Li, R. E. Marra, and S. M. Douglas. 2012. First report of *Cylindrocladium pseudonaviculatum* causing leaf spot of *Pachysandra terminalis*. Plant Disease 96: 1069.

Presentation of results at a scientific meeting:
Dr. LaMondia attended the annual national meeting of the American Phytopathological Society in Minneapolis MN to present an invited paper titled 'Kryptonite for boxwood blight: Management with fungicides and sanitizers' as part of the symposium "Boxwood Blight: Confronting an emerging disease through collaborative connection" (August 13, 2014).

Goals and Outcomes Achieved

Goal: (1)	**Conduct research to develop effective disease management strategies for control of boxwood blight.**
Performance Measure:	Determine the concentrations required to achieve 50% or 85% suppression (EC_{50} and EC_{85}) for at least 20 different fungicides; this will allow us to identify at least 3 effective fungicide management strategies. **This goal was completed and results were published in a refereed scientific journal – PLANT DISEASE**
Baseline:	No effective disease management program has been described.
Target:	Identify 3 effective disease management strategies. **This was achieved. Multiple efficacious fungicides were identified and management strategies utilizing combination treatments of multiple active ingredients targeting spore germination and/or growth in leaves were presented to growers and landscapers.**
Goal: (2)	**Identify other host plants in the *Buxaceae* family, understand how they may act as a source of the pathogen, and determine how to break the cycle.**
Performance Measure:	Results of pathogenicity testing of Pachysandra species.
Baseline:	No data currently exists
Target:	Identify 2 new species of host plants as a possible source of the pathogen. **Three new species *Pachysandra terminalis*, *P. procumbens* and *P. axillaris* (new to the trade) were identified as hosts of the boxwood blight pathogen and the role of these species as potential sources of infection in the landscape was explained to growers and landscapers.**
Goal: (3)	**Work with nurserymen to control boxwood blight under nursery production conditions.**
Performance Measure:	The number of nurseries who implement management programs.
Baseline:	No effective disease management program has been described

Target:	Work with at least two commercial nurseries to implement management programs, and present at least two talks to industry groups. **We worked with Imperial Nurseries, Prides Corner Nursery and Summer Hill Nursery to demonstrate management of the disease and educate staff about the disease and how to manage it using integrated sanitation and fungicide tactics**.

Beneficiaries

This project's accomplishments have benefitted wholesale and retail nurseries, landscape managers and homeowners. The impact of an efficacious management system has been very large and in combination with sanitation and best management systems has resulted in recovery of the boxwood market. Previously, nurserymen were very concerned that customers who cannot fill orders containing boxwood place entire orders with different sources, rather than just the boxwood plants, resulting in much larger economic losses than just due to boxwood blight and loss of boxwood sales alone. The economic impacts of effective disease management therefore go well beyond simply avoiding the more than $5 million losses experienced in Connecticut since October 2011, and have helped restore confidence in Connecticut nurseries as consistent sources of healthy boxwood plants.

Lessons Learned

The success of this project has demonstrated the utility of truly collaborative research and extension between multiple researchers and extension personnel in multiple states as well as the importance of support from and collaboration with industry.

Additional Information

Additional information and resources concerning boxwood blight, management and best management practices can be found on the CAES website at:
http://www.ct.gov/caes/cwp/view.asp?a=3756&q=500388&caesNav=|

Honey Extractor Rental Program

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Project Summary

Most Americans are aware that the honeybee is in a critical state right now. Without adequate numbers of honeybees, our food crops will not be fully pollinated, reducing the quality and volume of locally-grown produce. Given the impact this has on both large-scale and small-scale farming operations, the cost of purchasing local produce and ultimately the whole economy of American-produced foodstuffs, there is a strong, clear need for more people to become beekeepers. However, the expense of starting a few honeybee hives has skyrocketed in recent years and the additional cost of honey extracting equipment, which is usually used only once per year, can discourage interested people from even starting this vital venture.

The goal of this grant was to purchase extracting equipment that could be rented to members of the Connecticut Beekeepers Association for a nominal fee. This program could eliminate one of the major start-up costs that a new beekeeper would encounter.

The intent of this program was to

- Encourage more individuals to become beekeepers
- Result in more honeybee hives in Connecticut
- Improve pollination of Connecticut's specialty food crops
- Produce more high quality local honey

Project Approach

1) As soon as grant funds were available in the spring of 2013, 4 manual extractors, a type recommended by the Maxant manufacturer, were purchased. Additional extracting equipment-pails, filters, knives, uncapping tank, etc. were purchased so that a new beekeeper would have everything he/she needed to extract their first honey. Refractometers were also purchased to insure that new beekeepers would learn to extract honey with the proper moisture content. Some additional knives, pails, and filters were purchased in the spring of year 2 and year 3. Bookkeeping supplies were also prepared.

2) A 5' X 10'storage unit was rented near the administrator's home in Windsor Locks, Connecticut, and all equipment was housed there. Beekeepers picked up and returned the rental equipment from this site for the entire three years.

3) The rental program, which would cost the individuals a mere $25, was announced at the Bee School in January 2013, but the equipment had not yet arrived to visually showcase to the prospective new beekeepers. In year two, the equipment was on display at the annual CBA Bee School and former CBA President, Ted Jones, used the equipment in year three to demonstrate how to

harvest and extract honey. This was a major boost in advertising the program. Prospective beekeepers perused the equipment after the session and asked many questions.

Ted Jones, using extractor equipment to demonstrate proper procedures at February 2015 CBA Bee School.

Beekeeper Sarael Sargent picking up extractor equipment at the storage facility appeared in the newsletter.

4) The administrator's job was to
   - arrange for beekeepers to meet at the storage unit
   - fill out paperwork detailing exactly what equipment they were taking home and were responsible for returning,
   - Obtain a signed liability release,
   - Give out instructions on proper usage, cleaning, and disinfecting,
   - Collect rental fees and forward to CBA Treasurer,
   - Record data from Post Rental Surveys,

- Give talks about the program at all CBA meetings.

During the last two weeks of September 2015 we had our very first waiting list for extractor rentals. We encouraged beekeepers to return them as soon as they were done so others could use them. No one waited more than one week to get equipment.

Goals and Outcomes Achieved

Goal #1 certainly encouraged new beekeepers to continue this hobby as noted on their Post Rental Surveys. The excitement they experienced with extracting their first honey (sometimes only 10 pounds) using the CBA equipment was infectious. Every single user of the equipment intended to continue beekeeping and renting an extractor in the following year! However, quantifying the number of actual retained beekeepers via their membership renewals was not possible as many beekeepers were sporadic in staying as paying members.

Goal #2-Before preparing the grant proposal, we took a survey of all beekeepers present at the April, 2012 meeting and the members were 100% in favor of pursuing this extractor rental program and most new beekeepers expressed a desire to use the equipment. We made an estimate that for Goal #2 there would be 30 rentals the first year. We miscalculated for several reasons. The harsh winter weather was a problem for beekeepers that year, and consequently, the honey harvest for first year beekeepers was nonexistent. Most second and third year beekeepers did not need to rent equipment since they had purchased their own extracting equipment in a previous year.

During the second and third years of the program more and more new beekeepers took advantage of the cost-saving rental equipment. As can be seen in the table below, we more than met our goal of 25% increased usage, both in number of rentals and amount of honey extracted. All renters expressed their plan to continually use the rental service each year because of the large financial savings over buying their own extracting equipment-one of the important goals of the project.

HONEY EXTRACTOR RENTAL DATA

Year	Rentals	% Increase	Honey (lbs)	% Increase	Income
1	15		1065		$375
2	20	44%	1544	45%	500
3	30	50%	2162	40%	750
4	*10*		*455*		*250*

The steady increase over the three years, as shown in the Data table above, also testifies to the effectiveness and popularity of the rental service. 100% of the Post Rental surveys were positive about the cost-saving rental program. For example, comments ranged from a simple “Easy to rent. Good system” to glowing accolades such as “Extractor was easy to use. All of the tools were well-maintained. Sharon and

George were extremely helpful. Thank you for having the extractor program, it makes beekeeping easier."

Goal #3- Although the grant program officially ended on September 30th, 2015, we continued without any changes. Year 4 is off to an excellent start as noted in green on the previous data table.

The program net an income of $1625 to offset any large repairs needed in the future, purchase a small storage shed, or even provide scholarship money to an interested young person. It was not as large as predicted but enough to accomplish the desired options. It is definitely a self-sustaining program now and has the basic format to continue for many decades.

The obvious outcome of "making beekeeping easier", to quote Monti and Sammi Jo Adams of Woodbridge, Connecticut, is to have many more beekeepers and beehives in the state. Pollination of the state's agricultural crops will improve and more healthful local honey will be produced. Unforeseen advantages of the program were the opportunity to discuss with the renting beekeepers the serious issue of mite levels in their hives, registering with the state entomologist, and a way to encourage attendance at CBA meetings and Massaro Farm beekeeping workshops. The funds obtained from the $25 rental fees provide a nest egg for insuring the sustainability of this program.

Beneficiaries

The small investment in funds from this grant provided the CBA with an invaluable program that we could not have offered otherwise. Many people were positively impacted by this program and the ability of this service to continue ad infinitum will reap increasing benefits throughout the state.

Lessons Learned

The problems that were encountered during the grant were small and easily remedied. Plywood bases were added to the extractor set-ups to provide more stability. A small kit with socket wrench and extra bolts and wing nuts was purchased for on-site repairs. The administrator's husband took on these repair jobs as well as often meeting renters at the storage facility. Cold uncapping knives were added to the tool kits for those who preferred them over the hot knives. The initial plan to disinfect equipment with a chlorine bleach solution was changed in the second year to the use of *Star-San Sanitizer*, better suited for stainless steel. Two digital refractometers were purchased because of their superior performance in extreme temperatures.

Additional Information

Information about the extractor rentals can be found on the www.ctbees.com webpage. An expanded advertisement in the newsletter and website, complete with pictures, was introduced in year 2 and improved in year 3.

Connecticut's On-farm Packing Houses: GAP/GHP Needs Assessment, Resources, and Training

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Project Summary

To remain competitive, produce farmers will need to address the (food) safety of their products with both Good Agricultural Practices and compliance with Food Safety Modernization Act Produce Safety Final Rule (released November 2015). This includes implementing safe food handling practices in the packing facility or packing house.

The US Food and Drug Administration (FDA) has reported that many of the factors contributing to the foodborne illness outbreak in Colorado cantaloupe in the summer of 2011 were related to the packing house facilities. Listeria monocytogenes was the pathogen causing illness and these factors likely contributed to the spread and growth (and, possibly the introduction) of this pathogen (http://www.fda.gov/Food/FoodSafety/CORENetwork/ucm272372.htm). More recently, a January 2015 listeria outbreak traced to apples from a California apple-packing facility. These outbreaks highlight the importance for farms to employ good agricultural and management practices in their packing facilities as well as in growing fields. In order to focus more attention on the potential food safety risks in packing houses, farmers may need to both learn and adopt a whole new set of working principles that will include Good Manufacturing Practices, sanitation of food operations, and attention to the prevention of microbial contamination of produce in the packing house.

Project Approach

This project consisted of a series of steps aimed at increasing farmer awareness and implementation of packing facility sanitation and safe fresh produce handling procedures.

During **year one** we completed the packing house environmental microbiological testing phase of the project. Farms were recruited through email lists of three cooperators, the Connecticut Department of Agriculture, and a mailing list of approximately 750 farms. Ten farms were recruited. Eight farms signed on for the confidential testing program. Consent forms, identifying the protocol were presented to each farm and signed by the farmer. Visits were made to each farm, testing protocols were followed and 10-14 swabs were taken from various locations including drains, food contact surfaces, floors, walls, fans, etc. In **year two** of this project we were able to further enumerate some of the microbiological testing results to develop a more complete picture of the presence of potential pathogens and other indicators in the packinghouse environments we looked at.

Results indicated: of eight participating farms.

- No E. coli O157:H7 was found

- Salmonella spp.(not enumerated for pathogenic species) were found in one farm on 4 surfaces including 2 floor drains, a cooler floor and fork lift tire
- Fecal coliforms were ubiquitous—on almost every surface at every packing house, indicating the need for attention to sanitation by all
- Listeria spp. were present in all 8 packing houses: When enumerated, one pathogenic type, L. ivanovii, was found at all 8 farms. A variety of locations were involved, including sinks, drains, bins, conveyor rollers, cookers, floors, packaging, and counters.

Diane Hirsch, and Candace Bartholomew arranged collection dates with farms, Dr. Venkitanarayanan, working with his graduate students, conducted the testing and analysis of samples. The Department of Agriculture and Extension Educators helped in the recruitment process via email and traditional mailing and newsletters.

At the same time in **year two**, a picture survey was conducted. Pictures were obtained from 7 of the 8 fruit and vegetable farms) including apple/pear orchards and farms growing a variety of small fruits and vegetables) who agreed to the microbiological testing. Permission from an additional group of 3 farms allowed the addition of more pictures for the survey. These pictures have been used to create powerpoint presentations for the training phase of the project. They were invaluable in illustrating both recommended practices and areas that needed improvement in the management of a sanitary packing house environment. Diane Hirsch and Candace Bartholomew conducted the picture surveys.

In **year two**, an online survey was developed by Diane Hirsch and Candace Bartholomew (reviewed by collaborators prior to sending) conducted to obtain information regarding packing houses and practices. The survey was sent via email to 178 fruit and vegetable farmers. In addition, the Connecticut Department of Agriculture sent a reminder notice to its email list regarding the survey. Thirty three farmers (18.5%) responded.

Notable results:
The responders were diverse in size, experience, products, and customers. 65% sell directly at farm stands, 55% directly to restaurants, 55% at farmers markets, 39% directly to grocery stores, and 35% sell via a produce distributor.

Farm operations varied in size, experience. 47% had been farming for more than 25 years; 23% for only 2-3 years. 20% were farming more than 100 acres, while 62% were farming less than 20 acres; 77% had 10 or fewer employees, while 16% had more than 20.

Facilities are also quite varied. 77% had some type of permanent packing facility (10% had a roof, but no walls). 84% were constructed of wood; 42% had no floor drain; 23% had dirt floors; 45% had untreated concrete floors; 45% had unpainted wood walls. 77% sourced their water from a well and 6% had no potable water source at the packing house.

There was not a lot of evidence from responders that there was an understanding of the relationship of personal hygiene, illness, facility sanitation and safe food handling practices to production of a safe fruit or vegetable product. Only 20% had a written food safety plan (likely those who underwent GAP audits). Cleaning and sanitizing practices were inadequate, with 31% reporting never cleaning walls or ceilings; only 67% cleaning food contact surfaces daily; and many never sanitizing walls (48%), ceilings (59%), air vents (32%), produce bins, boxes (17%), floor drains (25%), product storage areas (21%), or food contact surfaces (7%).

Finally, employee training regarding personal health, hygiene, or safe food handling practices is lacking. Only 33% had a health/hygiene policy; only 35% train regarding health and hygiene; 67% train regarding safe handling: 20% conduct no such training. 26% responded that a barrier to training was that they know (and their employees know) what they need to know.Survey results were reviewed and taken into consideration as the training workshop was developed.

A total of three workshops were provided to Connecticut farmers in **years two and three**. The initial workshop was developed with input from the advisory group. Twenty four farmers attended the packing house workshop on March 13, 2014. This day long workshop included: a review of food safety hazards associated with packing house processes and products; review of results from the survey and micro study; describing your facility, developing a flow chart, and doing a food safety risk assessment; Good Manufacturing Practices (GMPs), Sanitation Standard Operating Procedures, Allergen Controls; Cleaning and sanitizing; Process and product controls, and developing a food safety/sanitation plan. A model food safety plan was developed as a tool for farmers. Evaluations completed the day of the program (22 responses from 24 participants) indicated that all 22 farmers learned something that they did not know before: 21 identified at least one new concept they learned with most identifying sanitation and cleaning processes as the most important to them. Twenty farmers were able to identify one or two food safety practices they plan to change as a result of information received at the program.

A second packing house workshop was provided as part of the 2015 Good Agricultural Practices (GAP) School. Twenty-eight farmers attended; 21 responded to the end of workshop evaluation. No responders indicated that they “did not hear anything they did not already know” when asked about 9 topics addressed in the workshop. 18 of 21 were able to identify at least one specific concept they learned as a result of participating and 18 shared one or two practices they planned to change.

A third workshop was offered when the opportunity presented itself to provide the program, Small Scale Low-Cost Facility Design for Post-Harvest with Robert Hadad from Cornell University. 20 registered for the program, but attendance was affected by weather at this late afternoon offering. Eight attended, six returned after-program surveys. All stated that the program helped them understand the issues of design and operation of a small-scale and low tech wash line packing facility to minimize food

safety risks and five indicated that they would change the operation of their wash/pack area based on what you learned today.

Candace Bartholomew, Diane Hirsch, and a collaborator from the Department of Agriculture, Mark Zotti developed and presented the workshops.

At the end of the project period, a survey was emailed to participants (mailed to one participant without an email address) in the two primary packing house workshops. 39 farmers received the survey. Twenty completed the survey. Significant findings included:

1. 85% are aware of how the implementation of sanitation and foods safety practices can reduce the risks of foodborne illness; 75% are aware of what they need to change in their facility; 30% still need more information to help them make these changes
2. As a result of attending the workshop, no one stated that they had not made any changes in their packing facility; 58% stated that they have adopted new sanitation practices; 47% stated that they adopted new produce washing procedures; 37% added a handwashing sink; 37% stated they have a plan to update or build a new facility; 21% wrote or amended a food safety plan; and 42% stated they purchased or plan to purchase more cleanable equipment.
3. Six to 12 months after attending the workshop, 84% have made some changes in sanitation procedures and/or food safety practices, while 47% are comfortable that they are using adequate sanitation and food safety practices.
4. When asked about barriers to implementation of sanitation and food safety practices, 68% identified financial resources to build or renovate; 47% identified financial resources for practice and procedure implementation; and 53% identified lack of sufficient time/personnel. Others cited technical expertise for writing SOPs (21%); technical expertise regarding sanitizer use (21%); and technical expertise regarding facility improvements (26%).
5. 47% of responders identified themselves as NOT likely to be exempted from the FSMA Produce Safety Rule.

Finally, in year three, with permission from our granting state agency, funds were used in combination with funds from Massachusetts and Vermont to develop 4 videos that will be placed on a website for use by regional small farmers. The four videos will address washing procedures for leafy greens; development of Standard Operating Procedures (SOPs); washing and sanitizing post-harvest equipment; and basic washing and sanitation procedures for the packing house.

Goals and Outcomes Achieved

Goal 1: To establish a baseline of information (including numbers, locations, facilities, condition, sanitation and safe food handling practices) about on-farm packing facilities in Connecticut.

Activity	Target	Actual	Discussion
Micro survey of packing facilities	10	8	The information gathered from these activities was meant to help characterize the on-farm packing facilities in Connecticut, including sanitation and food safety practices and procedures. • The micro survey confirmed that sanitation of on-farm packing house environments of the 8 participating farms need to be addressed by improving the awareness, knowledge base and skills of farmers relating to sanitation of these facilities. The eight farms that participated in both the micro and photo surveys ranged in size from Connecticut's smallest to largest; included both orchard facilities and multi-product facilities, enclosed permanent; enclosed temporary (canvas); and open packing facilities. Fecal coliforms were ubiquitous—on almost every surface at every packing house, indicating the need for attention to sanitation by all and there was the potential and/or actual presence of pathogens in several farms as well. • The photo survey confirmed via visual evidence, the need for implementation of a variety of sanitation/safe food handling procedures. • Finally, the survey indicated that packing facilities are for the most part constructed of materials that are not easily cleanable and that responding farms need to improve their sanitation and food safety related facilities, practices and procedures.
Packing facility email survey	178	33	
Photo survey	20	11	

Goal 2: To improve on-farm packing facility sanitation and safe food handling practices in Connecticut.

Activity	Target	Actual	Discussion
Workshops, post-harvest/packing house focus	50	52	A curriculum, handout materials and a model food safety plan for the on-farm packing house were developed and presented at two workshops. Post-workshop evaluations indicated both knowledge gained and planned behavior change. All 43 respondents indicated that they learned new information as a result of attending the program. A follow up survey emailed to all participants was answered by 20 farmers. Of that group, 21% (4) indicated that they wrote or amended a food safety plan for their facility. That was below our goal of having 40 farmers achieve this (even if the 21%

			was applied to the 52 attendees we would fall far short). However, 38 participants in the workshops indicated that they planned to make changes in their sanitation and safe handling procedures. Our goal was for 35 farmers to make these changes. The longer term follow up survey indicated that 84% (17) of respondents had made changes as outlined in the discussion above. We may have achieved close to our goal of 35 of those attending the workshops if we look at both planned changes and actual reports of approximately 38% of program participants.
Low cost facility design workshop*	0	8	All participants in this "pop up" workshop (not part of original proposal), Small Scale Low-Cost Facility Design for Post-Harvest, brought to Connecticut and held at a Connecticut orchard, stated that the program helped them understand the issues of design and operation of a small-scale and low tech wash line packing facility to minimize food safety risks and five indicated that they would change the operation of their wash/pack area based on what you learned today.
Series of four post-harvest practices videos**	5	4	A series of four videos is being completed by a collaboration with the University of Massachusetts and the University of Vermont. Final videos and fact sheets will be available on the University of Connecticut Food Safety Website in the section relating to Produce Safety.

*****Added when project related training opportunity was available
** Addition included in 2014 year-end report

Beneficiaries

- 52 farmers who attended the packing house workshop benefited by the increased knowledge in on-farm packing house sanitation and safe food handling that the program provided. They learned skills and practices that they can adopt that may decrease the risk that their product will cause a foodborne illness.
- Future farmers will benefit from project outputs including course materials.
- Distributors/retailers who require a third party audit (presently one large distributor and 4 retail supermarket chains with stores in Connecticut) benefit from having a pool of trained farmers who are providing a local product (increased consumer demand exists for local product) that is produced under a food safety plan, again, reducing consumer risk. Thirteen of the participating farmers have also successfully completed a USDA GAP third party audit in the last year.

- Consumers of products produced by farmers who have adopted packing house sanitation and safe handling practices will benefit from reduced risk for foodborne illness from locally grown produce.

Lessons Learned

In Connecticut, there are relatively few farmers who are required by vendors to participate in a third party audit. That is changing as for some vendors GAP has become the expectation instead of something to work towards. Presently, in Connecticut, we have 14 farms that have participated in a USDA/GAP/GHP or Harmonized audit. These numbers may help to explain why we did not meet our goal for the initial survey, micro survey and photo survey.

Though the numbers were small, we learned that a three part survey (online, micro, and photo) was especially helpful when describing results and developing the training program. While the online survey responses described both packing facilities and practices of responders, the micro testing and picture survey helped to inform our packing house descriptions with results that illustrated problem areas and confirmed our belief that Connecticut produce farmers need to address both food safety practices and sanitation in these facilities. In addition, the size of the facility was irrelevant. Problems were evident in the very smallest and the largest operations.

We learned that perhaps in some ways, farmers believe that they can make effective changes in food safety risk in a packing house environment versus a field environment. Focusing on the packing house brought some farmers to our program that had not been involved in our previous GAP training programs. In addition, we learned that farmers want to see:

- Visuals of both the bad and the good—what is it that they can improve on? The picture survey supplied us with many visuals that we could use in our training programs. Farmers can look at the visuals, compare them to their own facilities or practices, and talk about both what improvements they can complete and how they can accomplish them.
- Models, sample forms, templates that they can easily adapt for use in their food safety programs.
- Concrete examples of the practices they need to implement as well as resources to help them do that.

As the standards for safety of local produce have increased, farms have been the target of many grant programs, surveys, focus group requests, etc. Farmers are busy. If they are not required by regulation or customer demand to change practices or keep records, then the motivation has to come from a general understanding of the relationship of on-farm practices to the safety of the final product. As educators we must continue to determine ways to get farmers to be part of a food safety culture, to understand and invest in an on-farm food safety system.

Additional Information

University of Connecticut Food Safety web page

www.foodsafety.uconn.edu.

Online survey mentioned in the Project Approach section

https://www.surveymonkey.com/r/?sm=SAYUemGbdW2FxXeACq7Aeg%3d%3d

Food Safety Videos (funds used for first and second).

Cleaning Greens
http://bcove.me/om8o1152
SOPs
http://bcove.me/sroyut5b
Cleaning and sanitizing
http://bcove.me/l2q5yy8x
Cleaning equipment
http://bcove.me/m0adn7dr

Developing production systems for novel and adaptable native shrubs to profit the nursery industry

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Project Summary

The nursery industry is losing important ornamental crops due to emerging issues with invasiveness and plant bans. Native plants represent the best alternative to invasives and nursery producers can use new native plant crops to replace invasives they can no longer grow. Testing at the University of Connecticut, funded in 2010 by a USDA Specialty Crop Block Grant, identified 10 new native shrubs that appear to be adaptable and able to directly replace invasives in landscapes. This project developed commercially viable propagation and production methods that will enable nurseries to efficiently grow several new native shrub crops.

Project Approach

In spring/summer 2013 studies of vegetative propagation by stem cuttings were conducted for the following six native shrub species: *Ceanothus americanus, Corylus cornuta, Lonicera canadensis*, *Myrica gale*, *Prunus pumila* var. *depressa*, and *Viburnum acerifolium*. For several species replicated experiments were conducted looking at timing of cuttings, where cuttings were taken in June, July and August, and rooting hormone concentration [0, 1000, 3000, and 8000 ppm indole-3-butyric acid (IBA)]. This work found that and *C. cornuta*, *M. gale, P. pumila* var. *depressa* and *V. acerifolium* could be propagated at 80% success. *C. americanus* could be propagated at 60% and *L. canadensis* at 50%. Some growers have reported difficulty propagating *V. acerifolium*, however we found it to be easy to propagate (100% success) when two node cutting are used. Single node cuttings of *V. acerifolium* had 65-80% rooting success. Based on this work, I have discerned that it is beneficial to hold off on transplanting rooted cuttings until they have been overwintered in their propagation container and break bud the following spring. The results of this work were published in HortScience journal in 2013. Plants produced from the 2013 propagation studies were grown on for additional years to observe their performance in containers, or used in actual container production experiments comparing media formulation, fertility rate and shade level.

In spring/summer 2014, (and repeated in 2015) a stem cutting propagation experiment was conducted for three native shrub species, *Eubotrys racemosa, Vaccinium staminium* and *Viburnum lantanoides,* which evaluated rooting hormone concentration [0, 1000, 3000, and 8000 ppm indole-3-butyric acid (IBA)]. *E. racemosa* rooted at nearly 100%. This plant's ease of propagation combined with its ornamental attributes and deer resistance (based on landscape trials from USDA-SCBG 2010 funds) makes it a very promising new native crop for nursery growers. *V. lantanoides* is one of the most desirable of all flowering shrubs, but one that has proven nearly impossible to propagate. However, we achieved 80% success, a result that will be very important to

the nursery industry. *V. staminium* cuttings rooted at 40%. Two native species, *Cephalanthus occidentalis and Cornus amomum,* were propagated from seed at germination rates greater than 80%. Plants produced from the 2014 and 2015 propagation studies were grown on for observation or used in container production studies.

In spring/summer 2014 (and repeated in 2015), container production studies were conducted for the following three native species: *C. cornuta, L. canadensis,* and *V. acerifolium.* Three different container media formulations and two fertility rates were evaluated using a factorial and randomized complete block design. Expanded shale added at 20% and 50% to growth media composed of four parts pine bark, two parts peat moss and one part sand did not improve growth for these species, and significantly larger plants of *L. canadensis* were produced in control media (lacking expanded shale) than in amended media. Over a 2-year production cycle, the higher fertility rate of 2.5 g N/pot produced *L. canadensis* plants that were larger and had more shoots than *L. canadensis* plants that received 1.0 g N/pot. For *C. cornuta*, the higher fertility rate can produce greater growth, but may not do so every year. Fertility rate did not impact growth of *V. acerifolium*. Plants of *V. acerifolium* that were pruned after transplanting to trade #1 containers had visual quality ratings two times greater than unpruned plants. Pruned *V. acerifolium* had equivalent plant height and width and a more symmetrical and full appearance than unpruned *V. acerifolium* plants. The results of this work were accepted in October 2015 for publication in Native Plant Journal.

In spring/summer 2015, a new container production study looking at three different shade levels (40%, 70% and 100% sun light) was initiated for the following three native shrub species: *E. racemosa*, *L. canadensis* and *V. lantanoides*. Shade improved growth of *V. lantanoides* and *L. canadensis*. *E. eubotrys* grows well in both sun and shade during container production. I anticipate a third referred publication from this project based on the results of the shade study and the results of the 2014/2015 propagation work with *E. racemosa* and *V. lantanoides*.

Goals and Outcomes Achieved

1. This project identified eight native shrubs species (*Cephalanthus occidentalis, Cornus amomum*, *Corylus cornuta, Eubotrys racemosa, Myrica gale*, *Prunus pumila* var. *depressa*, *Viburnum acerifolium* and *Viburnum lantanoides*) that could be propagated at 80% success, which is the level achieved for the popular and widely sold native, ornamental shrub winterberry holly (*Ilex verticillata*). This finding met my goal of a minimum of eight species that perform comparably to winterberry holly.

2. This project identified seven native shrub species (*Cephalanthus occidentalis, Cornus amomum*, *Corylus cornuta, Eubotrys racemosa, Myrica gale*, *Prunus pumila* var. *depressa*, and *Viburnum acerifolium*) that could be produced as a marketable two-gallon container shrub in two years, which is currently achieved

with winterberry holly. This finding exceeded my goal of six species that could be propagated at 80% success.

3. This project developed specific recommendations in the form of a grower manual, which includes protocols for the propagation and container production (including media, fertility, pruning and shade) of 10 novel native species. This manual exceeded my goal for developing specific recommendations for six novel native shrubs.

Beneficiaries:
There are 63 operations marketing containerized nursery stock in Connecticut, according to the latest Census of Horticultural Specialties (2009), and these operations generated over $47 million in total sales in 2009. Major wholesale nursery growers indicate that sales of invasive shrubs are down as much as 60%. This is a significant loss for growers since the annual wholesale value of just one invasive shrub, Japanese barberry, is $28.5 million in the United States according to the 2009 Census of Horticultural Specialties. A survey of the Connecticut Nursery and Landscape Association membership found that growers strongly favored the promotion of natives as a solution to invasives. The development of new native shrubs for growers will replace lost sales of invasives and may even generate new revenue.

Lessons Learned:
Most of the native species evaluated were relatively easy to produce using standard nursery practices. However, several species presented unique challenges in either the propagation or container growing stages of production. *C. americanus* and *L. canadensis* were moderately difficult to root from cuttings. *L. canadensis* was also moderately difficult to grow in a container. *V. lantanoides* rooted moderately well from cuttings, but container production is not easy. *V. lantanoides* and *L. canadensis* require further study of media formulation and shade level to optimize production protocols. *C. cornuta* rooted well from cuttings, however preliminary attempts at rooting the related species *Corylus americanus* have proven difficult. C. cornuta had satisfactory growth in our control media. Improved growth of this species has been observed in pilot studies using media containing greater amounts of sand.

Additional Information:
Several publications, which include findings from this project, have been produced as follows:

Referred journals
Lubell JD, Shrestha P (2016) Optimizing container production of American fly honeysuckle (*Lonicera canadensis* L.), beaked filbert (*Corylus cornuta* Marsh.), and maple leaf viburnum (*Viburnum acerifolium* L.). Native Plant Journal. (in press)

Cartabiano JA, Lubell JD (2013) Propagation of four underused native species from softwood cuttings. HortScience. 48(8): 1018-1021

Conference proceeding and abstract:
Shrestha P, Lubell JD (2015) Optimizing container production and propagation protocols for five underutilized Northeastern United States native shrubs.

The 112th Annual Conference of the American Society for Horticultural Science. (New Orleans, LA)

Lubell JD (2013) Softwood cutting propagation of northeast United States native shrub species.

Combined Proceedings of the International Plant Propagators Society. 63: 275-276

Trade articles:

- Lubell JD (2015) *Spiraea tomentosa*. Nursery Management. 31(10): 20-23. (http://www.nurserymag.com/article/nm1015-Spiraea-Tomentosa-native-plants)
- Lubell JD (2015) A novel native for landscapes. Garden Center. 20(10): 42-45. (http://www.gardencentermag.com/article/garden1015-Spiraea-tomentosa-native-plant)
- Lubell JD (2015) Reliable native shrubs. Connecticut Gardener. 21(4): 19-23.
- Lubell JD (2015) Discovering landscape adaptability in rarely-used native shrubs. Connecticut Botanical Society Newsletter. 42(1): 3-5.
- Lubell JD (2014) Suitable substitutes. Garden Center. 20(6): 72-77. (reprint). (http://www.gardencentermag.com/ll0714-northern-native-plants.aspx).
- Lubell JD (2014) Suitable substitutes. Nursery Management. 30(4): 41-43. (http://www.nurserymag.com/nm0414-shrubs-native-alternatives.aspx)
- Lubell JD (2013) On the back burner. Garden Center. 19(8): 126-134. (reprint). (http://www.gardencentermag.com/garden1013-natives-production-demands.aspx).
- Lubell JD (2013) On the back burner. Nursery Management. 29(9): 16-19. (http://www.nurserymag.com/nm0913-natives-consumer-interest.aspx)

Grower manual and fact sheets

- Lubell JD (2015) Native shrubs for sustainable landscapes: A manual for landscape use, propagation and production for lesser known native shrubs with ornamental and landscape potential.
- Lubell JD (2014) New England native shrub replacements for Japanese barberry and winged euonymus. (http://cag.uconn.edu/plsc/plsc/People/Faculty/Lubell.php)

- Lubell JD (2013) Ten tough new native shrub alternatives for barberry and burning bush. (http://cag.uconn.edu/plsc/plsc/People/Faculty/Lubell.php)

The results of this work have been shared on my Facebook page Native Plant Gal (https://www.facebook.com/NativePlantGal), which currently has 623 followers, and have been presented at the following events:

- Smaller American Lawns Today (SALT) Symposium. Connecticut College, New London, CT. 14 November 2015. *Novel Native Shrubs*
- UCONN Advanced Master Gardener Program. New Haven, CT. 29 October 2015. *Landscape adaptable native shrubs*.
- Long Island Native Plant Symposium. Farmingdale, NY. 24 October 2015. *Building sustainable landscapes with novel natives*.
- Grow Native Masachusetts. Waltham, MA. 21 October 2015. *Designing with native shrubs: many are tougher than you think.*
- Northern New England Nursery Conference. Rye, NH. 6 March 2015. *Enhancing landscape use of native shrubs: moving beyond winterberry*.
- Connecticut State Museum of Natural History. Storrs, CT. 28 March 2015. *From the wild to the landscape – native shrubs to replace natives* (20 attendees)
- Northern New England Nursery Conference. Portsmouth, NH. 6 March 2015. *Enhancing landscape use of native shrubs: Moving beyond winterberry* (30 attendees)
- Weston Nurseries' Green Up Academy. Wellesley, MA. 2 March 2015. *Novel native shrubs as replacements for invasives* (50 attendees)
- The Connecticut Invasive Plant Working Group (CIPWG) Symposium. Storrs, CT. 7 October 2014. *Suitable native alternatives for invasive plants* (100 attendees)
- Massachusetts Nursery and Landscape Association (MNLA) Summer Conference and Trade Show. Deerfield, MA. 24 July 2014. *Underused native shrubs to grow, sell, and design with* (100 attendees)
- UCONN Master Gardener Coastal Certificate Program. Stamford, CT. 3 March 2014. *Cultivating native shrubs* (40 attendees)
- Connecticut Nursery and Landscape Association (CNLA) Winter Symposium. Manchester, CT. 14 January 2014. *Native alternatives for invasive shrubs* (75 attendees)
- Northeast Organic Farming Association (NOFA) Organic Land Care Program (OLCP) Annual Meeting. Southbury, CT. 11 December 2013. *Sustainable landscapes using native shrubs* (150 attendees)
- The 63rd Annual Meeting of the International Plant Propagators' Society (IPPS) Eastern Region. Chicago, IL. 8 – 10 October 2013. *Native shrub propagation* (150 attendees)
- UCONN and USDA Risk Management Agency, Twilight Meeting for the Green Industry. Lebanon, CT. 12 August 2013. *Native plants: The new expansion area for the green industry* (80 attendees)

Buying Local: Measuring Baseline Consumption and Awareness in CT

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Project Summary

While we know that consumers are attempting to shift toward local purchasing when available, little is known about what or how much Connecticut consumers are purchasing, and we have limited understanding of consumer perceptions of "local". Large business buyers of agricultural products have also begun to shift their purchasing patterns toward local, yet there is sparse information regarding the major crops and their value to the local economy. ButCTGrown.com is a public service website designed to help consumers discover local agriculture, providing a valuable platform to capture new information about how businesses participate in purchasing specialty crops. In particular, this SCBGP project leveraged the website's new engagement tool (CT 10% Campaign) to track purchasing data from businesses that pledged to spend 10% of their purchases on locally grown specialty crops.

Grant funding awarded to the University of Connecticut Cooperative Extension System was used for research and outreach to: 1) address data gaps and generate baseline information around current consumption of local specialty crops; 2) provide a better understanding of the CT consumers definition and willingness to pay for a variety of 'local' specialty crops; 3) clarify needs and demonstrate opportunities for increasing specialty crop sales by working directly with large buyers to increase their commitment through the 10% Campaign-Specialty Crops Partners Program; and 4) demonstrate the economic impact (jobs and income) of scaling up 5 targeted specialty crops with high potential for increasing local consumption. This results of this project are intended to help CT specialty crop producers better understand business needs and consumer perceptions of their products, and also help policy leaders better understand the potential economic impact for increasing consumption of certain specialty crops.

This project proposal coincided with the reconfiguration and launch of the State of Connecticut Governor's Council on Agricultural Development in 2012, whose focus on strengthening the agriculture business sector underscored the need for new research on consumer preferences and behaviors toward CT-Grown products. This project met the state and federal priority issues of "increasing child and adult nutrition knowledge and consumption of specialty crops." Finally, this project met three of the CT Department of Agriculture's priority issues: 1) increasing consumption of CT agricultural products; 2) increasing consumer awareness/education of local agricultural products; and 3) establishing baseline data regarding purchases of CT agricultural products.

Results indicate that some individual consumers in CT have a preference for, and in many cases, are willing to pay a premium for locally produced specialty crops. Researchers found that 75% of CT consumers perceive the state boundary (and a short distance outside the state) to be the geographic boundary for local. CT consumer perceptions of local produce and plants are very similar. "Freshness" and "supports the

local economy" are the two perceived benefits of purchasing local specialty crops that are most important to CT consumers. The most common barriers to purchasing specialty crops include higher prices and lack of products available.

By working directly with a group of larger business buyers (restaurants, dining services, retail farm stands), and utilizing a new tool to track purchases on www.buyctgrown.com, the project found a strong commitment to buying locally grown specialty crop products (ranging in between $10,000 to $100,000) in annual purchases. Business buyers welcomed free marketing materials to share with customers informing them of the business' commitment to locally grown, and were eager to host education activities in their place of business to increase consumer awareness and interest in buying locally grown specialty crops products. In terms of challenges, business buyers expressed the need for more resources in finding and connecting with local farms, and in practice showed uneven commitment to purchasing from specialty crop farmers in the event of staff changes.

With respect to economic impact, the project found that purchasing of local specialty crops varies by crop type. For instance, for food it is estimated that 2.5% of consumption is locally grown while for plants the percentage is 60% or more. Given that the greenhouse, nursery, and floriculture industry is the largest agricultural production sector in CT, the largest impact, in magnitude, on the state economy comes from this sector. However, when examining economic multipliers, project data shows that the fruit and vegetable sector has a slightly higher multiplier effect compared to other specialty crops. By increasing the local consumption within the fruit and vegetable sectors it would have a larger impact on the local economy. However, increasing fruit and vegetable consumption may be more difficult than increasing plant purchasing.

Project Approach

In order to assess the address data gaps and generate baseline information around current consumption of local, Dr. Ben Campbell at UConn's College of Agriculture, Health, and Natural Resources, first assembled existing literature on specialty crop consumption. Joined by other faculty researchers, he then estimated local consumption for food in CT to be around 2.5% of total food expenditures with purchasing of local plants at 60% or more of total sales (Warner et al. 2012).[16] Using these numbers in conjunction with the 2015 economic impact report by Lopez, Plesha, and Campbell and sales from the 2012 Agricultural Census by the USDA, the agricultural economics team

[16] Warner, T., R. Lopez, A. Rabinowitz, B. Campbell, and J. Martin. 2012. "Estimates of Consumption of Locally-Grown Agricultural Products in Connecticut." University of Connecticut, Zwick Center for Food and Resource Policy, Research Report No. 10, Prepared for the Connecticut Governor's Council for Agricultural Development. http://www.zwickcenter.uconn.edu/documents/Outreach10-GrowCTAg.pdf

estimated the impact of various specialty crops on the CT economy.[17,18] Taking the multipliers and local sales data associated with a variety of specialty crops produced in CT, we estimated the local impact of the specialty crops on the CT economy. From these numbers we are able to see specific impacts associated with key specialty crops.

In the fall of 2013, an online survey was conducted to assess CT consumer understanding willingness to pay for a variety of 'local' specialty crops. A total of 1,770 CT respondents participated in the survey. A choice experiment was used to determine the willingness to pay for ten specialty crops (maple syrup, microgreens, apples, sweet corn, honey, strawberries, tomatoes, Christmas trees, azaleas, impatiens/begonias). Notably, we examined the impact of a CT origin label on the purchasing decision. In order to evaluate the perceptions and barriers to purchasing specialty crops we asked questions to assess how and why consumers purchase and do not purchase local specialty crop products.

UConn Extension recruited and hired a Coordinator for the 10% Campaign-Business Partners activity in the summer of 2013. This part-time position was initially filled by Amanda Freund, of Freund's Family Farm, and replaced in early 2015 by Nancy Barrett, of Scantic Valley Farm. The Coordinator worked under the supervision of the PI, Jiff Martin, and participated in a project team along with staff at CitySeed, based in New Haven. At the CT Plant Science Day in August 2013, UConn Extension and CitySeed unveiled a new version of the website buyctgrown.com, which included new marketing graphics for specialty crops and a tool to track purchases intended for individuals and businesses that pledged to spend 10% of their food and gardening dollars locally. The Coordinator began recruiting businesses to take the 10% pledge in the fall of 2013. Businesses targeted were very likely to purchase specialty crops, such as restaurants, institutions, retail-oriented farm markets, and distributors. Although business owners were willing to pledge, they struggled to report their purchases on a regular basis unless the Coordinator made extensive efforts to assist in this process. During this recruiting stage, many businesses showed enthusiasm for the 10% Campaign and were willing to take the pledge, but were unreliable with tracking their purchases and better positioned to simply promote the campaign to their customers. To accommodate the marketing needs of businesses with differing levels of engagement, the project team created two categories: Pledge Partners and Promotional Partners. The Pledge Partners included restaurants, university dining halls, public schools, private schools, caterers, hospitals, and farm stands. The Promotional Partners included farmers, farmers markets, and CSAs.

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[17] Lopez, R.A., N. Plesha, and B. Campbell. 2014. "Economic Impacts of Agriculture in Eight Northeastern States." Research report for Farm Credit East. http://www.zwickcenter.uconn.edu/outreach_reports_7_2768804440.pdf

[18] USDA-National Agricultural Statistics Service. 2012. "2012 Census of Agriculture – State Data." http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_1_State_Level/Connecticut/st09_1_002_002.pdf

Coordinator's activities were:

- Communicate regularly with business partners, reminding them to track their purchases of locally grown specialty crops at least once a year (each business determined their own preference for reporting, whether monthly, seasonally, or yearly);
- Lead the development of marketing materials intended for businesses, including "partner posters", rack cards, hang tags, and window clings. Marketing materials were delivered to businesses via mail and personal visits;
- Create content for 10% Campaign monthly e-newsletter about business partners who purchased locally grown specialty crops; the newsletter was sent to over 1300 consumers and businesses;
- Assemble and share digital portfolio of 10% Campaign marketing materials with business partners (http://www.buyctgrown.com/ct-10-partners-resource-page)
- Create web content about business partners for "Featured Food and Goods" (http://www.buyctgrown.com/food-goods) and also banner ads to give additional recognition to the 10% Partners growing and producing Maple Syrup, Nursery and Greenhouse crops, Seedlings, and Fruit at Pick-Your-Own orchards)
- Collaborate with CitySeed staff on posting social media content to highlight business partners (https://www.facebook.com/buyctgrown/);
- Respond to requests from media to highlight CT 10% Campaign (such as Buy Local Program on NBC CT, Moo Dog Press Magazine, The Day, Go Local magazine);
- Organize tabling events at some of the business partners' location in order to connect with their customers about the pledge campaign (such as tabling at "Local Grown" evening at Whole Foods Market, "Escape Into Spring" at Van Wilgen's Garden Center, "Unicef Weekend" at Jones Family Farms, and Bishop's Orchard Fall Corn Maze);
- Make presentations to producers at key gatherings to help identify more business partners and share marketing materials (such as at the CT Fruit & Vegetable Growers Conference, Annual Perennial Plant Conference, Maple Syrup Growers Annual Meeting, CT Farm Bureau Annual Meeting, CT Nursery and Landscape Association Summer Picnic, Ag Day at the Capitol, and CT Plant Science Day).

In Feb 2015, 35 business partners and project supporters attended a luncheon to discuss progress and brainstorm ideas for the future promotion of specialty crops. Suggestions included focusing more attention on wineries, creating an alternative tracking tool for businesses, strategic partnering with insurance companies and corporate wellness plans, and generally amplifying marketing to consumers in order to support businesses that take the pledge.

Goals and Outcomes Achieved

(1) The project's first goal was to establish a baseline for consumption of major CT specialty crops. This goal was achieved, as UConn's researchers determined that approximately 2.5% of total food expenditures are spent on locally produced products, and over 60% of plant purchases are locally produced product. The project set a target

of making baseline information available to policy makers, industry leaders and advocates to efficiently address the needs of the specialty crop industry. Toward this end, the baseline estimates were shared with the CT Governor's Council for Agricultural Development, and published by the University of Connecticut Zwick Center for Food Resource and Policy.[19] The baseline research was shared with the CT Governor's Council for Agricultural Development, and also in a variety of producer and academic presentations as well as in conversations with producers and industry stakeholders (e.g. CT Farm Bureau Association).

(2) The project's second goal was to understand consumer perceptions and value of 'local' among CT consumers. To achieve this goal, a survey was implemented with 1,770 consumers participating in CT. Results indicate that CT consumers are, on average, willing to pay a premium for locally labeled product. However, the amount of premium depends on the specialty crop, as all premiums are not equal. Consumers were willing to pay a premium for local for some specialty crops compared to crops originating from other places. For instance, apples from CT at a farmers market received a $1.08 premium per pound over CT apples from a grocery store (Table 1). However, NY apples from a grocery store received the same premium as CT grocery store apples. CT tomatoes on the other hand received a premium above other locations but it was the same for farmers markets and grocery stores. With respect to plants, azaleas and impatiens/begonias received premiums compared to plants from other locations. The project set a target of identifying at least 5 strategies to increase penetration of buy local campaigns and local marketing. Instead, the survey results generated insights into marketing to consumers with local specialty crops, see below. The survey results and marketing insights were formally presented on Feb 10, 2015 to the CT Governor's Council for Agricultural Development.

Survey outcomes and marketing insights:

- Boundaries for local: 75% of consumers have a definition of local for fruit/vegetables and plants consistent the CT Dept. of Ag. mandated definition, within state or 10 miles from point of sale (Table 2).
- Why buy local specialty crops: CT consumers indicated that supporting the local economy is important to their reason to purchase local (80 score out of 100) (Table 3).
- Barriers to local specialty crops: High prices are the number one reason consumers do not purchase more local and why non-buyers do not purchase local. Other major barriers include lack of products available that are wanted, shops do not carry local products, and local specialty crops are not labeled (Table 4).

[19] Warner, T., R. Lopez, A. Rabinowitz, B. Campbell, and J. Martin. 2012. "Estimates of Consumption of Locally-Grown Agricultural Products in Connecticut." University of Connecticut, Zwick Center for Food and Resource Policy, Research Report No. 10, Prepared for the Connecticut Governor's Council for Agricultural Development.
http://www.zwickcenter.uconn.edu/documents/Outreach10-GrowCTAg.pdf

Table 1. Willingness to pay values by groups from the choice experiment.

Maple Syrup	wtp (G1)	ll	ul	wtp(G2)	ll	ul
Organic	-0.26	-0.51	-0.01	-0.55	-1.11	0.02
Farm	0.36	0.12	0.60	0.21	-0.33	0.76
NY	-1.05	-1.47	-0.63	-0.58	-1.46	0.30
VT	0.43	0.08	0.77	-0.25	-1.03	0.54
CN	-2.88	-3.37	-2.39	-2.13	-3.11	-1.16
MN	-2.21	-2.68	-1.75	-2.82	-4.02	-1.62
Nolab	-2.73	-3.21	-2.26	-2.22	-3.22	-1.23

Microgreens	wtp (G1)	ll	ul	wtp(G2)	ll	ul
Organic	0.48	0.11	0.86	-0.04	-0.38	0.30
CT-FM	-0.10	-0.71	0.51	-0.51	-1.05	0.04
NY-SUP	-1.06	-1.66	-0.47	-0.81	-1.33	-0.29
CA-SUP	-2.19	-2.87	-1.51	-2.16	-2.78	-1.54
US-SUP	-1.05	-1.66	-0.45	-0.80	-1.34	-0.27
CN-SUP	-2.42	-3.13	-1.70	-2.17	-2.82	-1.53

Apples	wtp (G1)	ll	ul	wtp(G2)	ll	ul
Organic	-0.21	-0.48	0.05	0.14	-1.04	1.33
Macintosh	-0.02	-0.32	0.29	1.13	-0.25	2.51
Macoun	-0.32	-0.63	-0.01	-0.37	-1.75	1.02
CT-FM	1.08	0.68	1.48	0.17	-1.56	1.90
NY-SUP	0.95	0.56	1.34	0.29	-1.42	2.01
WA-SUP	-1.47	-1.91	-1.03	-1.80	-3.78	0.17
US-SUP	0.62	0.20	1.03	1.18	-0.67	3.03
CH-SUP	-3.49	-4.15	-2.83	-2.02	-4.31	0.26

Sweet Corn	wtp (G1)	ll	ul	wtp(G2)	ll	ul
Organic	0.20	-0.17	0.57	-0.08	-0.96	0.80
CT-FM	0.20	-0.36	0.75	1.93	0.17	3.69
US-SUP	-1.49	-2.09	-0.89	0.64	-1.06	2.33
CN-SUP	-2.47	-3.33	-1.60	0.44	-1.28	2.17
MX-SUP	-3.05	-3.97	-2.13	0.50	-1.24	2.23
NY-SUP	-1.38	-2.01	-0.76	1.00	-0.71	2.71

Honey	wtp (G1)	ll	ul	wtp(G2)	ll	ul
Organic	0.18	-0.49	0.85	2.96	-0.42	6.34
Farm	0.33	-0.33	1.00	0.89	-1.76	3.55
NY	-2.19	-3.25	-1.13	-6.37	-11.92	-0.82
CN	-1.84	-2.89	-0.79	-4.80	-9.39	-0.20
NJ	-1.92	-2.95	-0.90	-8.78	-15.92	-1.64
CA	-5.36	-7.29	-3.42	-4.25	-9.14	0.65
Nolab	-1.38	-2.41	-0.35	-0.91	-4.48	2.66
Strawberries	wtp (G1)	ll	ul	wtp(G2)	ll	ul
Organic	0.76	0.60	0.92	0.88	0.15	1.62
CT-FM	-0.98	-1.25	-0.70	-0.11	-1.25	1.03
MX-SUP	-4.52	-4.92	-4.11	-4.13	-5.80	-2.46
NY-SUP	-1.20	-1.47	-0.94	-1.35	-2.51	-0.20
CA-SUP	-2.08	-2.37	-1.80	-2.67	-4.09	-1.25
US-SUP	-1.62	-1.88	-1.35	-1.86	-3.10	-0.63
Tomatoes	wtp (G1)	ll	ul	wtp(G2)	ll	ul
Organic	0.04	-0.12	0.19	0.53	-0.62	1.68
CT-FM	-0.05	-0.25	0.15	-0.46	-2.10	1.18
NJ-SUP	-1.77	-2.03	-1.50	-1.64	-3.66	0.39
MX-SUP	-3.34	-3.67	-3.01	-2.60	-4.87	-0.32
US-SUP	-2.01	-2.31	-1.72	-0.48	-2.56	1.60
CA-SUP	-1.57	-1.82	-1.31	-0.52	-2.32	1.28
Red Round	-0.27	-0.46	-0.07	-1.37	-2.80	0.07
Heirloom	0.19	0.00	0.37	-0.83	-2.22	0.56

Christ.Trees	wtp (G1)	ll	ul	wtp(G2)	ll	ul
Height	-2.75	-3.86	-1.65	-3.97	-5.83	-2.12
White	15.70	7.94	23.47	4.57	-6.54	15.67
Scotch	12.12	3.89	20.35	4.84	-7.44	17.13
Frasier	12.33	4.62	20.04	5.13	-6.46	16.72
NGH-CT	22.05	12.42	31.68	17.42	2.63	32.21
HIC-OR	-17.92	-28.40	-7.43	-21.20	-38.75	-3.64
HIC-CN	-36.58	-48.08	-25.08	-47.37	-66.73	-28.01
CC-CT	24.25	16.45	32.06	14.86	3.11	26.62
HIC-PA	-12.18	-20.01	-4.36	-8.72	-20.85	3.40

Impatiens/Begonia	wtp (G1)	ll	ul	wtp(G2)	ll	ul
Nurse	1.62	1.26	1.98	1.12	0.68	1.55
Begonias	-0.78	-1.12	-0.44	-0.76	-1.18	-0.34
CN	-2.58	-3.17	-2.00	-2.66	-3.38	-1.95
CA	-3.54	-4.23	-2.85	-3.19	-3.97	-2.41
US	-1.79	-2.32	-1.27	-1.58	-2.20	-0.96
NJ	-1.12	-1.63	-0.62	-1.09	-1.73	-0.45
Nolab	-3.06	-3.79	-2.32	-2.72	-3.57	-1.87
White	-0.62	-1.08	-0.17	-0.60	-1.18	-0.02
Pink	-0.27	-0.74	0.20	0.45	-0.13	1.03
Yellow	-1.11	-1.62	-0.61	-0.59	-1.21	0.03

Azaleas	wtp (G1)	ll	ul	wtp(G2)	ll	ul
Nurse	1.87	0.69	3.06	1.19	0.33	2.06
CN	-5.01	-7.00	-3.02	-4.57	-5.99	-3.14
WA	-5.48	-7.65	-3.32	-3.82	-5.31	-2.34
US	-3.70	-5.64	-1.77	-4.51	-5.97	-3.05
NJ	-4.12	-6.10	-2.14	-2.92	-4.36	-1.48
Nolab	-3.80	-5.73	-1.86	-3.66	-5.05	-2.27
White	0.02	-1.65	1.68	-0.58	-1.80	0.63
Pink	0.94	-0.75	2.63	0.11	-1.11	1.33
fuchsia	3.62	1.99	5.25	2.46	1.32	3.60
Bloom	3.54	2.28	4.79	3.55	2.63	4.47

***FM = Farmer's market; SUP = supermarket; HIC = home improvement center
base: maple syrup = CT; microgreens = CT-SUP; apples = CT-SUP; sweet corn = CT-SUP; honey = CT; strawberries = CT-SUP; tomatoes = CT-SUP; Christmas trees = HIC-CT; impatiens/begonias = CT; azaleas = CT; ll/ul = lower and upper limits of confidence intervals.

Table 2: Consumers Definition of “Local”

Definitions	Fruits & Vegetables*	Plants
1) My neighborhood, town/city, or in a neighboring town/city		8%
2) Within 50-100 miles		
3) Connecticut		16%
4) Connecticut or a small distance into a neighboring state		32%
5) A neighboring state		19%
6) Northeastern U.S.		8%
7) Eastern coast of the U.S.		9%
8) Anywhere in the United States		4%
		3%

Table 3: Consumers Beliefs About “Local”

Beliefs	Fruits & Vegetables*	Plants
Freshness	88	83
Price	75	79
Supports the local economy	80	80
Safe to eat	8	64
Environmentally friendliness	4	71
Healthiness	69	77
Open space preservation	80	64

Table 4. Breakdown of barriers to purchasing more local by buyers and non-buyers.

Barriers	Buyers	Non-Buyers	t-test significance of the means
High prices	54%	61%	
Lack of products available that I want	37%	16%	***
Shops do not carry local products	28%	17%	***
Local not labeled where I shop	24%	27%	
Lack of unique products available	11%	7%	
Quality issues	11%	5%	**
Other	10%	16%	**
Consider local a marketing gimmick	3%	6%	

*,**,*** represent significance at the 0.1, 0.05, and 0.01 levels.

(3) The project's third goal was to increase commitment to procure CT specialty crops among businesses (including grocery stores, school cafeterias, colleges, hospitals, co-ops, and restaurants). The target was to actively engage 60 businesses in the 10% Campaign, with at least 15 businesses willing to share data on their procurement of locally grown specialty crops. By the end of the project period, 30 businesses had agreed to share their purchasing data and joined the CT 10% Campaign as Pledge Partners; these included 17 Restaurants, 6 Schools/ Universities, 1 Hospital, 4 Distributors, 3 Markets and 6 other. In total, the Pledge Partners account for 93% of the $2.9 million that has been tracked collectively by consumers and businesses since August 2013. An additional 194 businesses agreed with the purpose and design of the 10% Campaign and signed up as Promotional Partners to show their commitment to buying locally grown specialty crops and also share the campaign's messaging with their customers/clients. Promotional Partners include of CSAs, farm stands, wineries, non-profits, and farmers markets.

Screen shot from buyctgrown.com on 12/21/15

The following list highlights several business partners and their tracked purchases of locally grown specialty crops:

- **UConn Dining Services**, Storrs joined the campaign in January 2014 and tracked
  $206,600.
- **Freund's Farm Market** is a farm stand that joined in January 2014 and tracked $71,000*
- **Max's Oyster Bar** of West Hartford, joined the campaign in January 2014 and tracked just over $50,000 (specialty crops *only*).
- **River Tavern** restaurant of Chester joined in September 2014 and tracked $43,800*
- **CitySeed,** a community based non-profit, has been tracking since the summer of 2014 and tracked $40,800.
- **Salisbury School**, a private high school, joined the campaign in late 2013 and tracked 32,700*****
- **CropUps** farm-to-chef web portal project joined the campaign in the fall of 2013 and tracked $21,500*
- **Bistro 7** restaurant of Wilton joined in the fall of 2013 and tracked $18,700*
- **CT Farm Fresh Express** is a delivery service that joined in the spring of 2014 and tracked $18,120
- **New Milford Hospital** joined in the spring of 2013 and tracked $8,626*
- **Blue Plate Kitchen** joined in August of 2014 and tracked $6,500*****
- **Auntie Cathies Kitchen** is a restaurant and caterer that joined in the spring of 2015 and tracked $5,260
- **Vernon Public Schools Food Service Dept.** joined in spring of 2014 and tracked $2,700*
- **Mountainside Café** joined in the fall of 2014 and tracked $2,000*
- **Whole Foods Market** in West Hartford is a larger grocery chain that joined in August of 2015 and has agreed to report annually.

**Does not include 2015 purchase data at time of this report*

(4) <u>The project's last goal was to measure the economic impact of 5 targeted specialty crops given varying increased consumption levels</u>. Results indicate that the total CT impact from the greenhouse, nursery, and floriculture (GNF) industry was around $225 million in 2012 and employing around 2,400 people (Table 5). With respect to fruit and vegetable production, total CT impact equates to over $2.6 million. The economic impacts for 8 specific specialty crops and 3 specialty crop categories are listed in Table 5. Within Table 5 the amount for "All Markets" and those to only CT consumers, "Local Markets" are presented.

Table 5. Economic impacts associated with several sectors and specific specialty crops.

Economic Impacts				
	All Markets		Local Markets	
	Total Impact	Total Employment	Total Impact	Total Employment
Maple syrup	902,731	7.5	22,568	0.2
Berries	8,899,636	83.4	222,490	2.1
Cut Christmas trees	9,137,431	96.0	5,482,458	57.6
Apples	24,291,961	227.5	607,299	5.6
Bedding garden plants	157,026,535	1,648.4	94,215,920	989.0
Potted flowering plants	26,825,936	281.6	16,095,562	168.9
Fresh cut herbs	9,077,166	95.3	2,723,151	28.6
Sod harvested	9,223,774	96.8	5,534,265	58.1
All fruit	47,300,000	460.0	1,499,091	14.0
All vegetables	38,540,000	527.0	1,159,319	9.9
All greenhouse, nursery, floriculture	376,700,000	3,876.0	225,624,602	2,368.4

The target for this goal was to make recommendations to Governor's Council on Agricultural Development, industry leaders, and other stakeholders regarding opportunities to expand targeted crops. Accordingly, Dr. Campbell completed the following:

Industry and Government: Presentations

Campbell, B.L., H. Khachatryan, B. Behe, C. Hall, and J. Dennis. 2015. "Consumer Perceptions: Sustainable, Organic, Ecofriendly, and Local." Perennial Plant Conference, University of Connecticut, Storrs, CT, March 5.

Campbell, B.L. 2015. "Examining the Effectiveness of CT Grown Labeling with Eye-Tracking Technology" at CT Fruit & Vegetable Conference, East Windsor, Jan. 15.

Campbell, B.L. 2014. "Consumer Perceptions: Sustainable, Organic, Eco-Friendly, Local – Your Customer Thinks Differently Than You Do." Connecticut Environmental Council, Southington, CT. Nov. 25th.

Campbell, B.L. 2013. "Economics of Local and Organic." New York Produce Show and Conference, New York City, NY, Dec. 9th.

Magazine, Reports, Whitepapers, Factsheets
Campbell, B.L., A. Rabinowitz, and Y. Liu. 2015. "What's Happening with Local? The Ins and Outs of Local Purchasing." CT Farm Bureau Newsletter, July/August, p. 6-7. http://www.are.uconn.edu/index_43_2486526470.pdf

Stearns, S. 2015. "Local vs. Organic Produce." Highlights of Extension. University of Connecticut, Department of Extension. http://cahnr.uconn.edu/ces/highlights/

Additional detail on academic presentations and publications is submitted below (under Additional Information)

Beneficiaries
Specialty crop sales make up a majority of CT agricultural sales, however, we do not know the portion of consumer expenditures that are spent on locally grown products. Until we have a better understanding of baseline consumption levels, perceptions, and barriers, efforts to set policy goals for the future (e.g. "increasing local consumption of CT agricultural products to 5%") have little meaning. The results of this project provide new understanding and measurements of spending on local products among individuals and businesses. Specialty crop producers broadly benefitted from the new marketing and public education materials generated for business partners in the 10% Campaign that encouraged buy local behavior, directed consumers to buyctgrown.com to find and discover locally grown specialty crops, and reinforced the state's own 'CT Grown' branding program.

Lessons Learned
- Not all consumers are willing to pay a premium for locally labeled specialty crops.
- Fruits and vegetables have a larger potential multiplier which implies if scaled up they would have a larger impact on the CT economy; however, the greenhouse, nursery, and floriculture industry may provide an easier route as it most likely will be easier to increase local purchases of these products.
- High prices and lack of specialty crop products available that are wanted are the two key barriers to purchasing more local specialty crops.
- Businesses (especially food service and large retail farm stands) have the capacity and are already purchasing thousands of dollars of locally grown specialty crops.
- Businesses are willing to share purchasing data on an annual or semi-annual

basis.

- Tracking data on business procurement is extremely challenging, requiring regular contact and communication with—usually—one key individual inside the business that has the authority to ensure the procurement of local specialty crops is happening.
- Businesses that are committed to procuring locally grown specialty crop products rely on a very narrow network of growers; they struggle to connect with more farms that have product and can either sell through a distributor or are willing to deliver.
- Businesses that are in a position to interact with consumers who support local agriculture are eager to help promote a buy local message, see value in hosting outreach staff for tabling at special events, and are enthusiastic about high quality marketing materials to share with consumers.

Additional Information

10% Business Partner Materials and Pictures

From top left: Rack cards for business partner display; hang tags for business partner products; Rack cards for garden centers; typical tabling display.

Clockwise from top left: Chef Rachael from A Thyme to Cook restaurant with Partner Poster; Whole Foods staff after signing up as Pledge Partner; Specialty Crops marketed with 10% pledge buttons; gift basket of specialty crops; customer at West End Farmers Market in 10% photo booth; Governor Malloy taking the 10% pledge.

Review/Working Papers

- Qi, L.,* A. Rabinowitz, and B.L. Campbell. "Buyer and Non-Buyer Barriers to Purchasing Local Food." Revise and Resubmit

- Qi, L.,* B.L. Campbell, and A. Rabinowitz. "Exploring Consumer Awareness and Pricing of Local Food Products in Restaurant Settings."

- Yu, Q.,* B.L. Campbell, and J. Martin. "A Choice Based Analysis of Community Supported Agriculture (CSA) in Connecticut: Valuation of Attributes."

- Zaffou, M.,* O. Hoke,* and B.L. Campbell. "Influence of Product Type and Perceptions on the Geographic Boundary of Local Plants and Food."

- Zaffou, M.,* and B. Campbell. "Preference for Azalea Attributes."

- Zaffou, M.,* and B. Campbell. "Preference for Christmas Tree Attributes."

- Zaffou, M.,* and B. Campbell. "Preference for Honey Attributes."

- Zaffou, M.,* and B. Campbell. "Preference for Maple Syrup Attributes."

- Zaffou, M.,* B. Campbell, and J. Martin. 2014. "Using a Randomized Choice Experiment to Test Willingness-to-Pay for Multiple Differentiated Products." http://ageconsearch.umn.edu//handle/176910

Academic: Conference Presentations

- Zaffou, M,* Q. Yu,* B.L. Campbell. 2015. "Understanding the Impact of Consumers' Characteristics on their Decision to Participate in Community Supported Agriculture (CSA) in Connecticut." Northeastern Agricultural Economics Association: Newport, RI; June 28-30.

- Zaffou, M.,* B. Campbell, and J. Martin. 2014. "Using a Randomized Choice Experiment to Test Willingness-to-Pay for Multiple Differentiated Products." American Agricultural Economics Association: Minneapolis, MN; July 27-29. Invited Track Session (Behavioral Economics)**: Methodological Developments and Challenges in Choice Experiments.**

- Zaffou, M.* and B. Campbell. 2014. "Influence of Product Type and Perceptions on the Geographic Boundary for Local Products." Northeastern Agricultural and Resource Economics Association: Morgantown, WV; June 1-3.

- Yu, Q.,* B. Campbell, and J. Martin. 2014. "A Choice Based Conjoint Analysis of Community Supported Agriculture (CSA) in Connecticut: Valuation of Attributes." Northeastern Agricultural and Resource Economics Association: Morgantown, WV; June 1-3.

- Qi, L.,* A. Rabinowitz, and B. Campbell. 2014. “Consumer Behavior and Barriers to Purchasing Local Food: A Two-stage Decision Model.” Northeastern Agricultural and Resource Economics Association: Morgantown, WV; June 1-3.

This final report was approved in January 2015

Double Value Coupon Program: Targeting Access to CT Grown Specialty Crops in Five Key Communities

Wholesome Wave
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Project Summary

Wholesome Wave's implementation of activities for the Connecticut Specialty Crop Block Grant program grant for 2013, awarded in 2012, was completed on December 31, 2013, as stipulated in our original proposal.

This project supported implementation of Wholesome Wave's Double Value Coupon Program (DVCP) in selected communities throughout Connecticut. The DVCP enhances the competitiveness solely of specialty crops by expanding the market for these products into underserved communities where people often cannot otherwise afford fresh, locally grown fruits and vegetables. Through the program, recipients of federal nutrition assistance benefits such as SNAP (formerly food stamps), WIC Farmers Market Nutrition Program (WIC FMNP) and Cash Value Vouchers (CVV), and Senior FMNP can double the value of benefits redeemed at farm-to-market retail venues. For example, an individual spending $10 at a participating market can buy $20 worth of fruits and vegetables—doubling revenues for specialty crop farmers and directing federal benefits toward support of local farms. Thus the DVCP increases the affordability of specialty crops relative to cheap, processed foods, encouraging recipients to change buying habits in favor of CT-grown specialty crops.

Importance and timeliness of project: This project built on Wholesome Wave's continuing success with the Double Value Coupon Program throughout the country. At the time that this project was proposed (in mid-2012), the national program had increased revenues for farmers vending at farm-to-market retail venues—most of whom sold specialty crops-- by more than $1.9 million in just one year. Program data also demonstrated that we had achieved as much as 300 to 600 percent increases in SNAP benefit redemption at farm-to-market retail venues, proving that there was a deep unmet need for nutritious, locally-grown food in these communities, and that DVCP incentives could help people afford the food they want.

In Connecticut specifically, statistics on federal benefit participation demonstrated substantial potential revenues from channeling more federal food dollars toward specialty crop purchases at farmers markets. As of February 2012, 402,571 CT citizens were receiving SNAP benefits, or approximately 11% of the population.[20] Moreover,

[20] United States Food and Nutrition Service, Supplemental Nutrition Program: Number of Persons Participating. www.fns.usda.gov/pd/29snapcurrpp.htm.

from January 2011 to January 2012, the number of people participating in CT SNAP increased by 8.9%. The state also had 56,083 WIC participants in 2011.[21]
Previously completed work: This project built on a similar SCBG project from 2012, which also supported Wholesome Wave's DVCP activities throughout the state. While the 2012 program helped to firmly establish DVCP as a component of farmers market programming, the 2013 program gave us the opportunity to provide additional technical assistance to our Connecticut partners so that they could begin to work toward self-sufficiency.

Project Approach
Activities performed: Essentially, Wholesome Wave provided technical assistance, training, and financial assistance to community-based organizations implementing DVCP in their own communities throughout Connecticut. A key component of our strategy was to engage CT partners in Wholesome Wave's national Learning Community, which allows organizations implementing DVCP across the country to share best practices and discuss solutions to common problems over a list serv, through webinars, and at our national convening in Washington, DC, in April.

We began early in the year with technical assistance and training tailored to our Connecticut partners' needs. As veteran DVCP operators, they no longer needed basic training in how to run the program. Instead, they received higher-level assistance with elements of the program such as outreach strategies and program management. We also continued to provide assistance with market data collection.

DVCP implementation at each market began when the markets launched in late May or June (depending on the market). Throughout the season, Wholesome Wave continued to provide technical assistance as necessary, and oversaw Learning Community activities, including our national convening in April, which was attended by our Connecticut partners. We also focused on monitoring data collection to ensure its timeliness and accuracy.

Targeted Connecticut communities, and the community-based organizations that worked there, included the following:

- Waterbury: Brass City Harvest
- Putnam: Day Kimball Hospital
- Bridgeport: Downtown Special Services District; St. Vincent's Hospital Farm Stand, East Side Farm Stand. (The latter two were managed by Wholesome Wave in the absence of another partner to operate them)
- Hartford: Hartford Food Systems
- Middletown: North End Action Team (NEAT)

As market seasons ended in October and November, we continued to focus on data collection and analysis, cleaning market data from each of our partners and beginning

[21] United States Food and Nutrition Service, WIC Program: Total Participation. www.fns.usda.gov/pd/26wifypart.htm.

to analyze it for results. Wholesome Wave has, from the beginning of the program, assisted our partners through data aggregation and analysis. We facilitate market data collection through a custom-designed online portal, which also allows our partners to see and analyze their own data, in addition to the opportunity to contribute to a larger, national database that helps to identify best practices and prove the effectiveness of the entire program.

Significant results, accomplishments, conclusions, recommendations: As is demonstrated through the data presented in the next section, Wholesome Wave's Double Value Coupon Program continued to increase specialty crop sales for Connecticut's direct-marketing farmers. Additionally, we were able to provide ongoing technical assistance, both through our trainings and through the learning community, which helped our Connecticut partners to gain self-sufficiency in the day-to-day operations of the Double Value Coupon Program. At the time, we were expecting that significant federal funding would soon be available for nutrition incentive programs similar to the DVCP, and wanted to be sure that our partners would be ready to take advantage of such an opportunity.

Favorable/ unusual developments: While this development was not directly related to this project, the future of DVCP in Connecticut was significantly affected by the passage, in February 2014, of the Federal Farm Bill, which contained legislation authorizing the Food Insecurity Nutrition Incentive (FINI) grant program. This program allocated $100 million nationally for nutrition incentive programs similar to the DVCP, enabling substantial expansion of these programs.

Significant contributions/ role of project partners: Our project partners in five Connecticut communities were essential to the successful implementation of the DVCP. As a national organization, Wholesome Wave relies on our community-based partners to tailor the program to their own communities and ensure successful implementation on the ground.

Goals and Outcomes Achieved:

Goal 1: Provide increased revenue for CT specialty crop farmers in order to enhance the competitiveness of solely specialty crops.

Target: CT specialty crop farmers at 16 market sites will increase revenues by at least $62,500 from DVCP incentives doubling federal benefit redemption, an increase of more than 18% of 2011.

The Double Value Coupon Program typically increases the value of federal nutrition benefits when used for fruit and vegetable purchases at farmers markets, including SNAP, WIC (Farmers Market Nutrition Program and Cash Value Vouchers), and Senior Farmers Market Nutrition Program. However, because SNAP benefits can be used for non-specialty crop products (such as meat and milk), SCBG funding was directed specifically to markets doubling WIC and Senior FMNP funds. Thus, while we worked

overall with 16 markets across Connecticut, only 8 were doubling WIC and Senior FMNP, making them eligible for Specialty Crop funding. Therefore, we did not reach our goal of working with 16 sites. However, income generated through the program substantially surpassed our goals.

Partner	Market	WIC sales	Senior FMNP sales	Total Federal Benefit sales	DVCP distributed to WIC and Senior FMNP consumers	Total revenue (WIC + SFMNP + DVCP)
Brass City Harvest (Waterbury)	Farmers Market on the Green	$15,879	$13,062	$28,941	$3,267	$32,208
Day Kimball Hospital (Putnam)	Monday market	$2,578	$2,525	$5,103	$4,746	$9,849
	Thursday market	$3,564	$6,075	$9,639	$9,639	$19,278
Downtown Special Services District (Bridgeport)	Downtown at McLevy Green	$5,065	$4,585	$9,650	$9,398	$19,048
Hartford Food System (Hartford)	North End Farmers Market	$2,300	$7,626	$9,926	$319	$10,245
North End Action Team (Middletown)	North End Farmers Market	$11,193	$4,941	$15,134	$15,134	$30,268
WW Bridgeport	East Side Farm Stand	$11,038	$4,683	$15,721	$11,536	$27,257
	St. Vincent's Farm Stand	$7,248	$2,004	$7,458	$6,354	$13,812
Total	**8**	**$58,865**	**$45,501**	**$104,366**	**$60,393**	**$161,965**

As illustrated above, Wholesome Wave's partners easily met our goal for sales and revenue generation among specialty crop farmers, generating revenues totaling $161,965 from DVCP in addition to WIC and Senior FMNP sales. (DVCP alone generated almost $60,400.)

Goal 2: Through expanded DVCP participation and additional farmers market sites spanning five CT regions, solely increase the competitiveness of specialty crops.

Target: At a minimum, this program will benefit 72 specialty crop farms, a 250% increase over 2011.

2013 market data showed that the Connecticut program benefited an average of 92 farms each week. We do not have precise figures since every vendor did not attend the markets every week.

Beneficiaries

This project benefited Connecticut's direct-marketing farmers vending at farmers markets, who experienced increased revenues through growing federal benefit sales as well as DVCP incentives. The exact numbers of increased revenues are provided above, under *Goals and Outcomes Achieved.*

The project also benefited federal nutrition assistance beneficiaries themselves, who had increased access to affordable, Connecticut-grown fruits and vegetables to help them maintain their health.

Lessons Learned

While most aspects of the program proceeded as planned, the Learning Community was not as successful as we had hoped. As part of the national program, we rolled out an online Learning Community platform that, we hoped, would help to stimulate partner-to-partner discussions and sharing of best practices. Unfortunately, what we found was that, while our partners were interested in sharing with their peers, they did not have the time required to support and maintain ongoing, productive conversations through the online Learning Community.

In short, we found that virtual community was not as productive as we had hoped. Partners—in Connecticut and elsewhere—were frank in their assessments that we provided the most value through in-person encounters, including trainings as well as the national partner convening.

We have, taken these lessons and applied them to our ongoing work with the Learning Community, using online tools to provide a learning library and program implementation tools, while continuing to make room for in-person conversations, as well as conference calls, webinars, and other opportunities for "real-time" sharing.

Additional Information

There is no additional information