

FINAL REPORT to the USDA Agricultural Marketing Service

For the:

SPECIALTY CROP BLOCK GRANT PROGRAM

Fiscal Year 2010

Agreement No. 12-25-B-1058

Date Submitted: December 23, 2013

Submitted by:

Connecticut Department of Agriculture

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Increasing the Competitiveness of CT Grown Specialty Crops through Promotional Materials

CT Department of Agriculture, Marketing Division

Contact and Email: Jaime Smith, jaime.smith@ct.gov

Awarded: \$75,000

Spent: \$75,000

Project Summary:

The Connecticut Department of Agriculture conducted a CT Grown specialty crop promotional materials campaign from October 2010 through September 2013. These promotional items included:

Eat your CT Grown fruits and veggies stickers	5000
Ask about CT specialty crops plastic sun visors	1500
CT Grown pop up tents	150
CT Grown display table runner	4
CT Grown tee shirts	140
CT Grown produce bags	27,000
CT Grown magnets	40,000
Ask about CT specialty crops pencils	6250
Ask about CT specialty crops pens	6250
CT Grown large point of purchase cards	7,723
CT Grown small point of purchase cards	4,085
<i>Buy some today, we'll grow more tomorrow</i> CT Grown banners	50
<i>CT Grown fruits and veggies chopped here</i> cutting boards	500
<i>Enjoy specialty crops on the go!</i> travel utensils	500
<i>Cook with CT Grown specialty crops</i> measuring spoons	1000
<i>Plant a CT Grown specialty crop</i> plant pots	1000
CT Grown pins with website	26,600

Using the CT Grown logo on these materials will increase public awareness and enhance the competitiveness of the specialty crops produced in the state. Any item that had the potential to benefit non-specialty crop producers was matched with 46% state funds to cover the percentage of non-specialty crop producers in Connecticut.

These items were distributed free of charge to:

- specialty crop producers
- retailers of CT Grown specialty crops: independent grocery retailers, farm stands
- schools and educators, including FFA, promoting Connecticut agriculture to reinforce specialty crop production in Connecticut.
- supplementary nutrition program sites (240 in total)
- agricultural nonprofits: Hartford Food Systems, Connecticut Farm Bureau, etc.
- state commodity associations: Connecticut Northeast Organic Farming

Association, Connecticut Christmas Tree Growers Association, Connecticut Apple Marketing Board, etc.

- Wholesalers – M&M Produce, Freshpoint, Buzzotos, C&S

The materials were also distributed at events where the public was the target audience. Some of these events included:

- 2011, 2012 and 2013 Big E in West Springfield, MA
- 2011, 2012, and 2013 Connecticut agricultural fairs: Wolcott, Hebron and Woodstock Fair
- 2011, 2012, and 2013 Agriculture Day at the Capitol in Hartford, CT
- 2011, 2012, 2013 UConn Earth Day Celebration, Storrs, CT
- UConn Cornucopia 2012 and 2013 in Storrs, CT
- Rock Cats Baseball Game, Agriculture Day 2012
- Mohegan Sun Casino's Connecticut Day 2012
- 2013 Department of Public Health, Health Fair
- School Nutrition Assoc of Connecticut Annual Food Show 2013
- Connecticut Apple Marketing Board prizes for the photo contest

Project Approach:

The agency's marketing unit discussed the two sets of target audiences which the promotional materials would be used for: producer and consumers. The unit felt strongly that items for producers should not only be beneficial to specialty crop producers but also useful and effective for consumers. The same approach with used to select items for consumers; the promotional items should be useful and not a short term, 'throw-away' item.

The results proved to be productive since specialty crop farmers were actively seeking the materials purchased for them and attendees at events often came over to the agency exhibit looking for certain materials that were being distributed.

Goals and Outcomes Achieved

The original Expected Measurable Outcome's were based on a positive change in the USDA New England Agricultural Statistics Service (NEASS) report in cash receipts of specialty crops for 2012. To date, the 2012 report has yet to be released (the normal release date for annual reports is the summer of the following year.) USDA NEASS is expecting to release the 2012 report in February 2014. Without this information we are unable to report if there has been a positive change in cash receipts showing an increased awareness and purchasing of Connecticut specialty crop agricultural products.

Beneficiaries:

Specialty crop farmers are the target beneficiaries of this project. The intent was to increase awareness of specialty crops in Connecticut and therefore increase specialty crop sales from Connecticut farmers.

In addition to specialty crop farmers, consumers benefitted from increased awareness of specialty crop farmers and products available in Connecticut. Wholesalers, schools groups, and other entities who we distributed our promotional materials also benefitted and allowed us to reach a target audience we may not have otherwise.

Lessons Learned:

Overall the project went very smoothly and there were no problems with the exception of the USDA NEASS 2012 report being issued much later than normal.

Additional Information:

Images of all the CT Grown specialty crop promotional materials can be found here:

<http://www.ct.gov/doag/cwp/view.asp?a=3243&Q=537198&PM=1>

Expanding Consumer Recognition of the CT Wine Industry

Connecticut Vineyard and Winery Association, Inc.

Contact and Email: Jamie Jones, jamie@jonesfamilyfarms.com

Awarded: \$75,000

Spent: \$75,000

Project Summary:

At the request of the Connecticut Farm Wine Development Council a study was conducted on the Connecticut wine industry. According to the study and the Connecticut Vineyard and Winery Association's (CVWA) observations, the Connecticut wine industry suffered from a lack of awareness and strong image type among consumers. Although CVWA's annual marketing efforts had produced positive results, it was time to move to the next level with an enhanced marketing campaign designed to raise greater awareness among consumers about the quality wines produced in Connecticut and to increase consumption of Connecticut wines.

Based on the state commissioned study and marketing plan, the Connecticut wine industry had a profit potential of at least \$35 million annually if a marketing investment was made to increase consumer awareness of Connecticut wines. The proposed marketing campaign was based on applicant's own observations, its history promoting the wine industry on a smaller scale, and on recommendations in the study. Success of the marketing campaign would be evidenced by increased visits to CVWA's CT Wine Trail website and by increased attendance to, and wine sales at, the annual CT Wine Festival.

Project Approach:

To promote the CT Wine Trail, a state-approved cooperative marketing effort among the CVWA member vineyards and wineries, the project goals included:

- Develop a recognizable logo. To accomplish this CVWA contracted with Cherokee Communications and they developed a new CT Wine Trail logo.
- Develop an annual travel guide brochure to include the new logo. CVWA again contracted with Cherokee Communications. A multi-panel color Travel Guide brochure with the new logo was developed. The brochure included travel map of the wine trail vineyards, list of wineries and business members and a calendar of events. Brochures were printed by Wolf Printing. 100,000 brochures are printed each year for distribution to member wineries and tourist centers in CT, RI, MA & NY.
- CVWA contracted with First Image to update the CT Wine Trail website with the new logo and other pertinent links. Website was updated March 2011. In 2012 CVWA contracted with Miranda Creative and a new updated CT Wine Trail website was released in the fall, 2012. Annual visits to the CT Wine Trail website were 113,000 for 6 months in 2011 and 199,300 in 2012.

- In addition, working with Miranda Creative, CVWA recognized the opportunity to reach younger consumers through Facebook marketing. In May 2011 we had 99 Facebook fans and currently we have 10,932 Facebook fans.
- Develop a software application (app) for handheld mobile devices, so the CT Wine Trail website, travel and event information are easily accessed and readable on iPhone, Blackberries, etc. CVWA contracted with RDH Consulting to develop an android version app.

To promote the Annual CT Wine Festival to spotlight the Connecticut wine industry:

- Integrating the use of internet ads, billboard and electronic board ads.
- The travel guide, website, and app will promote the Wine Festival.
- Promoting the festival on local and state television and radio news media.

CVWA contracted with Herman & Almonte Associates in 2011 and 2012 to promote the Wine Festival with a public relations campaign consisting of internet ads, billboards/Electronic Board and TV/Radio/Print advertising. Attendance at the CT Wine Festival increased from 3,328 in 2009 to 8,000 in 2011, an increase of 140%. Attendance at the 2012 CT Wine Festival was 5,100, 53% increase from 2009 but it was also a 37.5% decrease from the 2011 attendance.

Goals and Outcomes Achieved:

The first goal was to increase visits to the CT Wine Trail website. With a benchmark of 160,000 annual visits when the project began, the target was a 10% increase in hits in Year 1 and 25% in Year 2. With a 6 month total of 113,000 hits we met/exceeded our goal of 175,000 annual visits or 87,500 hits for the six month period in Year 1. Year 2 had 199,300 annual hits, meeting our goal of a 25% increase from the benchmark of 160,000 annual visits. The increased visits were achieved by the accumulation of all our activities: new logo design, new travel guide brochure with new logo, website updates and adding our new logo to the wine trail website, and social media marketing through Facebook increased awareness of the Connecticut wine trail.

The second goal was to increase attendance to the CT Wine Festival. Our benchmark was 3,328 attendees and our target was to increase attendance 10% each year of the project. Year 1 had 8,000 attendees at the Wine Festival, an increase of 140% from the 3,328 benchmark. Year 2 attendance at the Wine Festival was 5,100, 53% increase from the 3,328 benchmark. Unfortunately, Year 2 attendance was a 37.5% decrease from Year 1. The weather over the weekend for the Year 2 CT Wine Festival affected attendance. It rained very heavy at times and there were severe thunderstorms on Saturday afternoon. The inclement weather reduced the number of people who attended the wine festival.

The third goal was to increase wine sales at the CT Wine Festival. Our benchmark was 3,500 bottles of wine and our target was to increase sales 5% each year. Wine sales for Year 1 were 5,400 bottles, an increase of 54%. Wine sales for Year 2 at the CT Wine Festival decreased to 4,100 bottles, a decrease of 24% but still an increase of

17.15% from our benchmark of 3,500 bottles. Again, weather over the weekend for Year 2 affected attendance which in turn reduced the number of people who attended and reduced the number who purchased bottles of wine.

Beneficiaries:

By increasing awareness of the CT wine industry the beneficiaries of the project were the 33 vineyards and wineries throughout Connecticut. Promotion of the CT Wine Festival, which takes place in Goshen, CT has also benefited hotels, inns, restaurants and gas stations in the Litchfield county due to the number of people coming through the area to attend the wine festival.

Lessoned Learned:

The project went well and we have increased annual visits to our website and currently have almost 11,000 fans on our Facebook page promoting the wine trail. While we did spend money to develop an android version we opted not to spend money on an iPhone app due to the cost. Instead we felt our money would be better spent on developing a mobile website since so many people have smart phones.

It is clear the weather affects attendance at the Wine Festival. If the weather is clear and dry, the attendance increases and if there is rain or inclement weather less people will attend the festival.

Additional Information:

Link to CTWine.com website: <http://www.ctwine.com/>

Link to CT Wine Trail Facebook page: <https://www.facebook.com/CTWineTrail>

Link to CT Wine Festival Facebook page: <https://www.facebook.com/CTWineFestival>

Link to 2013 Wine Travel Guide [Brochure](#)

Link to Android Mobile [App](#)

Pictures from the CT Wine Festival can be found on the [CT Wine Festival Facebook page](#).

Bringing Deep Zone Tillage to Connecticut and New England Vegetable Farms

University of Connecticut Cooperative Extension System

Contact and Email: Jude Boucher, jude.boucher@uconn.edu

Awarded: \$34,109.90

Spent: \$21,132.04

Project Summary:

The excessive conventional tillage practices used on vegetable farms in the Northeast are expensive, inefficient, and result in problems with soil compaction, soil degradation and soil erosion. Our conventional and IPM vegetable growers continue to compact their soils, break down the soil structure and mine the soil organic matter away every time they till the soil. Most vegetable farmers plow, harrow several times, cultipack or bed the plantings, and may also cultivate multiple times. Additional tillage passes are associated with sidedressing fertilizer, incorporating crop residue and planting cover crops.

Multiple tillage trips across the field are expensive and produce plow and disc-pans which often prevents root growth beyond 8-12 inches deep and leads to soil flooding and disease problems. Constant tillage also oxidizes away soil organic matter as CO₂ resulting in the loss of soil structure and the inability of the soil to hold water, nutrients, and pesticides, which may end up in surface or ground water. With conventional tillage, more organic matter is lost than can be replaced through the use of winter cover crops and by incorporating crop residue. Loss of organic matter can also cause the soil on the surface to crust or plate, making an almost impenetrable barrier, which prevents seed emergence. As the farms are divided and handed down to new generations, new growers are pushed off the bottom land and onto the slopes, where they continue to use bare-cultivation practices that result in severe soil loss. In 2006, one grower actually resorted to building rock "bridges" every 100 yards or so, across four-foot-deep erosion ditches, so that he could spray his sweet corn for insect pests, and then, rebuilt them when they washed out. As land trusts buy up open land in Connecticut, they often institute policies that prevent vegetable farmers from using conventional tillage to prevent further damage to the property. Such policies limit future vegetable production in a state where land is extremely expensive and prevents young farmers from gaining access to land to gain experience growing our food. As urbanization spreads across New England, farmers also have trouble with new neighbors along the farm boundaries who object to the dust and noise. Fuel prices continue to rise making multiple tillage trips cost prohibitive. Vegetable farmers in an increasingly-crowded region can no longer afford to farm using the same techniques that their father's used. They must adopt reduced-tillage systems that are capable of addressing all these problems or become extinct in New England.

Deep zone tillage can address all of the problems mentioned above and more. Unlike no-till, which relies on a heavy blanket of plant residue to protect the soil and delays the warming of the soil and crop growth in Northern climates, DZT uses a 5-inch-wide tilled

strip to simultaneously break up plow pans, prepare a seedbed and warm the soil. A deep shank or subsoiler breaks up the plow-pan while fluted coulters cut a strip in the residue/cover crop, and rolling baskets help break up clods to prepare the narrow seedbed. Most of the ground between the crop rows retain the heavy cover crop residue and is protected. The 5-inch-wide tilled strip is slightly raised, warms faster than covered soils, and does not allow water to build up enough speed to erode a slope.

When combined with the use of cover crops, the constant accumulation of organic matter using this system reverses the deterioration of the soil, improves soil drainage, increases soil water and nutrient holding capacity, and allows beneficial soil organisms to thrive. Five New England growers that switched to DZT between 2007 and 2009 observed the following benefits of their new tillage system. 1) Reduced trips across the field to prepare field for planting. 2) Reduced field preparation time by 40-83% (reduce labor costs). 3) Reduce tractor hours and equipment maintenance. 4) Reduced fuel use by 30-77%. 5) Reduced nitrogen use. 6) Reduced dust and tractor noise when preparing fields near crowded neighborhoods. 7) Eliminated dust devils (wind erosion) that are common on conventional fields. 8) Preserved soil moisture under mulch in dry conditions, which produces better seed germination and plant stands (higher yields). 9) Allowed sequential plantings to go in on time during dry spells without additional irrigation. 10) Improved root health and length (2-3 feet deep, rather than 11 inches). 11) Prevented dry tips on sweet corn at harvest. 12) Eliminated water erosion from sloped fields. 13) Improve soil drainage in wet years (prevents surface pooling). 14) Eliminate soil compaction (destroys plow pan). 15) Produced cleaner winter squash and pumpkins (eliminates washing). 16) Reduced incidence of black rot on pumpkins and winter squash. 17) Reduced incidence of Phytophthora blight on peppers and squash. 18) Produce longer straighter carrots. 19) Acquired new rental land from a municipality that doesn't permit bare-cultivation. 20) Allowed growers to plant on-time in 2009 despite constant rain. 21) Plant stands matured evenly in wet seasons (not in conventional fields). 22) Allowed DZT growers to harvest on time (better relations with buyers). 23) Turned unproductive wet hole into productive area (break up plow pan). 24) Ability to plant wet field in a rainy year and not put a rut in it (increased acreage/yields). 25) Can easily avoid preparing wet section (don't have to prepare whole field at once). 26) Dramatically reduces hours spent picking rocks (less backbreaking work). 27) No dead furrows (more productive field space). 28) Stop deterioration of the soil health. 29) Start to improve soil health. 30) Return of earthworms.

A similar project was originally funded in 2008 as a small NE SARE Partnership Grant (extended until late 2010). In that grant, we proposed an increase from 0 to 10 DZT farms in New England. We achieved our goal of 10 DZT vegetable farms and stimulated the interest of Extension Educators in VT, MA and RI. We also purchased a DZT machine at UConn for further research. With this new grant for 2011, we hoped to introduce DZT to an additional 10 vegetable farms. We believed that once we had 30 or more farms scattered across New England using DZT, the system would spread by itself, due to its obvious merits. We felt that it was crucial that we kept the momentum building for this new system, while we had the grower's interest. Most growers needed to hear about DZT more than once before they purchased new tillage equipment and

began to master a whole new way of farming. DZT represents a sizable investment and requires mastering new techniques, but can repay a grower in one to two years.

Project Approach:

The activities and tasks proposed and performed during the grant period included: providing DZT and soil health talks at the CT Vegetable & Small Fruit Growers' Conference, hosting a DZT workshop/discussion group, arranging for a DZT session at the New England Vegetable & Fruit Conference, providing additional talks at conference and workshops throughout New England, writing an additional case study for a DZT farm, conducting pre-adoption Soil Health Tests for new DZT farms and post-adoption tests at farms that had used DZT for 5 years (early adopters), conducting a compaction comparison at DZT and conventionally-tilled farms, and conducting DZT research at the UConn Plant Science Research Farm.

Significant results, accomplishments, conclusions and recommendations included: 14 New England vegetable (specialty crop) growers purchased DZT machines during the grant period, and 5 others also moved to reduced tillage or DZT. Most growers who made the switch to DZT are completely satisfied with all the benefits that the system provides, and many have stated that they will never return to conventional tillage. One grower purchased a second DZT machine to use while preparing raised beds and experienced better quality root crops (carrots and beets) and greens (lettuce, spinach and chard). A grower with a smaller farm (20 acres) found the system so beneficial that he, first borrowed, and then purchased a larger tractor to pull his DZT machine. He found that even on small farms (<20 acres), this technology can generate over \$417 per acre in labor and fuel savings, reduced maintenance costs, and increased yields, and can pay for itself in just two years.

Many growers found that one of the most impressive features of using DZT was that it was a great tool for dealing with climate change. It preserved soil moisture in dry years to produce better plant stands, and helped drain fields during excessive precipitation events, reducing diseases and increasing yields. The climate in the Northeast is forecast to become warmer and wetter, in contrast to most of the country that should become warmer and dryer. Extreme weather conditions in New England over the past 10 years seem to confirm that growers will have to learn to farm with more moisture and an occasional extreme drought. DZT is much more forgiving in either extreme condition than a plow and harrow, and just as good in a "normal" season.

In a compaction survey on 10 DZT and 12 conventional fields/farms, DZT succeeded in reducing the percent of fields/farms with highly compacted plow pans from 100% to 60% or increased the depth to plow pans by 2 inches. Cornell Soil Health Tests conducted before, and 5-years after adopting DZT, in the same fields on early adopter farms, confirmed the destruction of the plow pan (100% before, 57% after) and showed improved levels of potentially mineralized nitrogen (reserve fertility).

Results from Research Farm experiments showed that DZT in an extremely wet season (2011) increased crop earliness and ear size for sweet corn, and fruit size and total yield for pumpkins. DZT also reduced the amount of disease (i.e. Plectosporium) and increased the marketable pumpkin yield in wet years. The pumpkin research also found that some powdery mildew-resistant varieties (i.e. Gladiator) do better than others (i.e. Magic Lantern) in a wet year. That it pays to use fungicides every year and they should be used on a 10 or 14 day spray schedule. That it pays to use DZT in wet years and growers may be able to stretch their spray interval to 21 days without much loss in yields or profits, which saves several pesticide applications per year. Our research on the effects of different spray intervals and tillage methods on pumpkins showed that growers using DZT in a wet year could improve their marketable yields by 5-35% over conventionally-tilled fields, depending upon the pumpkin variety and length of spray interval used. That would be an improvement in gross income per acre of \$700-\$4,900 retail or \$238-\$1,666 wholesale. Research results showed that a grower could pay for a new DZT machine with higher profits from as little as 2-3 acres of retail or 6 acres of wholesale pumpkins in a single wet year.

Favorable and unusual developments included: developing an alternative DZT machine-loan program to the one originally proposed. We originally proposed lending the university DZT machine to growers. However, after talking at length with the Extension Educator in VT, who had a year of experience with such a program, and finding out that the expenses were great (new trailer and larger truck, special insurance contract, technician to advise and maintain farm schedule, equipment maintenance, etc.), but the rewards were slim (0 of 12 growers purchased a machine after the first year, all wanted to borrow the university machine again), we decided to find a better way. The problem of growers wanting to borrow rather than buy a machine seemed to arise from the fact that they only needed to use it for a few days per season to prepare fields for planting. The last thing we wanted was to become a permanent lender of a DZT machine, inheriting the repairs, and logistics of hauling it from place to place in a timely fashion to match planting schedules. We felt that the manufacturer and local equipment dealers would have more incentive to loan or rent a demo machine than us, because they would stand to profit from such a relationship in the event growers wished to make a purchase of a Zone Builder or a tractor to pull it. By 2013, we had arranged for the manufacturer to provide a demo DZT machine to a local equipment dealer, who then lent it to growers to try on a field or two. We surveyed the growers to create a list of farmers that wanted to try the machine and were equipped to borrow, use and move it. Growers needed a forklift or frontend loader large enough to move the machine off and on the trailer, a large enough tractor to pull the one-ton machine, needed to be willing to kill the cover crop early to compensate for not having residue managers to clear large amounts of straw from the seedbed, needed to be on the right row spacing, etc. The dealer moved the machine to the first farm, and the growers moved it to the next farm after they had prepared a field or two using DZT. Six growers tried the demo machine in 2013 and 3 expressed interest in purchasing the demo or a new machine this winter. One purchased a larger tractor capable of pulling a DZT machine and two have already ordered a machine for 2014. Another grower borrowed a machine from UMass.

Significant contributions and roles of project partners included: Extension and NRCS educators and agents throughout New England, New York and Nova Scotia were instrumental in organizing or helping to organize conference sessions and talks, workshops, twilight meetings, and other educational events about DZT, soil health, and reduced-tillage, or even by loaning university machines to growers to try. “Mentor growers” or early adopters, who spoke at conferences, workshops and twilight meetings, were crucial in convincing their peers that this novel type of reduced-tillage system had many advantages over the conventional tillage systems they had used in the past. The Farm Manager at the CT AG Experiment Station in Griswold, CT helped organize and conduct sweet corn research on population density and tillage. The manufacture rep and CT equipment dealer provided a demo machine for growers to try.

Goals and Outcomes Achieved:

The following activities were completed to achieve the goals and outcomes for the project (also see activities list by year at the end of this report – Additional Information section).

Since October 1, 2010, in an effort to spread the word about deep zone tillage (DZT), reduced-tillage, soil health, cover crops, and crop rotation, J. Boucher and partnering growers/educators made: 31 DZT-related Extension presentations in 4 states (CT, ME, MA, NH) and Nova Scotia, and published 1 magazine, 4 newspaper/radio, 5 proceedings and 7 newsletter articles (1 DZT farm case study). Extension Educators in all New England states started or continued programs on DZT during the grant period (many of their solo events were not recorded). Three Extension Fact Sheets on ‘Getting Started with DZT’, and DZT research, have been written and published either in print and/or on the web. The Reduced-Tillage and DZT sections of the New England Vegetable Management Guide have been updated twice in the three years (print and web, www.nevegetable.org). Five posters on DZT were presented each January at the CT Vegetable & Small Fruit Growers Conference, and a technical report to the CT legislature highlighting progress on DZT adoption was published. Special DZT events/presentations included: co-organizing and co-moderating a session on reduced-tillage at the New England Vegetable & Fruit Conference, organizing and moderating a Workshop and discussion group on ‘Getting Started with DZT’, 2 twilight meetings at DZT farms, and 10 conference or workshop presentations by “mentor” growers who had adopted DZT. In 2013, we arranged for a manufacturer to provide a demo DZT machine to a local CT equipment dealer, who loaned it out to 6 growers equipped to move and try a machine. Three of the growers expressed interest in buying the demo or a new machine, and two have already placed orders for 2014. In addition, one CT grower tried the UMass machine and is planning on ordering one for 2014. Two local equipment dealers (1 CT, 1 MA) have begun to stock DZT machines.

There were two main goals and outcomes listed in the original grant proposal under Measurable Outcomes: 1) to “increase the number of vegetable farmers in New England using DZT” from 10 to 20 by the end of the grant, and 2) to “determine if there were compaction differences between DZT and those using conventional tillage.” We

expected “less than half the DZT farms to have plow pans” by the end of the study, while a benchmark study conducted in 2008 showed that 89% of the conventionally tilled vegetable farms in CT had a plow pan 11 inches deep.

The main goal of this grant was to increase the number of DZT vegetable growers in New England from 10 to 20. Eight CT, MA and NH growers adopted DZT for the 2011 season (2 were dairy farmers, not specialty crop producers). Seven CT, MA, VT, and ME growers adopted DZT or adapted existing equipment to produce a comparable reduced-tillage system in 2012. Four CT and MA growers adopted DZT for 2013. During the three-year period of the grant, 14 vegetable growers purchased DZT machines, exceeding our initial goal of converting 10 additional growers to this reduced-till technology. In addition, two adapted equipment they owned to do DZT, one purchased another reduced-till machine, and four who recently tried a loaner expressed interest in buying a machine this winter (two have already ordered). Others are hoping to borrow and try a machine next year. Two dairy farmers (non-specialty crop growers) also purchased machines (bonus!). A total of 10 Connecticut growers adopted DZT during the grant period, one had trouble adapting to this change and has sold his machine, and one dairy farmer switched to no-till.

The secondary goal of this project was to “determine if there were compaction differences between DZT and those using conventional tillage.” This was accomplished in two ways: a direct comparison between DZT and conventionally-tilled fields on separate farms, and pre-and post-DZT comparisons on the same farms, before and 5 years after adopting DZT.

First, as proposed, we conducted penetrometer surveys in fields in 10 DZT and 12 conventionally-tilled fields/farms. Farms and fields were chosen at random. The reduced-till farms had used DZT from 2 to 7 years. Farms were defined as having a hard pan (near-impenetrable subsoil layer) if at least half of 10 random penetrometer probes recorded a maximum pressure of 300 p.s.i (which is all that a plant root can penetrate) in the top 18 inches of soil. All (100%) of the conventionally-tilled farms had plow pans and 92% of the individual probe attempts achieved a maximum pressure of 300 p.s.i. Only 60% of the DZT fields had plow pans, where only 50% of the probes recorded a maximum pressure of 300 p.s.i. These results were confirmed in the pre-and post-DZT comparisons on the farms of early adopters.

Five farms had used DZT for 5 years by the end of the study period. Cornell Soil Health Tests were conducted on 14 fields on these 5 farms both before adopting DZT and 5 years later. All 14 fields had a plow pan prior to using DZT, but only 57% had one 5 years later. A total of 82% of the probe attempts “maxed out” at 300 p.s.i. prior to DZT, and only 42% at the end of 5 years. The average depth to the plow pan also increased from 12 to 14 inches in the fields that still had a compacted layer. Eliminating compaction and plow pans improves drainage and provides crop roots more usable soil profile to explore for water and nutrients, which can be critical during periods of excess or limited precipitation.

Preliminary Soil Health Tests (SHT) were conducted in 18 fields at five new CT DZT vegetable farms, so that additional comparisons can be made in the future. Four of these fields had SHT taken from in and out of wet holes to compare variations in soil health characteristics in flooded and dry conditions.

Another objective of this grant was to conduct replicated field studies on DZT to help provide growers with more information on this technology and to become a more proficient operator/advisor with this equipment. Two split-plot research experiments comparing DZT to conventional tillage on sweet corn and pumpkins were conducted at the UConn Plant Science Research Farm in Storrs, CT, and the sweet corn experiment was also conducted in Griswold, CT at the CT Ag Experiment Station Research Farm. Results showed that DZT in an extremely wet season (2011) increased crop earliness and ear size for sweet corn, and fruit size and total yield for pumpkins. With normal precipitation (2012), crop yields, size, earliness and fruit quality were similar in tilled and DZT plots.

Beneficiaries:

This project benefited all vegetable growers in Connecticut and many throughout New England by alerting them to the soil health problems associated with excessive tillage and traffic on their fields. Because DZT also relies on cover crops and crop rotations to function properly, discussions and publications on soil health, cover crops and crop rotations benefited all vegetable growers in CT and many growers in surrounding states. The real winners though were the 19 growers who made the transition to reduced-tillage, increased their use of cover crops, improved their crop rotations, and lowered field traffic. These growers reduced: soil erosion, soil compaction, loss of pesticides and nutrients to surface waters, field preparation time, equipment maintenance, labor, N use, fuel costs, dust and noise, disease, crop quality problems, dead furrows, rock picking and deterioration of their soil health. A CT grower that tracked the time and money saved using DZT reported a 72% savings in field preparation time and a 67% reduction in fuel use preparing fields for planting. One CT DZT grower with a smaller farm calculated that he saved \$74 per acre in labor and fuel compared with conventional tillage, increased his sweet corn yields and gross income by \$300 per acre, and saved hundreds more on machine maintenance for the season. Two CT DZT growers have also switched to using liquid N, placed 8 inches below the seed at planting, and have eliminated sidedressing operation in all but the wettest years. One CT grower purchased a no-till drill to plant his cover crops, which eliminated the need to harrow corn stalks after harvest and harrow in the cover crop seed for good soil to seed contact for germination. He also began planting summer smother crops (i.e. buckwheat or sorghum-Sudan) after early harvested sweet corn, to avoid coming back to harrow down weeds so they wouldn't produce more seeds before sowing winter cover crops. Several growers have started to use cover crop mixes (i.e. tillage radishes + rye or oats) to help prevent plow pans from reforming and to improve future cash crop growth. Follow-up Soil Health Tests after 5 years of using DZT showed that many DZT fields reduced compaction and eliminated plow pans, but also improved the amount of potentially mineralized nitrogen (reserve fertility) available to their crops. Also, two local

equipment dealers benefited from the project by selling DZT machines and/or larger tractors to pull them. The general public benefits by a reduction in the amount of soil, pesticides and nutrients that run off reduced-till fields to the regions surface waters.

Lessons Learned:

The following unexpected outcomes and results occurred during this project. In our pre- and post-DZT compaction study, we found out a lot can happen to vegetable fields in 5 years. It turned out that many of the fields measured originally on the 5 early adoption DZT farms were not zone tilled continuously. In fact, some were no longer rented by the original farmer, some had other crops (like blueberries or tobacco) where DZT was not used, or the fields had been used for plasticulture crops (solanaceous or cucurbits) most years. So, 5 years after adoption, we chose to sample 2 to 4 fields per farm that had been zone tilled for most of the 5 years, for a total of 14 DZT fields. Sometimes DZT was used for a couple of years and then intensive tillage and raised beds were used for a year or two, before returning to DZT. So there wasn't always a straight line to improved soil health (i.e. "two steps forward, one backwards").

When we conducted Soil Health Tests on the 14 fields, 5 years after the early adopters started using DZT, we expected to see a slight, but real improvement in several important soil health indicators (e.g. aggregate stability, total soil organic matter and active carbon) that failed to occur. It takes nature decades or centuries to change the OM content of a soil, so we weren't expecting too much improvement in this area. However, growers who have moved to other forms of reduced tillage see some positive movement in OM and probably the related active carbon portion of the OM. Other researchers have reported seeing improvements in aggregate stability in as little as one year. In the case of these 5 DZT farms, the average readings for these 3 soil health indicators stayed pretty much stable over the 5 years. It may take additional efforts using composts and/or summer cover crops before we can increase the OM and related indicators over a relatively short period of time, especially if DZT is not used in a field every year.

On one of the five farms we actually tested many fields prior to adopting DZT and were able to test 3 DZT and 3 non-DZT (control) fields at the end of the 5-year cycle. Interestingly, lab results for aggregate stability, OM and active carbon declined in both DZT and control fields at this farm, which indicated that it may have been factors other than tillage that accounted for some of the soil test results. At first we thought that weather events over the 5 years may have caused results to decline for both DZT and non-DZT fields, or that our follow-up samples were taken too early in the season, before soil microbes were active, since mineralized N levels were extremely low. The results were so surprising and disappointing that we decided to test the soil again a month and a half later only to find similar (poor) results, but a good deal of variation between readings for the same indicators. It appears that the timing of the sampling, soil moisture, and even the exact location of where the soil was sampled within the field, may influence the results more than tillage practices. In short, the Cornell Soil Health test may be an imperfect tool, with too much variation, for determining pre- and post-

DZT differences even within the same fields. Although penetrometer readings are also moisture and location dependent, we had more faith in results for surface and subsurface hardness (plow pan) because the readings were mechanical (based on a pressure gauge) rather than lab dependent. The SHT plow pan results were also confirmed by a direct comparison between fields on DZT and non-DZT farms.

It also surprised us that two growers never mastered the use of a DZT machine and/or were not completely happy with this reduced-tillage system. These were the first two unsatisfied adopters we had experienced. One of the dairy farmers who had only used a light harrow (no plow) on his fields previously, was not happy that he pulled more large rocks to the surface using DZT, and moved to no-till as an alternative in 2013. Most vegetable growers have used a plow and harrow, and had to pick rocks for years, thus experience many fewer rocks pulled to the surface with DZT, than a grower who has never plowed or picked rocks. He made the move to no-till, even after finding that he had fewer rocks the second year than the first, and had higher yields and less water running off his fields (and flooding his barn) using DZT. He actually eliminated the flooding of his barn in an extremely wet year (2011) using DZT. The second grower simply never mastered using the machine for undetermined reasons. The two fields where he attempted using DZT, before giving up, looked like they had been prepared using conventional tillage, with all, or almost all of the cover crop tilled under. Usually DZT fields have killed cover crop covering most of the surface after planting. Several possible solutions were proposed, but he was unwilling to try the machine again or work with Extension to eliminate the problem, and sold his machine. The dealer feels certain that someone else will buy it.

Finally, we failed to spend all of the money budgeted for this grant (see last section on “Budget Review”). Much of the unspent supply money was originally budgeted to purchase a trailer to haul the university DZT machine between farms so growers would have a chance to try a machine before buying one. As explained above, we didn’t purchase the trailer, but instead arranged to have the manufacturer provide a demo machine to a local equipment dealer, who helped move and/or arrange for the movement of the machine between farms. Some of the budget for personnel and travel was not spent because rather than hiring a full-time summer technician to help with DZT research and soil sampling, a technician was shared with another researcher the first summer. Just after the start of the second summer the technician left for another job with USDA NRCS. As students had already left the university for the summer when the technician resigned, no attempt was made to hire another technician. Volunteers helped record data in replicated research plots during the second season and a state vehicle was used for soil sampling, rather than a technician’s private vehicle.

Additional Information:

See Appendix A for project additional information.

Natural Beekeeping Methods In Connecticut

Massaro Community Farm, Inc.

Contact and Email: Jason Morril, Jason@sectio16.org

Awarded: \$33,120

Spent: \$33,120

Project Summary:

Due to the growing interest in organic farming and focus on the plight of the honey bee the Massaro Community Farm teamed up with the CT Beekeepers Association to establish an apiary for research into natural beekeeping methods and educate the general public with hands on workshops.

The farm provides an accessible venue for beekeeping workshops. As a certified organic farm, natural methods to mitigate pests and diseases which plague the honey bee are of specific interest. Those who purchase produce from the farm and burgeoning beekeepers from across the state have a strong desire to maintain their bees with few harsh chemicals. The workshops on the farm encouraged attendees to be mindful of bee habitats and the ecology surrounding their own apiaries. Methods taught during the workshops directed people to pay particular attention to the general health of the colonies so they can grow and survive year after year.

Research in the apiary was done by the local Connecticut Agricultural Experiment Center. The results from each sample throughout the grant period helped direct the workshops and apiary maintenance to keep the hives as healthy as possible using only natural methods of pest and disease control. Tests included monitoring nosema, measuring mite loads, testing for American foul brood, and genetic tests to determine what DNA markers could help identify bees that could survive a Connecticut winter. This grant was awarded during the first year of organic produce production at the Massaro Community Farm. During this period the general public was attracted to this new venue and resource in the community. Such interest helped attract new and experienced beekeepers alike. The partnership with the Connecticut Beekeepers Association made for a beneficial partnership which strengthened both organizations ability to reach the general public and increase awareness of the educational workshops.

The grant was spread across three years to provide sufficient time to establish an apiary and obtain meaningful results. The first year established the apiary, provided baseline measurements, and launched our workshop schedule. The second year the apiary was growing and research began in earnest. The workshop schedule was refined and a general curriculum formulated. The third year provided data upon which to compare with the prior year and workshops continued to be well attended with the curriculum fully developed in a way that instructors and attendees knew what to expect prior each session.

The approved grant indicated a pollination research goal. Attempts were made to coordinate with a researcher and discover ways to perform such research without affecting overall hive health. After six months of attempts to coordinate with a researcher and no solution to perform this research without affect the hive health we decided to redirect our efforts into a topic more relevant to hive health. The new research direction was to focus on nosema. Nosema is a growing problem for all hives in the state. As it turned out it was a contributing factor to the collapse of a number of hives in our apiary.

Project Approach:

Education: From the beginning, the educational workshops were designed to appeal to beginning beekeepers. We hoped to increase the number of beekeepers in the state.

The apiary was designed in such a manner that it was conducive to educational workshops. Using concrete block and 10-foot 4x4 posts three hives were placed in a row. This was repeated throughout the apiary. The rows were placed and arranged to allow a group of people to gather and receive instruction. The entire apiary was surrounded by a solar powered bear fence. This was part of the education for the attendees; making them aware of the devastation a bear can create in an apiary.

To moderate the number of attendees at any particular workshop we required pre-registration. The limit was twenty attendees and dictated by the size and design of the apiary. If a session was filled we offered an opportunity to attend the other session that day. On each workshop day two identical sessions were offered. This permitted up to forty beekeepers to attend any given workshop. Registrations were accepted via email or phone and a single person was responsible for managing them.

Instructors from the Connecticut Beekeepers Association led each workshop. There was primarily a core group of four people who would rotate through the workshops during each year. Having a committed group of instructors to rely upon helped prevent any one person from becoming overwhelmed. The challenge was to assure that a standard curriculum was taught as each instructor brought with them a unique approach to keeping bees.

It was important to choose instructors with the proper combination of experience, understanding, effective communication skills, and patience. The instructors had to be experienced in order to offer helpful advice. They needed to be patient and attentive to answer questions and gauge whether their instructions were being understood. It was important to pace each workshop to the general experience of the attendees for each session; and it varied from session to session. Most of all, communication was critical. Instructors must be able to present the workshop content in a manner that flow well. Here again is where a clear curriculum can make or break a workshop session.

The instructors needed to understand the hives were being managed using only natural methods. They also needed to be aware the hives were being used for research. This

meant if a hive was performing poorly it was not to be merged with another. Doing so would adversely affect the research outcomes. This same information was presented to the attendees at the beginning of each workshop to help set expectations and guide their understanding of why certain chemical treatments were being excluded.

Research: The apiary was established in the spring of 2011. The source of bees was primarily packages purchased from suppliers importing queens and bees from the south. This is typical for northeast apiaries. To provide at least some variation two different suppliers were used for the bees.

Sampling from the hives was performed at least once in the spring and once in the fall. During two years a third sampling was performed during the summer. Initial samples were taken in the spring of 2011 and final samples were taken in October 2013. It is anticipated that a final sampling will be performed in the spring of 2014.

The apiary comprised the ten research hives and several “club hives” owned by the CT Beekeepers Association. Not an ideal arrangement; this presented some challenge in communicating to the instructors which hives should be used for workshops. Close attention was paid to assure this. The research hives were not mingled with the club hives during any workshop, maintenance, or sampling.

The hives were inspected regularly and monitored for general health. The use of chemicals, such as Fumagillin B, was strictly limited to only prevent a complete loss of a colony. Otherwise the hives were left to “just be bees” and manage their own health.

For overwintering the hives were closed. Mouse guards were affixed to the front entrance. Telescoping covers were used and propped to allow ventilation. All bottom boards included removable boards. These boards were inserted for the winter. Hives were not wrapped or otherwise insulated.

Pollination research was an initial goal. From the start this goal presented problems. The limited availability of a qualified researcher prohibited us from effectively contracting such services. The necessary hive equipment to conduct such research, such as pollen traps, would have affected overall hive health. As the hives were managed using only natural methods any equipment that would artificially impact hive health was considered unacceptable. After much consideration this goal was changed. The new research goal was to conduct research into nosema and its effect on hives being managed using natural methods.

To perform the nosema search, samples were taken up to three times per year from each hive. Nosema spore counts were made through microscopic counting and using the sequential sampling protocol. The results of this research were made available to the CT Beekeepers Association.

Goals and Outcomes Achieved:

Goal 1: Increase community knowledge of honey bees and natural management methods through educational opportunities.

The educational workshops were held regularly each year during the grant period. The class attendance was recorded as follows:

Date	AM Session	PM Session	Notes
6/25/2011	12	13	
8/20/2011	22	16	
10/22/2011	19	18	
3/17/2012		9	No AM session
4/21/2012	20	10	
6/23/2012	18	18	
8/18/2012	21	14	
10/20/2012	24	12	
3/23/2013	6		¹ registration not required, unable to get accurate numbers
4/20/2013	9		¹ registration not required, unable to get accurate numbers
6/22/2013			¹ registration not required, unable to get accurate numbers
8/17/2013	25		¹ registration not required, unable to get accurate numbers
10/12/2013	20	21	*instructor & attendee list was complete prior to 9/29/2013

(1 – Registration was not required for the noted sessions. Along with a change in the afternoon time slot, from 12pm to 2pm, we also tried loosening the process for attendees)

Overall the attendance remained high except for the AM session in 2013. We adjusted the afternoon session to 2pm, from 12pm. We chose to make this change to accommodate for a 12pm educational workshop on the farm for organic lawn care and landscaping. They were not part of the grant workshops but indirectly associated in their content. Due to the lack of interest and instructor availability for 2pm workshops, in October 2013 we returned to the 12pm session and attendance rebounded.

After each workshop we anticipated circulating a survey asking people to indicate whether they benefitted from the workshop. They were asked to gauge the effectiveness of the workshop at increasing their beekeeping knowledge. Overall attendees indicated they did come away learning new information and techniques they would apply to their own apiaries.

We were able to send out a survey twice per year. While fewer in number than anticipated the results were promising and enlightening. Results from the surveys can be found attached to this final report.

A final survey, at the conclusion of the grant period, was sent to all prior attendees asking them to indicate the effectiveness of the workshops. Seventy seven percent of respondents indicated by attending our workshops they increased their knowledge in beekeeping. Based upon the survey terminology, forty five percent indicated their knowledge increased by "a lot". All survey responses indicated they would recommend our workshops to others and ninety-five percent indicated they will attend future workshops.

The overall results from our surveys were positive. They indicated a strong ability of the workshops to increase people's knowledge in beekeeping. They felt the hands-on approach of the workshops was of great benefit. Many commented learning from experienced instructors. Attendees gained confidence in observing and participating in hive inspections.

To demonstrate the growing interest in beekeeping and indicate how the workshops have affected the community at large; prior to 2009 the average attendance to the Connecticut Beekeepers Association "Bee School" held in February each year was 100 people. In 2013 that number had grown by 20% with just 120 people attending this annual all day event.

In the spring of 2009 the State of Connecticut recorded 3,651 registered hives. On September 5, 2013, there were 737 registered beekeepers with 5,343 hives. This figure demonstrates significant growth in beekeeping in Connecticut.

Goal 2: Demonstrate effective natural methods of pest and disease control through pest control research.

Samples were taken from the apiary several times each year during the grant period. The full research report can be found in the Additional Information section.

The "natural methods" used during this research period amounted to allowing the bees to naturally manage themselves. Beekeepers would only intervene with chemical treatments, such as Fumagillin B and formic acid, as a last effort when a colony was on the verge of collapse.

In the first year of establishing the apiary the mite counts were insignificant throughout the season. No intervention was necessary. In the second year mite loads increased seemingly without bound. By the end of the season mite loads were incredibly high, in one hive the count demonstrated that 30% of the bees were being fed upon by mites. The high level of mites combined with the high levels of nosema led to nearly all hives dying off over the winter. In the third year most hives had been started with new packages or nucs and mite levels were much lower. This time, however, even hives started anew experienced mite loads high enough that without treatment they would be

weakened and not survive the winter. These hives were treated with formic acid in September in an effort to reduce the mite load and increase the likelihood of hive survival.

Aside from mites the next greatest pressure on hives was Nosemosis. Specifically, *Nosema ceranae*, was present in all hives during the research period. It was a likely contributor to the collapse of nearly 100% of the hives in the spring of 2013. It should be noted that *Nosema apis* was not detected in this apiary.

Goal 3: Demonstrate performance of different bee species in southern Connecticut by researching different species.

The hives of the apiary were started with two different races of bees: New World Carniolan and Minnesota Hygienic (Italian). This limited genetic diversity stems from the limited sources for bees at the start of the research period.

Of the two races the Minnesota Hygienic exhibited a stronger ability to survive in southern Connecticut. At the start, three hives were New World Carniolan and seven were Minnesota Hygienic. By the middle of the second year two of the NWC hives had died. The winter between 2012 and 2013 presented the greatest losses due to high nosema infections, high mite loads, and a dramatic accumulation of 40" of snow. Only two of the ten hives survived. By mid 2013 only a single Minnesota Hygienic hive continued to survive.

None of the hives in this apiary was able to produce a significant surplus of honey. This can be attributed to the large number of hives dying before reaching a maturity level that would generate a meaningful amount of honey. In the summer of 2013 a surplus of approximately 40 pounds was estimated. Being an amount not worth extracting and bottling it was placed on hives to help provide a greater chance of survival for hives through the winter of 2013-2014.

Overall the survival rate and honey production of this apiary did not demonstrate that natural beekeeping methods could increase either measure. A longer research period could result in more meaningful results. We anticipate continued monitoring and management using similar methods. Results from such management will be published through the Connecticut Beekeeper's Association at a future date.

Goal 4: Increase pollination to local farms and gardens.

The efforts behind this goal were redirected to nosema research due to lack of a qualified scientist.

We were unable to find a suitable researcher not otherwise aligned with another pollination project. During the first year of the grant we attempted to contract the services of a researcher from the CT Agriculture Experiment Station. After repeated emails, phone calls, and meeting attempts we were unable to coordinate with this scientist. It was learned they were engaged in another grant focused on pollination.

Learning this we chose to redirect our efforts into the health of the hives and publish results on the study of nosema.

Shortly after the start of the apiary there were concerns the equipment necessary to perform pollination research would adversely affect hive health. Considering that our efforts were to manage the hives in a natural method we had strong concerns about hive survivability.

These two factors led us to redirect our efforts into nosema research; a topic that directly affects bee health and of greater interest to the bee community than pollination.

Beneficiaries:

There is growing interest in the State of CT, and across the country, in keeping honey bees. Many of these people are part-time beekeepers with several hives in their yard or placed on properties in their area which benefit local farms, home gardeners, and the fruit trees throughout the State.

During every workshop the connection between honey bees and the health of the environment were highlighted. Being located on an organic farm, this connection was easy to demonstrate and justify to the students. In the third year of the grant the farm began holding additional educational workshops on organic lawn care which blended nicely with the beekeeping workshops and strengthened people's knowledge of the link between a healthy environment and healthy hives.

The educational workshops attracted beekeepers of all experience levels. The majority, 71% as measured in our survey, is just beginning and have 2 years or less of experience. Our long term goal is to encourage these part time beekeepers to maintain their apiaries to the benefit of local farms and nurseries. Eventually some may turn into full time beekeepers and grow the honey production and pollination service market in the state of Connecticut. Future surveys will help reveal whether our long term goal is being achieved.

Through informal polling at the start of each workshop we observed geographic diversity in attendees. People came from throughout the state. The importance of this diversity is that hives are truly dispersed throughout the State. Their increased knowledge is thus benefitting the whole state, not any specific town or county.

By encouraging new beekeepers to manage small apiaries we are expanding the pollination potential throughout the state. Bees travel several miles in any direction from their colony. Having smaller apiaries throughout the state increases overall pollination. This increased pollination benefits small farms and nurseries in Connecticut.

As the apiary matured and meaningful results were obtained from the research, results were published in the Connecticut Beekeeper's Association newsletters. The most

recent samples were collected in October. The results from these samples will be published in an upcoming issue.

We hope to continue the relationship with the CT Agriculture Experiment station for as long as possible. The current researcher has indicated a strong interest in assisting with future projects in this apiary. The results from all future research will be published online for public access. The information we provide can help beekeepers, particularly in the northeast, understand the effectiveness of natural beekeeping methods.

Our results indicate high *Nosema ceranae* infection rates. The treatments and results in this apiary can benefit other beekeepers through demonstrated effectiveness. If other beekeepers can be made aware of this disease and effective methods of detection and treatment their apiaries may be saved before collapse and loss of colonies and income potential. Even for apiaries as small as one or two hives losses create an economic impact.

The most immediate and direct beneficiary of the apiary is the USDA certified organic farm, the Massaro Community Farm. Being a vegetable operation the farm relies heavily upon pollinators. The hives established during this grant have allowed the farm to benefit from the pollination it brings. Without such an apiary the farm would incur the expense of hiring the service of a beekeeper to locate hives on the farm during the growing season. The farm also benefits from demonstrating the connection between the apiary and produce production. This enhances the community's experience when visiting the farm and learning what it takes to manage a successful vegetable operation.

Lessons Learned:

The educational workshops at the farm have been an overall success. Over the three year period we gained valuable insight into attracting attendees, best times to hold workshops, proper length of workshops, and more.

In the first two years we held two sessions on a Saturday; one at 10am and another at 12-noon. Each session required preregistration and was limited to 20 attendees so the apiary would not be overcrowded. The 10am session was the most popular and nearly always filled. The 12-noon session was typically half filled. In the third year we tried shifting the afternoon session to 2pm. This resulted in no attendees for the second session. After trying this new model for three workshops we returned to the 12pm session. Attendance rebounded and the 12-noon session became more popular for the remainder of the third year.

Five workshops per year fit the beekeeping "season" very well. They were spaced out from March through October. Starting in March was appropriate. Ending in October is a bit too late in the year and we recommend ending in mid-September instead.

At the start of each workshop we asked attendees to indicate their level of experience and from where they came. The actual level of experience varied widely from no

experience at all to 15 years and more. The majority of attendees were new beekeepers with less than five years of experience and lots of questions. They came from throughout the state and not concentrated in any one area. Ages ranged from the very young, 4 years old, to the retired. With such a wide range of geography, age, and experience it was challenging to pace the workshop in such a way that everyone remained engaged.

Holding workshops in March, before the bees arrive, gives new beekeepers a chance to reinforce their knowledge. We encouraged attendees to bring their new hive equipment to assemble during the workshop. While a good intention, the reality is that people are not inclined to bring their equipment and would rather observe techniques. This first workshop attracted the least number of attendees and only one session is sufficient. Due to weather variability this session must be planned for an indoor session.

The second workshop focused on installing new bee packages. Due to the variability of bee package availability, this workshop would be rescheduled as needed. Such reschedules did cause some people to drop out but most did not mind. Another challenge was to have people attend on the very same day they were picking up their bees. The 10am session would be filled with new beekeepers that departed afterward to pick up their bees and install them in the afternoon.

The summer maintenance workshop was scheduled for late June. It was well attended and the weather was of little concern. New beekeepers would come with many questions as they are several months into learning how to manage their hives.

The fall preparation workshop is held in August. Attendance dips a bit due to the weather, it's very hot, and people are away on vacation. This is unfortunate as the workshop focuses heavily on mite counting and mitigation to strengthen the hives going into the fall.

The winter closing workshop has been held in early October and well attended. The weather has been reasonably predictable during this time of year. Upon further reflection we have determined this workshop should be held in mid-September. This gives attendees a chance to take what they've learned and apply it to their hives before the very cold weather arrives.

We will continue to hold educational workshops on the farm using the basic curriculum we have developed. The curriculum is based upon what we've learned over the three years of the grant period. A clear curriculum is necessary to assure the various instructors who run the workshop understand what is expected of them by the attendees. We tried a few variations on the instruction by splitting our sessions into two groups, one instructor per group. This resulted in a confusing gathering and people were unable to focus. For our apiary of 10 hives a group of 20 attendees and one instructor with one assistant is adequate. More instructors led to confusion. More attendees led to overcrowding and inability of people to meaningfully participate in the workshop.

The workshops used the 10 hives for each session. Hives were opened and inspected and used to demonstrate aspects of hive health. In some cases this created unnecessary disruption of the hives used for research. We don't believe these disruptions adversely affected the research outcomes. However, to keep a clean separation of purposes, if we were to conduct research and education again we would set aside certain hives for research only and others for education only.

Using SurveyMonkey as our survey tool was quite helpful. It provided a simple method to build and collect data. We did not pay for this service and were limited to 10 questions per survey. In general we were able to obtain a 30% response rate which provided valuable insight. The use of surveys will continue as our workshops proceed in 2014 and beyond.

A three year grant period provides a minimal period to conduct research. Beekeeping, as with farming, is analyzed year by year. It requires many years to gauge trends and draw meaningful conclusions. We hope to continue our partnership with the CT Ag Experiment station and publish findings in the CT Beekeeper Association newsletters and emails.

Though we were unable to perform the original goal of pollination research we believe the work done on nosema presents a more valuable result. Nosema affects hive health and survivability of colonies. While pollination affects farm and flower production. If hives are to produce meaningful pollination they need to be healthy. The research into nosema presents data and results which demonstrate that managing hives using natural methods is not an economically viable solution. Untreated nosema infections quickly lead to an unhealthy hive and its eventual collapse. This was demonstrated by the fact all our hives were infected and at the end of the second year nearly all were on the brink of collapse.

Additional Information:

The following additional materials can be found online at

<http://www.massarofarm.org/beegrant>

- Research results from the CT Agricultural Experiment Station
- CT Beekeeper Association newsletters referencing the education and research
- Photos of the apiary and storage shed
- Photos from workshops
- Workshop Curriculum
- Survey results

Additional information can also be found in Appendix B.

Maple Products Growth Proposal Demonstration Project

Maple Syrup Producers Association of Connecticut

Contact and Email: Mark Harran, jmharran@comcast.net

Awarded: \$28,800

Spent: \$26,216

Project Summary:

The demonstration project was approved in 2010 to test the validity of key elements in a proposed plan to dramatically increase the production value of Connecticut's maple products from a historical level of about \$1 million to upwards of \$20 million over a ten year period. The project's three key initiatives were to (1) open more land across the State to maple tapping, (2) implement advanced maple production technology within Connecticut's small to medium producer infrastructure that in combination achieves significant productivity improvements at reasonable costs and payback levels, and (3) change the local maple syrup marketing/sales model from mainly farm stands and farmers market outlets now to more big box stores which have much broader consumer reach and where most maple syrup is currently sold in Connecticut.

The demonstration project was judged successful not only in terms of what it achieved but also in what was learned as a result of its implementation. More trees were tapped on newly opened land, the targeted productivity advancements were generally achieved and distribution was gained in large supermarket chains. A key lesson learned was that the UPC bar code certification is a basic necessity to gaining chain supermarket distribution and the huge productivity potential of Reverse Osmosis (RO) machines was confirmed as economically viable for the small to medium maple producer, like most of those in Connecticut.

Project Approach:

Connecticut's maple industry has been historically comprised of primarily small producers with limited technology applications, tapping about 1/10 of 1% of Connecticut's eligible sugar maples. This compares to over 3% in Vermont and 33% in Quebec. An estimated 90+% of maple syrup products purchased in CT are supplied from Canada or Vermont. The potential exists to substantially increase the production/sales dollar value of CT maple products among existing operators with a three pronged approach. (1) Increase the number of maple trees tapped. Promote environmentally sustainable forest management by CT land owners through increased use of the lands for maple syrup production. Have maple producers become stewards of CT's forests to promote healthy growth and monitor for invasive species. In 2010 only, about 70,000 maple trees are tapped in the state compared to a total of about 10 million eligible trees (11 inches or greater in diameter). Thus, leaving a huge opportunity for growth. **A total of four sites were executed: one site in Glastonbury, CT, (800 taps) one in Harwinton, Ct (300 taps) and two in Litchfield, CT (460 taps). An agreement with the CT Department of Energy and Environmental Protection was executed for the first time ever.**

- (2) Enhance current infrastructure to achieve significantly increased productivity. Over the past 20 years new technologies have dramatically improved the way maple sap is collected and syrup is produced. Collectively, they have increased productivity and improved quality while lowering costs and environmental emissions. Historically, they have been cost prohibitive for smaller producers, but recently these new technologies have advanced to the point that they meet the cost and payback needs of the smaller producer, like most of those in Connecticut. The project sought to substantiate their applicability in Connecticut. All sites and 1,560 taps are on vacuum sap collection systems. A max flue pan was installed on plan and boosted productivity by about 50%. This is outlined in the previous annual reports.
- (3) Develop a marketing model that includes Connecticut maple sales in high traffic retail outlets. Currently, most Connecticut syrup is sold through farmers' markets and farm stands, which have limited consumer reach and sales potential. Meanwhile, most maple syrup retail sales in Connecticut are through large supermarkets and the like. The current consumer interest in local foods has supermarkets receptive to "locally grown" products, including maple syrup. As production is increased, distribution in large supermarkets becomes essential to support the increased dollar value/sales of Connecticut maple products. As mentioned earlier the in-store test was not executed due to inability to gain cooperation from a supermarket chain. However, as reported in the final report, distribution was gained in 6 supermarkets and the producer's records showed a sales increase of 21% in his total sales in the same year (2012). Most significant, the goal of supermarket/big box store distribution was attained and it was learned that the inclusion of the UPC bar code on the package is key to gaining same. A shelving plan and sales test was not conducted because the in store tests were not conducted. However, the goals forming the basis for executing the sales test were achieved through various producers obtaining UPC code.

By pursuing a coordinated approach of these three elements, in ten years the CT maple syrup products industry crop value could go from today's \$1,000,000 to \$20,000,000 annually, providing sufficient product to better compete for sales, first in CT and then other markets.

Goals and Outcomes:

- GOAL: More forests will be opened to maple farming.
- PERFORMANCE MEASURE: Actual number of additional trees tapped.
- BENCHMARK: Currently less than 1% of eligible trees are being tapped.
- TARGET: At least 1000 more trees will be tapped in this pilot.

RESULTS: This goal was achieved. Most significant, a first ever 5 year lease agreement between the CT Dept of Energy and Environmental Protection and a Connecticut maple producer opened up a State forest in Glastonbury, CT to maple production and 650 taps are now operative there. A sizeable portion of the

grant monies were allocated to install a vacuum assisted tubing collection system at that location on which another 150 taps will be added in 2015 for a total of 800. Also, on State land in Harwinton, CT, another producer, encouraged by the Glastonbury success, gained a yearly renewable lease on 6 acres on which he installed 300 taps in 2012. Additionally, in Litchfield, CT, another 460 taps were added on two private lands parcels, all with vacuum assisted tubing, during the Grant period. Perhaps partly as a result of this growth initiative and the publicity surrounding it, total taps in Connecticut increased 10% over the course of the grant period, from 70,000 in 2010 to 78,000 in 2013.

GOAL: Increased sap flow per tap through the use of tubing vacuum systems and a recently introduced check-valve spout.

PERFORMANCE MEASURE: Sap production from new vacuum tubing installations versus bucket and gravity tubing systems on comparable land/conditions will be measured.

BENCHMARK: Sap production per tap with bucket and gravity tubing systems is about 10 gallons per season. (Note: the amount per tap can vary year to year based on weather conditions, length of the season and the like)

TARGET: Sap production per tap will be increased to 40 gallons per season. **Note:** In retrospect, this amount claimed to have been achieved at the Proctor Center Maple facility at the University of Vermont in 2009, may have been overly ambitious target, since 20 gallons per tap is considered generally good across the industry.

RESULTS: Although the target of 40 gallons of sap per tap was not achieved, the 650 taps on CT State land achieved 21 gallons per tap, despite being tapped only half the season in 2013. At the Harwinton and Litchfield locations, sap per tap ranged from 17 to 25 gallons in 2013. All three were well above the ingoing benchmark of 10 gallons per tap and in the range to provide satisfactory payback time for the equipment investment.

GOAL: Greater evaporator productivity through the application of steam away, max flue, and reverse osmosis units.

PERFORMANCE MEASURE: Measure syrup produced with enhancements vs. already documented historical records.

BENCHMARK: Documented historical records.

TARGET: Syrup production on an existing evaporator will be increased up to six times

its historical productivity level, as measured by sap gallons processed per hour.

RESULTS: This goal was achieved, primarily through the deployment of a Reverse Osmosis (RO) machine supported by a steam away and a max flue pan. The combination increased the production rate of a small 2X6 evaporator, commonly used in Connecticut, by 6 times or to an hourly though put equivalent of 218 gallons from the 36 gallons an hour rate, which it was designed to and did process before the technology was added. Oil burner usage was the same both before and after at 4 1/2 gallons per hour, resulting in a projected net savings of 1,225 gallons of oil burned and a fuel cost savings of \$4,600 in 2013. Incremental electrical usage to run the RO machine was only \$44 and was mostly off-set by the reduced evaporator run time (.e.g., lower usage of blower for steam away and lights in the sugar house and evaporator).

GOAL: Demonstrated ability to market/sell the increased (25% over the previous two years) Connecticut maple production in high traffic outlets.

PERFORMANCE MEASURE: Measure the retail category and brand specific volumes over nine-12 months as compared to historical data for the category. In-store sales test will be conducted with a retailer(s) who have historical data on “real” maple syrup sales. A “test” panel and a “control” panel of stores will be identified. The “control” stores will NOT have Connecticut syrup in them. Syrup sales in total, and by brand, will be measured in both panels for nine to 12 months. Using retailer data, customized reports will be generated to report sales data in both panels for the period *before* introducing Connecticut syrup and *after* introducing Connecticut syrup. Analysis of the data will assess volume sales and the impact of Connecticut syrup in a high traffic retail store.

BENCHMARK: There is no benchmark at this time.

TARGET: Distribute and sell Connecticut produced and labeled maple products in a large chain supermarket environment to determine if they can compete successfully head-to-head with established brands (mostly Canadian).

RESULTS: Although the in-store sales test did not happen and thus the sales increase goal was not measureable from independently supplied scan data, new distribution was gained by one producer in 6 supermarkets, primarily due to the addition of the UPC bar code on his syrup containers, and, based on his 2013 sales records, he achieved a 21% increase in his total retail store sales (vs. 2012).

The in-store sales test proved to be more complex and costly than originally anticipated. The sale of scan data is a profit center for supermarket chains.

They normally sell their scan data to syndicated information service companies, like Nielsen and IRI, as well as large market research firms. Selling it in small batches to individuals or small suppliers runs against their practices and, even if they did agree, the estimated price for it was above what the budget for this project allowed.

A major finding in the process of pursuing this goal is that the inclusion of the UPC symbol on maple syrup product containers is critical to gaining distribution in major supermarkets. Large supermarket and big box chains simply cannot manage the sale of products without it. The cost of attaining bar codes access, several hundred dollars, is a barrier to some producers, but the incremental volume generated from distribution in just a few “big box” stores can achieve payback in short order. The UPC symbol was the basis for one producer gaining distribution in six supermarkets across two chains and paid back the barcode cost in a matter of weeks. Given this UPC bar code driven success coupled with the relatively high cost to initially obtain a bar code authorization, a portion of the grant monies, remaining as a result of not implementing the in-store test, was offered to members of the Maple Syrup Producers Association of Connecticut to financially assist them in obtaining UPC bar codes. Two producers took advantage of this offer and plan to have supermarket distribution in 2014.

Beneficiaries:

This project will benefit maple producers **in the 13 U.S. producing states** by charting a path or template for business growth. It will also benefit consumers, retailers, forest owners, including the Connecticut Department of Energy and Environment (CT DEEP), and other local specialty crop farmers. Consumer interest in purchasing local foods will be enhanced by greater availability of local agricultural products where they shop most often. Large retailers, like supermarket chains, will be more willing to distribute local foods that carry the UPC bar code. Forest owners will have the demonstrated success of maple tapping on the forest lands tapped in this project as reassurance that the use of their land for agricultural purposes can work for them. Finally, what has been demonstrated for maple products can be tailored to and followed by various other specialty crops.

Lessons Learned:

1) **Importance of the UPC bar code to big box store distribution.** The UPC bar code is virtually a prerequisite for gaining distribution in large big box stores. Their systems and processes are driven by scanning UPC's and products without bar codes increase costs and consumer dissatisfaction, e.g., looking up UPC's at the checkout slows the payment process and decreases front-end productivity. This project found the process for bar code purchase and authorization takes only a few minutes from GS1 and the cost, although relatively high, at the outset can be paid back relatively fast from the volume from just a few large chain stores.

2) **Necessary steps to gain long-term tapping rights on State owned land take time and effort.** State forests have a number of use applications and provisions that must be considered before a long-term agreement can be reached with a maple farmer. In addition to liability and financial considerations, they include the impact maple sap collection will have on recreational use of the property, water shed run off, the soils and trees and wild life restrictions. One example of what was not anticipated on the CT DEEP Glastonbury property was that it is a refuge for rattle snakes, which limits human access from April 1 until October 31. Many of the same considerations apply to private forests, where the owner may have similar concerns or their land may be under conservation easements that require special attention.

Winter Food: Growing, Storing, Marketing and Cooking Specialty Crops for the Cold Season

Connecticut Northeast Organic Farming Association, Inc. (CT NOFA)

Contact and Email: Eileen Hochberg, eileen@ctnofa.org

Awarded: \$73,346

Spent: \$73,346

Project Summary:

People need to eat all year long. As interest in local and sustainable eating, and the number of Winter Farmers Markets and interested consumers has quickly grown, there has been an increasing opportunity for Connecticut's fruit, vegetable and herb producers to provide for this expanding market by growing, storing, processing and marketing specialty crops through the winter. For example a talk given by CT NOFA on "Winter Food, Root Cellars and More" at Milford Library on March 22, 2010 attracted about 50 attendees.

This project was designed to increase the availability, sales, and consumption of winter specialty crops grown and stored on Connecticut farms through a range of educational and outreach activities.

Some growers have created innovative new ways, or resurrected old ways, to meet the need for winter foods, and many other growers have a need to learn how to more successfully implement strategies for meeting the demand for winter food. Ways to meet the need for winter food include season extension tunnels, root cellars, minimal processing and/or proper storage locations for crops like onions, garlic and squash. This project educated producers on market opportunities and best practices for growing, harvesting, processing and storing winter food.

In addition, there has been a need for consumer education on the availability and exciting flavors of winter specialty crops such as Gilfeather Turnip (not really a turnip!), and about ways to use the foods that are available in the winter including fresh greens, minimally processed fruits and vegetables and stored foods including root crops. A variety of outreach methods used in this project let consumers know about the flavor, availability and nutritional value of winter food grown in Connecticut, as well as how to minimally process, store and cook the food.

Project Approach:

Farmer Education: This project reached between 60-70 farm operations, and in many cases more than 1 farmer from each operation, with education on various aspects of winter growing, storing, processing and marketing winter food.

1) A total of seven on-farm workshops were held from fall 2010-fall 2012, one a month before final execution of the grant contract, and six over the course of the grant period:

- Cold Weather Crops, October 16, 2010, Common Ground HS, New Haven
- Greenhouse Growing, March 21, 2011, Wayne's Organic Garden, Oneco

- Greenhouse Growing, April 25, 2011, Holcomb Farm, West Granby
- Fall & Winter Planning, August 31, 2011, Common Ground HS, New Haven
- Greenhouse & High Tunnel Winter Growing, March 20, 2012, Starlight Gardens, Durham
- High Tunnel Growing, September 17, 2012, Community Farm of Simsbury
- Cold Storage of Fruits & Vegetables, September 19, 2012, New Haven County Extension Center, North Haven

As Greenhouse & High Tunnel growing proved to fill a great educational need for farmers and consistently drew large numbers of attendees, the following workshop was held in 2013:

- Greenhouse & High Tunnel Winter Growing, March 21, 2013, Yale Farm, New Haven

2) At CT NOFA's Winter Conferences in 2011 which had 400 attendees & in 2012 which had 600 attendees there were workshop tracks on Winter Food for farmers on growing, storing, processing and marketing Winter Food:

- My First Year Using a Heated Greenhouse (2011)
- Canning (2011)
- Winter Vegetable Gardening (2011)
- Growing Nuts in CT (2011)
- Quick Pickles: Make 'em today, eat 'em tomorrow! (2011)
- Growing Winter Greens in a Cold Greenhouse & Frames (2011)
- Growing Garlic (2011 & 2012)
- The World of Sprouting Seed in Winter (2011 & 2012)
- Can I Eat This? Fermented Foods (2012)
- Mushroom Growing on a Small Scale (2012)
- Root Cellars & Food Storage (2012)
- Collards & Other Cold Weather Greens (2012)
- How You Can Easily Grow Fresh Greens All Winter (2012)
- Winter Farmers Markets are Hot! (2012)

3) The Winter Food workshops proved to be in great demand and highly beneficial to farmers, so inclusion of them at CT NOFA's Winter Conferences will continue. The following Winter Food workshops were held at CT NOFA's Winter Conference in 2013:

- Growing Great Garlic
- Winter Growing: Have a Winter Salad
- Growing Nut Trees
- Inner Secrets of Seed Sprouting
- Winter Hoophouse Production
- 12 Month Profit from Specialty Crops & Greens
- Storing Produce for the Winter: Root Cellars and More
- Food Preservation
- Foraging for Mushrooms

- 4) The CT NOFA website's dedicated page for the Winter Food Project has educational resources for farmers on growing Winter Food.

Consumer Education and Promotion: This project was very successful in reaching thousands of consumers on various aspects of Winter Food at stand alone workshops and at Winter Conferences, as well as at other events throughout the state, through our e-newsletter, blog and website, and in publicity generated by our press releases.

- 1) Four workshops for consumers were held, one just before grant contract execution in fall 2010, and the remaining three in 2011:

- Preserving the Harvest, October 10, 2010, Common Ground HS, New Haven
- Preserving: Freezing and Drying, October 15, 2011, Common Ground HS, New Haven
- Preserving: Canning, October 15, 2011, Common Ground HS, New Haven
- Indoor Food & Flower Gardening, November 12, 2011, Common Ground HS, New Haven

- 2) CT NOFA's Winter Conferences in 2011 & 2012 featured Winter Food workshop tracks for consumers, who were also given the opportunity to take any of the workshops listed above for farmers. The same was offered at Winter Conference 2013, and proved to fulfill a demand for information.

Also at the Winter Conferences there were exhibitors focused on Winter Food, such as Riverbank Farm and High Hill Orchard.

- 3) From January - May 2011, from October - December 2011, and from January 2012 through January 2013 every issue of CT NOFA's Gleanings e-newsletter (21 issues in total) featured the Winter Food Project and Winter Food recipes. Gleanings reaches an audience of over 5,000 readers. Each e-newsletter is also archived separately on the CT NOFA website.

- 4) The Winter Food Project has a dedicated page on the CT NOFA website and includes a link to all the recipes published in the Gleanings e-newsletter. This page has received over 1600 unique visitors since the beginning of the project.

- 5) The CT NOFA blog featured the Winter Food Project and associated recipes from time to time in 2011, 2012 and 2013 and drew over 500 views.

- 6) We added a Winter Food feature to our CT NOFA display board and used it at many events throughout the grant period, including at CT Winter Conferences, the Hartford Flower Show, Ag Day at the Capitol, farmers market tabling, and many Earth Day and other gatherings.

- 7) CT NOFA's annual Farm & Food Guide has a hard copy distribution of 10,000 each year and also resides on the CT NOFA website. The website has over 138,000

unique visitors a year and the pages on which the Farm & Food Guides reside each year, which also has a link to the Winter Food Project page, gets between 9,000-10,000 unique visitors per year (<http://ctnofa.org/Farms.php>)

The 2011-2012 and 2012-2013 editions had 2--page educational spreads on the Winter Food Project, including:

- a recipe
 - ways that consumers can eat more Connecticut Grown fruits, vegetable and herbs in the winter, including participating in Winter CSAs, Winter Farmers Markets, stocking up on easy to store specialty crops, learning to use less common storage crops, and preserving crops
 - instructions with simple methods for storing various vegetables through the winter, depending upon which one of four conditions they need for storage
- 8) Overall promotion of workshops, conferences, etc. on CT NOFA's website, blog, newsletter, press releases, etc. brought additional attention to the Winter Food Project.

Goals and Outcomes Achieved:

Farmer Education: The goals for Farmer Education on how to grow, store, process and market winter food, and the outcome of the goals:

- **Hold 3 on-farm Winter Food workshops in 2011 and another 3 in 2012, for a total of six on-farm workshops.**
All 6 of the on-farm Winter Food workshops were held, with an additional 1 being held immediately before final grant execution, and another additional 1 held on the first day of spring in 2013 - for a total of 8.
- **Develop a Winter Food workshop track for farmers at CT NOFA's Winter Conferences in 2011 and 2012.** These proved so successful that Winter Conference 2013 also included a full offering of Winter Food workshops, which will be the case at all future Winter Conferences.
- **The goal was to reach at least 60 farm operations through the farmer education activities of this project.** A conference in partnership with the Yale Sustainable Food Project that was a goal of this project was cancelled by Yale, but the other workshops and conferences succeeded in attracting participation from at least 60-70 farm operations, and often more than 1 attendee per farm operation.

Changed Behavior Among Farm Operations

- **We will reach at least 60 farm operations through the three conferences and four on-farm workshops.**

This goal was achieved:

- At least 60-70 farm operations, and often more than 1 attendee per farm operation, attended the Winter Food stand alone workshops, as well as the workshops at the Winter Conferences.

- At least 8 farms created new, or improved existing, systems for producing, processing or storing specialty crops for winter food as a result of the conferences and follow up workshops.
- Please see the next goal for the details of the outcome related to the above point.
- **Five farms will adopt a new, or expand an existing strategy for growing, storing and/or marketing Winter Food.**

This key goal was met. At least eight farms adopted a new, or expanded an existing strategy for growing, storing and/or marketing Winter Food, as outlined here:

- A follow up survey was sent to 52 respondents who attended CT NOFA Winter Food workshops, and 12 farms answered.
- Among those 12 farms, 10 market food during the winter season and 2 don't.
- Of the 10 who do market food during the winter season, 5 started marketing winter food after attending a CT NOFA Winter Food workshop held under this grant and 5 had been doing so beforehand.
- Of those 5 farms that had been selling winter food, 3 of them increased their winter food sales after attending a CT NOFA workshop.
- In addition, 2 of the respondents have a commercial root cellar storage facility, 1 of which had been put into use after attending a CT NOFA Winter Food workshop.
- Of the 10 farm operations that market food during the winter season, 8 are interested in further increasing sales and 2 may be interested.
- 11 of the 12 respondents are interested in growing winter food crops in the upcoming season.

Additional outcome:

- All 12 respondents are interested in further education, workshops on growing, storing and marketing Winter Food.
- When asked about further education, farmers indicated wanting to learn about planning, off-grid greenhouses, solar power, glass houses/cold frames, what grows and sells best in high tunnels in winter in CT, and about sources of funding and community support. One farmer eloquently said, "The greenhouse course at Yale was a tremendous resource for us as we set up our high tunnel. Help with developing a market is the next step, and having a peer (or peer group) to visit and critique our operation - though inevitably humbling - would be a benefit as we learn the ropes. I believe we can all learn from each other and in-the-field training is always essential in the translation from theory to practice."

- **Institutions will connect with farmers who will supply them some winter food.**

This goal was achieved:

- The chef at the Unquowa School in Fairfield attended at least one Winter Food workshop at the 2012 Winter Conference, "Collards & Other Cold Weather Greens, taught by a chef, a farmer and a naturopath. This workshop including tasting , cooking and learning about the nutritional qualities of collards, kale and swiss chard. The chef learned new winter food recipes, and connected with farms such as Sport Hill Farm in Easton and Urban Oaks Organic Farm in New Britain for the purchasing of winter greens
- West Hartford Public Schools connected with Urban Oaks Organic Farm in New Britain for the purchasing of winter food, whose wholesale sales, including farm to school sales, increased after Urban Oaks' participation in Winter Food workshops at Winter Conference in 2011
- Central Connecticut State University in New Britain also connected with Urban Oaks Organic Farm in New Britain for the purchasing of winter food, whose wholesale sales, including farm to school sales, increased after Urban Oaks' participation in Winter Food workshops at Winter Conference in 2011

Consumer Education

The goals for Consumer Education on the availability, flavor, nutritional value of Winter Food and how to store, process and cook it, and the outcome of the goals:

- **Add a Winter Food Project section to the CT NOFA website for consumers and farmers, and include Winter Food recipes.**

This site was added and drew over 1600 unique visits. Although not originally listed as a goal of the project, the Winter Food Project appeared in the CT NOFA Blog in 2011, 2012 and 2013 and reached 500 readers, and also was linked to Facebook.

- **Design a Winter Food Project section of CT NOFA's Gleanings newsletter featuring Winter Food recipes, and include this section in the newsletter 11 times during winter 2011 and 2012.**

This section was created and included in 21 issues, double the number in the Project Plan, and the newsletter is also archived on the CT NOFA website.

- **Include Winter Food Project pages in the 2011-2012 and 2012-2013 Farm & Food Guides**, which have a hard copy distribution of 10,000 each year, and also reside on the CT NOFA website. The Farm & Food Guides in each of those years featured full 2-page spreads with important information on purchasing, cooking, preserving and storing Winter specialty crops.

- **Have Winter Food tracks for consumers at Winter Conference 2011 (which drew 400 attendees) and 2012 (600 attendees).**

This was done with tremendous success, and was also repeated in 2013 (800 attendees). The Winter Conferences also included exhibitors who were focused on Winter Food. In addition, although not part of the Project Plan, over the course of the project there were 3 stand alone workshops for consumers on Winter Food and its preservation, and there was an additional 1 held just prior to final grant contract execution.

- **Create a Winter Food display board for events.**

This display board reached thousands of consumers at CT Winter Conferences, the Hartford Flower Show, Ag Day at the Capitol, farmers market tabling, and many Earth Day and other gatherings.

Beneficiaries:

This project was designed to increase the availability, sales, and consumption of winter specialty crops grown and stored on Connecticut farms through a range of educational and outreach activities.

The beneficiaries of this project clearly included the 60-70 farm operations that learned valuable information on implementing or expanding upon existing strategies for the growing, storing, processing and marketing of specialty crops through the winter. Follow up survey results show changed behavior among the farms who attended Winter Food Project workshops and implemented winter food sales or increased them, are interested in further increasing sales, growing winter foods in the upcoming season, and learning more from additional workshops.

Beneficiaries included the Farmers Markets, CSAs, restaurants, schools and other wholesale customers, and farm stand consumers the farmers indicated selling to in the follow up survey.

In addition, thousands of consumers were reached with information and education on the availability, flavor and nutritional value of winter food grown in Connecticut, as well as how to minimally process, store and cook the food. Not only were these consumers direct beneficiaries of the project, but farms throughout Connecticut, as well as farmers markets and restaurants, have benefitted from increased consumer interest and demand.

Lessons Learned:

The Winter Food Project confirmed CT NOFA's understanding prior to the Project that as interest in local and sustainable eating, and the number of Winter Farmers Markets and interested consumers has quickly grown, that there has been an increasing opportunity for Connecticut's fruit, vegetable and herb producers to provide for this

expanding market by growing, storing, processing and marketing specialty crops through the winter.

Even with the cancellation by Yale of a conference to be held in partnership with CT NOFA in fall of 2010, CT NOFA had no problem at all reaching and educating between 60-70 farm operations on strategies for growing, storing, processing and marketing of specialty crops through the winter. Survey results show changed behavior among farm operations attending Winter Food farmer education activities offered under this grant, and a strong desire for more. This has contributed to an increase in the competitiveness of Connecticut Grown specialty crops, specifically storage crops and winter grown produce.

In addition, consumers are indeed hungry for information about Winter Food, including the various methods for preserving food, which has emerged as a very popular topic and workshops on the subject, both stand alone and at 3 Winter Conferences, drew large numbers of attendees.

Views of the Winter Food Project content on the CT NOFA website and blog were consistent with high interest in Winter Food.

The emphasis on Winter Food, and its importance and opportunities for growers and consumers, will continue as an important topic in CT NOFA programming, and publicized in a press release with follow up survey results. Future programming will include farmer and consumer workshops, both stand alone and at Winter Conference. The first day of spring annual Greenhouse workshop promises to continue into the future.

Additional Information:

Additional information for this project can be found in Appendix C.

Genetic Improvement of Christmas Trees for Connecticut Farms

Connecticut Christmas Tree Growers' Association

Contact and Email: Kathy Kogut, wkogut@cox.net

Awarded: \$36,092

Spent: \$36,092

Project Summary:

Christmas tree production is an important agricultural activity in CT: 495 farms have 4,830 acres in production representing annual sales of approximately \$18,000,000. Locally grown natural trees must compete with artificial trees and those grown at a great distance from our markets. A competitive advantage for locally grown trees can be obtained by ensuring that our trees are of exceptional quality. Critical needs to ensure high quality are improvements in needle retention properties and resistance to root rots, which limits production of valuable true firs. Growers planting firs continuously in fields usually find that with each successive crop an increasing proportion of firs dies due to root diseases. Field tests of Canaan fir and different families of Turkish and Nordmann firs were conducted at cooperating growers' fields and at CT Agricultural Experiment Station (CAES) farms to determine those with the best survival, growth, color, and shape. Overall ranking of performance was consistent across sites: some Turkish and Nordmann provenances are superior to Canaan fir in non-frost prone locations. Loss of central leader buds and the surrounding whorl of terminal buds from late frosts will be problematic for both limiting tree growth and disfiguring trees among the European species until late-bud break genotypes are developed through selection. A small number of exceptional trees found in these trials will be transplanted to the CAES Griswold Farm to establish a permanent seed production nursery to sustain competitive CT Christmas tree production. Other species have been grown in a nursery at the CAES Valley Laboratory, in preparation for field planting. West Himalayan firs were killed by the Connecticut winter. The performance of the other species will require about three more years of field growth for evaluation. This project permitted us to collaborate with five other states and Denmark in a fir genetic improvement project; as a result, an additional 6,000 seedling firs, mostly Turkish and Trojan firs, were planted at two Connecticut sites in 2013.

Project Approach:

This project has used field selection under adverse growing conditions to find true firs with exceptional growth characteristics. The original proposal had two major activities to accomplish the overall objectives of genetic improvement. The first part was to field test at three sites commercially available transplants to screen them for superior survival, growth, color, and shape. The second activity was to test additional species available only from seed. A third opportunity presented itself, in which we were able to participate. This was a carefully coordinated and executed program called CoFirGE (Consortium for Fir Genetic Enhancement), that mounted a seed collection expedition to Turkey so that a properly designed genetics experiment based on evaluation of about 100 families could identify trees with superior genetics.

Goals and Outcomes Achieved:

Five to 10 exceptional trees have been identified. The total number is not as important as their quality, however and believe that the criteria we were looking for has been fulfilled as that will be suitable for starting a seed orchard. For one thing, firs can be grafted, and so even three or four outstanding trees could be turned into an entire forest of a seed plantation. There will be many more trees coming out of the 2013 planting. Fir mortality was assessed and Trojan fir (Family #85) has suffered no mortality yet at either of the two test farms. When taking the planting conditions of wet mud into consideration, this is quite astonishing.

Part 1 identified superior genetic material among commercially available transplants. Plantings took place during spring of 2010 at two collaborators' farms and at the Valley Laboratory of the Connecticut Agricultural Experiment Station. Original plans to isolate and inoculate trees *Phytophthora* proved to be impractical, as (a) plant pathologists were unable to isolate a strain of this pathogen from Christmas trees in Connecticut and (b) conditions at the three sites were already conducive to root disease, as indicated by the high mortality among Fraser firs (included in the trial because they are known to be susceptible to root diseases).

Overall performance of the firs can be compared in the table on the next page. Highlighting indicates acceptable performance for a particular characteristic, and when the species and source is also highlighted, that indicates that the overall performance for all three characteristics may be acceptable.

Several results are striking from this large experiment. First, there was generally consistent performance across sites for each type of tree (species and source), even though two sites had heavy textured soils and the third site (upper right table), the Valley Lab, had excessively droughty soils. Poorer overall growth at the droughty site suggests that drip irrigation could significantly shorten production cycle at similarly droughty sites. At one site (in the upper left table), the trees were so vigorous that Canaan fir, the fastest growing species, will mostly be ready to harvest in 2014. At the other two sites, Canaan fir, although having the highest growth rate, is showing signs of root disease (manifested as poor needle color) and may not survive to harvest. It is understood that trees can either use photosynthates for defense or for growth. That is clearly illustrated in these tables by the pattern of growth vs. survival. Species like Fraser and Canaan firs, and the two hybrids had exceptionally high initial growth rates (growth of Fraser fir in this table does not show the high early growth rates, as the few left of this species are now dying) and are generally showing poor survival, except for Canaan fir at one site. Nordmann and Turkish firs generally have better survival and exceptional color, but generally have poor vertical growth. Trojan firs are an outlier: they have fairly rapid vertical growth, good color, and high survival.

Unfortunately, all of these exotic firs have earlier bud break than the Fraser and Canaan firs, and so they have suffered loss of the terminal leader and uppermost whorl buds as

a result of late frost (mostly in 2012). This was most pronounced at one site, where trees were planted in a frost pocket. Trojan fir, with the earliest bud break, has grown into deformed specimens at this site, and so probably cannot be planted in similar frost-prone locations.

A few individuals of Turkish and Nordmann firs have shown no loss of buds from late frosts. These exceptional individuals can be presumed to have later bud break than the rest of their cohort, and will be dug for transplanting to the Griswold Farm of the CAES to start a fir seed plantation.

Table 1. Comparison of commercially available transplants. C, Canaan fir; E, Trojan fir; F, Fraser fir; H, hybrids; N, Nordmann fir; T, Turkish fir. Grow13, terminal leader growth (cm) in 2013; color13, color rating (0 is brown, 1 is yellow, 2 is acceptable green) in 2013; surv13, percent survival from the time of planting to November 2013. Each sub-table is from an individual site. Green highlighting indicates acceptable growth characteristics. Values in the table are averages from surviving trees out of the sixty trees (6 replicates of 10 trees) of each source that were planted at each of three sites.

variety	grow13	color13	surv13
C1	44.4	1.9	86.7
E1	24.0	2.0	95.0
F1	28.3	1.3	48.3
H1	32.2	1.9	35.0
H2	29.0	1.8	40.0
N1	24.6	2.0	90.0
N2	22.0	2.0	91.7
N3	18.3	2.0	100.0
N4	21.8	2.0	100.0
N5	15.5	2.0	73.3
N6	15.3	2.0	98.3
N7	6.9	2.0	43.3
T1	21.7	2.0	88.3
T2	27.3	2.0	93.3
T3	20.3	2.0	98.3

variety	grow13	color13	surv13
C1	33.3	1.3	85.0
E1	19.5	2.0	90.0
F1	5.9	0.5	5.0
H1	18.0	1.1	28.3
H2	22.0	1.3	48.3
N1	21.5	2.0	98.3
N2	21.1	2.0	86.7
N3	11.1	1.9	78.3
N4	15.4	2.0	96.7
N5	9.7	2.0	73.3
N6	11.0	2.0	80.0
N7	5.3	2.0	75.0
T1	21.7	2.0	60.0
T2	22.2	2.0	95.0
T3	11.6	2.0	98.3

variety	grow13	color13	surv13
C1	19.9	1.6	60.0
E1	20.2	1.9	85.0
F1	18.4	1.5	45.0
H1	14.2	1.6	50.0
H2	18.6	1.8	43.3
N1	17.3	2.0	93.3
N2	15.0	2.0	86.7
N3	11.6	2.0	86.7
N4	12.2	2.0	91.7
N5	8.5	2.0	70.0
N6	10.4	2.0	78.3
N7	10.7	2.0	81.7
T1	16.0	2.0	61.7
T2	14.7	2.0	96.7
T3	13.5	2.0	86.7

Part 2. Other species of true firs were obtained as seeds from F. W. Schumacher Co., Sandwich, MA, and grown at Itasca Nursery in Minnesota. They are now in nursery beds at the CAES Valley Laboratory in preparation for field planting in 2014. West Himalayan firs were found to not be hardy enough to survive winters in Connecticut. The performance of the other species (of special interest are Shensi, Toros, and Veitch firs) will require about three more years of field growth for evaluation.

Part 3. Seed from Turkish and Trojan firs were collected by Drs. Chal Landgren, Gary Chastagner, and John Frampton from Oregon State, Washington State, and North Carolina State Universities, respectively, and collaborators in Turkey during 2011.

These seeds germinated and grew quickly at Kintigh Nursery, and were shipped to collaborators in the CoFirGE project during spring of 2013. Individual transplant plugs were labeled, and the trees were planted in a 100-treatment randomized complete block design. Thirty replicates (3,000 trees) were planted at the Lockwood Farm of the CAES in Hamden, CT, in a field that had been cleared and prepared expressly for this project. Another 30 replicates were planted at a cooperator's farm site in Somers, CT. Both sites were chosen because they have drainage problems and relatively heavy textured soils. Any firs surviving at these sites must have exceptional genetic qualities. The Lockwood Farm site has been evaluated for transplant survival in November, 2013; data are presented in the table below. Other species in the test (such as Nordmann, balsam, etc...) were included in the trial for comparison purposes. Clearly, the European species of fir are more tolerant of wet sites and heavy soils than are the North American or Korean firs.

Table 2. Survival among 3,000 plug transplants at the Lockwood Farm, Hamden, CT, in 2013. Source is the province and locale in Turkey where seeds were collected. "n" is the number of half-sibling families planted in the trial.

Species	Source	n	Mortality (%)
Turkish	Bolu-Kokez	20	12
Turkish	Karabuk-Kaltepe	20	14
Turkish	Adapazari-Dokurcun	16	11
Trojan	Balikesir-Kazdagi	19	21
Trojan	Cannakale-Can	14	11
Nordmann	Various	5	7
Noble	Special selection	1	84
Balsam	Weyerhaeuser	1	57
Concolor	Weyerhaeuser	1	81
Fraser	Weyerhaeuser	1	63
Grand	Weyerhaeuser	1	60
Korean	Weyerhaeuser	1	56
Turkish	Kintigh Nursery	1	13

Among the outcomes achieved in this project, we have identified sources of firs of superior genetics to Canaan fir, the previous leading choice for planting in heavier soils in Connecticut. Among these, Trojan, Turkish and Nordmann accessions are worthy of planting in sites where growing North American firs has been difficult. In frost-prone areas, however, Turkish or Nordmann firs selected for late bud break will be required to prevent the deforming effects caused by frost, with its resulting bud loss. Individuals with the latest bud break of these species have been noted in the field; it will be exciting in 2014 to start the seed plantation with these exceptional trees. At one site, we found that Canaan fir grew very quickly, and the exotic firs performed poorly due to frost injury. At sites like this, it will make sense to continue to grow Canaan fir, but to use additional measures to avoid root disease with cultural practices to minimize the "disease triangle," perhaps by establishing raised beds and using products such as phosphites to induce innate resistance to disease.

The outcomes from this work was disseminated at:

1. Oral presentations were given by (1) by R. Cowles and J. F. Ahrens on July 18, 2012, to approximately 40 Connecticut Christmas tree growers at the CCTGA summer meeting, Windsor, CT, on the subject of Turkish, Nordmann, and Trojan fir survival relative to native firs, and
2. the same subject presented by R. Cowles to approximately 40 Connecticut Christmas tree growers at a CCTGA summer meeting at a cooperating farm in Somers, CT, on June 11, 2013, and
3. again in Windsor, CT, on July 23. Data were available at the last meeting and growers were warned of Trojan fir's unusually early bud break relative to the other species grown.
4. Growers have been informed of this project through *The Real Tree Line* industry newsletter.

One grower in Brooklyn, CT mentioned he purchased Turkish fir trees for planting at his farm, based upon the results from our field trial, and the interest is growing to plant these root rot resistant trees on farms suffering losses from disease.

Beneficiaries:

A few growers in Connecticut have already started purchasing Turkish fir transplants to establish in fields where they have had difficulty growing other species of firs. Eventually we expect many Christmas tree growers in Connecticut and elsewhere will benefit by having plant material that will not be so susceptible to root diseases.

Without this effort Christmas trees will become more expensive to grow, and their production may become uneconomical, as growers' losses increase from root rots. Therefore, this project is not only central to being able to grow affordable real trees, it is essential for the viability of Christmas tree production in CT. Without this effort, Connecticut consumers may have to either buy lower quality species of trees, or trees that are shipped from distant sources.

Lessons Learned:

(1) Our expectation that we could use artificial inoculation with pathogens, and to use berms around individual trees to create flooded conditions conducive to root rots, were completely unnecessary. Field sites where there has been a history of loss of trees from root rots are adequate for doing the challenge tests needed for eliminating trees that are susceptible to root diseases.

(2) The disfiguring effects of frost were much more pronounced than was anticipated. An additional rating of trees for tree shape and fullness is necessary to capture the importance of late bud-break characteristics needed for growing Christmas trees.

(3) In frost-prone locations, Canaan fir will have to be grown. Other horticultural techniques may be required to create conditions in which this species can survive root

diseases long enough to allow harvest. Because Canaan fir can grow extremely rapidly, a harvest cycle could be as short as four years from the time of planting.

(4) Excessively droughty soils severely limit the growth of fir trees. Providing trickle irrigation at sites prone to dry soils may significantly reduce the number of years of growth until harvest, and could reduce stress that may predispose trees to root disease.

Additional Information:

Susceptible to root rots



Highly resistant to root diseases



Figure 1. Representatives for the species of true firs grown in Connecticut to investigate their suitability as Christmas trees. Trees were planted in 2010 and photographed in 2012. For Nordmann and Turkish firs, the fastest and slowest growing sources are represented for these species. Note that in spite of their fast initial growth, all the species above the line were found to be susceptible to root diseases, and so may not survive to marketable size. Images are presented at approximately the same scale.

Evaluating landscape adaptability of novel native shrubs as alternatives to invasive exotics for the nursery industry

University of Connecticut

Contact and Email: Jessica D. Lubell, Jessica.Lubell@uconn.edu

Awarded: \$55,892

Spent: \$53,879

Project Summary:

The nursery and landscape industry is facing the loss of some of its most important landscape shrub crops due to their invasive tendencies. Consumer awareness of invasiveness has reduced sales of important species and plant bans have eliminated the crops in some areas. For example, Japanese barberry (*Berberis thunbergii*) and winged euonymus (*Euonymus alatus*) have been banned in Massachusetts and New Hampshire and the Connecticut Nursery and Landscape Association is enacting voluntary bans on problematic barberry and euonymus cultivars. Major wholesale nursery producers in Connecticut indicate that sales of invasive shrubs are down as much as 60% (personal communications).

A widely recognized solution to the loss of invasive shrubs is the increased use of native shrubs for landscaping. Barberry and euonymus are among the most popular landscape shrubs because they are highly adaptable to variable landscapes and perform well under difficult growing conditions such as parking lot island plantings. If native plants are going to be successful as replacements for invasive species, it is critical that they be well adapted to challenging landscape sites. The nursery industry needs a substantially broadened palette of versatile and adaptable native plants in order to meet the growing desire of landscapers and consumers to utilize native plants in landscaping. The identification of well-adapted native plants will enable the nursery industry to produce plants that will be successful in landscaping and profitable in the long run.

Project Approach:

The first round of experimental plantings was established in a large commuter parking lot on the University of Connecticut campus in Storrs, CT in June 2010. Included in the planting were six Connecticut native shrub species and two invasive shrubs, which were treated as controls. The native species were *Cephalanthus occidentalis* (buttonbush), *Comptonia peregrina* (sweetfern), *Corylus americana* (American filbert), *Diervilla lonicera* (northern bush honeysuckle), *Myrica gale* (sweetgale) and *Spiraea tomentosa* (steeplebush), and the control species were *Berberis thunbergii* (Japanese barberry) and *Euonymus alatus* (winged euonymus). The experimental planting was organized as a randomized complete block design with six replications and installed within each replicated planting were 5 individual plants of each species. In total, 240 shrubs were planted. Plant size measurements were taken at the time of installation and in July of 2011 and 2012. Plants were also evaluated each year in late summer for aesthetic quality. The first round of the study produced extremely positive results with 5 of the 6

native species performing as well as the control invasive species after three growing seasons.

During the 2011 growing season native plant material was propagated for the second round of experimental plantings, which was installed in spring 2012. The native species that were included in the second round are *Cornus racemosa* (gray dogwood), *Cornus rugosa* (round leaf dogwood), *Eubotrys racemosa* (sweetbells), *Lindera benzoin* (spicebush), *Prunus pumila* var. *depressa* (eastern sand cherry), *Rosa virginiana* (Virginia rose), *Sambucus canadensis* (elderberry) and *Vaccinium corymbosum* (highbush blueberry). The same two control species were planted and a similar replicated design was used. In total, 250 shrubs were planted. Data on plant size and aesthetic quality was measured yearly. The second round study will be completed in summer 2014. A graduate student studied propagation and production strategies for several of the native shrub candidates.

Goals and Outcomes Achieved:

1. This project identified eight native shrubs species that will perform well in harsh, commercial landscape sites, such as parking lot islands. This finding far exceeded our goal of a minimum of four species that performed at 75% or greater than the control invasive species.
2. This project identified 12 native shrub species that will perform well in garden sites typical of residential landscapes. This finding far exceeded our goal of six plants.
3. Several resources have been produced to increase grower, landscaper and homeowner awareness of native shrubs.
4. Two of the largest wholesale nurseries in Connecticut have already begun adding native species identified in this project to their production lines. In 2014, five wholesale nurseries will each add a minimum of three of the native species identified to their production lines. In 2015, eight wholesale nurseries will be surveyed by the P.I. to determine the increase in production levels of identified native shrubs.
5. The results of this project were disseminated to the nursery, gardening and scientific communities through publications and presentations.

Beneficiaries:

There are 96 operations marketing nursery crops in Connecticut, according to the latest Census of Horticulture (1998), and these operations generated over \$77 million in total sales in 1998. The annual retail value of Japanese barberry and winged euonymus in Connecticut is \$10 million dollars (CNLA bulletin, 2005). One large nursery grower in Connecticut estimates that 15% of his current production line consists of native plants (personal communication). This project was successful in identifying new native plants

for growers to help replace lost sales from Japanese barberry and winged euonymus, and may generate sales beyond the levels produced by barberry and euonymus

Lessons Learned:

An unexpected element of this study, was the heavy deer presence at the study site, which was parking lots islands on the University of Connecticut campus in Storrs, CT. Deer browse became an important component of the evaluation process.

Additional Information:

The P.I. has produced three fact sheets on topics related to Connecticut native shrubs and a guide entitled *Native shrubs: A guide to landscape use*. These are available for download (<http://www.canr.uconn.edu/plsc/plsc/lubellcv.html>). The fact sheets and guide have all been well received and widely used by landscape groups and invasive plant groups. The P.I. wrote a six part series for the UConn, College of Agriculture and Natural Resources (CANR) Home and Garden News (500+ subscribers) entitled *From the Wild to the Landscape*. Each issue featured a different native species from the project and included information about the plant's natural history, ornamental traits, landscape uses, production and culture. An outgrowth of this project has been the Native Plant Gal facebook community page (<https://www.facebook.com/NativePlantGal>), which provides information about native plant landscape use, and propagation and nursery production and wild sightings. The P.I. is the primary administrator for Native Plant Gal, and makes posts two to three times weekly. Currently the page has 104 followers and reaches an average of 180 people per week.

To reach the grower audience, the P.I. wrote articles for trade publications including Connecticut Nursery and Landscape Association magazine, American Nurseryman, and Nursery Management. For Nursery Management, the P.I. produced a series of articles on natives, which spanned three issues of the magazine in 2013. Twice in 2013 the P.I. presented on native shrubs to Connecticut nursery producers, first at the Connecticut Nursery and Landscape Association (CNLA) summer meeting (40 attendees), and second at a twilight meeting for the green industry (80 attendees). The P.I. lead a tour of the native experimental parking lot plantings for CNLA board members in August 2012. To reach landscape architects, master gardeners, and groundskeepers the P.I. presented at meetings for the Connecticut Groundskeepers Association (CGKA) (125 attendees), Connecticut Chapter of the American Society of Landscape Architects (CTASLA) (40 attendees), Connecticut Invasive Plant Working Group (CIPWG) (50 attendees), and UConn Master Gardener Program (50 attendees). The findings from this work have been published in the peer-reviewed journal HortTechnology (<http://www.canr.uconn.edu/plsc/plsc/lubellcv.html>). The P.I. will to produce a second peer-reviewed publication on this work in 2014. The P.I. has presented on this research at the American Society for Horticultural Science annual conference in 2012 (50 attendees) and the International Plant Propagators' Society annual conference in 2013 (150 attendees).

Increasing the Competitiveness of New England Specialty Crops through the Harvest New England Association

Harvest New England Association

Regional Contact and Email: Jaime Smith, CT Dept of Ag, jaime.smith@ct.gov

Project Summary

New Englanders seldom think of their region as being plentiful and offering a diverse selection of agricultural specialty crops. Through increased use of the Harvest New England (HNE) logo by producers, wholesalers, and grocery stores, residents of New England will have an increased awareness and greater knowledge of the availability of regional produce.

As a result of activities conducted by HNE the following was accomplished:

1. Increased marketing of New England specialty crops.
2. Increased awareness of the HNE logo and New England specialty crops.

This was accomplished by:

1. Hosting two New England-wide marketing conferences
2. Redesigning the HNE website into a more user-friendly, information-filled website.
3. Developing the HNE logo brand guidelines to inform users how to properly use the logo to keep the standards of the logo consistent
4. Producing banners to line the Avenue of States on the Eastern States Fairgrounds during the annual Big E and year round.

The HNE logo was promoted to potential users, which include all specialty crop producers and distributors, and consumers at a variety of venues and opportunities. These venues will included the 2011 and 2013 Harvest New England Agricultural Marketing Conference and Trade Show, a complete redesign of the Harvest New England website, developing specification sheets for using the HNE logo, and installing light post banners on the Avenue of States during the Big E.

Project Approach

- 2011 and 2013 Harvest New England Agricultural Marketing Conference and Trade Show.
 - In 2011, 392 specialty crop producers and 483 in 2013 were educated on how use the HNE logo and better market their agricultural specialty crop products to New England consumers. In 2011, 54 scholarships were awarded to specialty crop producers from around New England who expressed hardships and could not have attended the conference otherwise.
 - The conference received great responses and feedback. The conference evaluation in 2013 asked attendees that participated in both 2011 and 2013 conferences if they had an increase in sales of specialty crops as a

result of marketing techniques learned at the conference. 78% of respondents said they did increase sales of specialty crops thereby solely enhancing the competitiveness of specialty crops in New England.

- Harvest New England website.
 - The website was made more user-friendly for both for the consumers as well as producer, wholesalers, etc. The logo can now be easily downloaded by specialty crop producers, wholesalers, and grocery stores. On the homepage, an overview of the program and drop down menus leading both consumers and producers to information has been added. New “Consumer Pages” providing information on locating New England specialty crop products, seasonality guide, and links to pertinent information such as the New England departments of agriculture websites have been added.
 - A “Producers Page” was also added and includes information on using the Harvest New England logo, logo brand manual, links to other webpages including the New England departments of agriculture websites, extension, among others. This is also the area where HNE can post timely information for the various specialty crop industries.
 - An events page was established. This is where the Harvest New England biennial conference can be highlighted along with any other relevant events.
- Spec sheets for the HNE logo.
 - The original specification ‘spec’ sheets for the HNE logo has been expanded to a more comprehensive logo brand manual. The manual outlines not only specifics of colors and logo graphic design components, but how the logo should be used on promotion materials, in sponsorship opportunities, electronically, etc. This more detailed manual is available for download prior to and after someone requests the download of the HNE logo. This manual will encourage a consistent use of the logo by specialty crop producers, wholesalers, and grocery stores.
- 28 light post banners on the Avenue of States at the Eastern States Exposition during the Big E were installed in 2011. They remained up for the 2012 fair and are anticipated to be up for the 2014 fair as well.
 - This increased the visibility of the logo by 1,201,428 New England consumers in 2011; 1,365,896 in 2012; and 1,481,917 in 2013 during the height of the harvest season in the region. Attendance in 2013 was reported to be the highest ever since the exposition started in 1917.

HNE ensured these funds solely enhanced the competitiveness of New England specialty crops through the following procedures:

- *2011 and 2013 HNE Conference:* Only specialty crop producers were given access to the HNE logo and only speakers pertaining to specialty crops received honorarium and other associated fees from these funds. Only specialty crop producers were awarded scholarships which was determined by an application process. Additional, non-SCBG funds were available to cover any expenses where non-specialty crop producers benefited or had the potential to benefit.

- *Harvest New England website update:* A disclaimer on the website specifying only specialty crop producers can utilize the HNE logo when marketing their product(s) regionally. Prior to downloading the HNE logo, producers are required to fill out an online form asking them their basic contact info and to list the general products for which the HNE logo will be used on.
- *Spec sheets for HNE logo:* A disclaimer prior to downloading the manual reminds producers that only specialty crop producers can utilize the HNE logo when marketing their product(s) regionally.

Goals and Outcomes Achieved

GOAL 1	To educate producers on how to use the HNE logo and better market their agricultural specialty crop products through the 2011 and 2013 Harvest New England Agricultural Marketing Conference and Trade Show.
Performance measure:	Specific questions on the evaluation form asked if specialty crop producers were better aware of how to use the HNE logo and market their specialty crop products as a result of attending the conference.
Benchmark:	Approximately 550 of the 800 attendees at the 2009 conference were specialty crop producers.
Summary of activities	A committee of representatives from around New England, in addition to all of the HNE board members, participated in brainstorming, planning, promoting, and executing the conference.
Original target:	At least 550 specialty crop producers will attend the conference in 2011 and 2013. A minimum of 10 scholarships will be awarded to specialty crop producers at the 2011 conference.
Actual target achieved:	In 2011, 392 specialty crop producers and 483 in 2013 attended the conference. 875 specialty crop producers in the end benefited from attending the HNE Conference. A total of 54 scholarships were awarded to specialty crop producers over the two years. At the 2013 conference 78% of respondents said they had an increase in sales as a result of marketing techniques learned at the 2011 and 2013 conference.

GOAL 2	To make the HNE website more user friendly and have a place where the logo can easily be downloaded by specialty crop producers as a result of updating and redesigning the site.
Performance Measure:	The number of logo downloads from the redesigned HNE website.
Benchmark:	There is no benchmark to compare to at this time.
Summary of activities:	A subcommittee of the HNE board of directors solicited three website firms and selected the most appropriate bidder. Website redesign and content was discussed and developed by the

	subcommittee and a firm was hired.
Original target:	A total of 50 downloads of the HNE logo per year will happen from the website.
Actual target achieved:	The information is still being collected at this time. However, it doesn't appear we'll meet the target of 50 downloads per year.

GOAL 3	To develop a specifications sheet which will give users guidelines on how to properly use the HNE logo.
Performance Measure:	The number of requests or downloads of the spec sheet from the HNE website.
Benchmark:	There is no benchmark to compare to at this time.
Summary of activities:	A subcommittee of the HNE board of directors updated the existing specifications sheets to a more comprehensive 15 page brand manual for the logo.
Original target:	A total of 50 downloads or requests of the spec sheet for the HNE logo per year.
Actual target achieved:	The information is still being collected at this time. However, it doesn't appear we'll meet the target of 50 downloads per year.

GOAL 4	To increase visibility of the logo to New England consumers during the height of the harvest season in New England as a result of producing light post banners to be on display during the Eastern States Exposition's, Big E.
Performance measure:	The number of attendees during the Big E.
Benchmark:	In 2009, 1.26 million people attended the Big E.
Summary of activities:	A New Hampshire company was hired to design and print the light post banners. Eastern States Exposition staff installed the banners prior to the 2011 Big E.
Original target:	To have at least five, up to 12, light posts banners developed with the HNE logo, promoting the purchase of specialty crops.
Actual target achieved:	28 light post banners were installed for the 2011 Big E. They were also on display for the 2012 and 2013 Big E. This allowed a total of 4,049,241 people to view the banners over the three years. The intension is for them to remain on the light banners for an undetermined amount of time.

The 2011 New England Agricultural Statistics (most recent available) reported that specialty crop sales increased by 97% since 2009. While this cannot be attributed solely to this project, it can be said this project is a contributing factor.

Beneficiaries

Specialty crop producers throughout New England had and still have the opportunity to benefit from using the logo to promote their New England Grown products. A total of

875 specialty crop producers benefited from attending the HNE Conference in 2011 and 2013.

Over 4 million people were exposed to the HNE logo at the 2011, 2012, and 2013 Big E combined. This raised awareness of the logo and availability of New England grown specialty crops.

Lessoned Learned

- 2011 and 2013 Harvest New England Conference:
 - Conference planning and execution went quite smoothly both years with no serious problems or delays occurring.
- Harvest New England Website:
 - The HNE website has been completed. The project was more substantial than originally anticipated and the project timeline was drastically off from the original project narrative submission. The website has been live since July 16, 2013.
- Specification Sheets for the HNE Logo:
 - The 'spec' sheet project was also seriously underestimated however turned out to be more economical to produce a 17 page brand guidelines than just a one page spec sheet. The brand manual is available on HNE's website.
- Light Post Banners at the Big E
 - This project was completed without and problems or delays.

Additional Information

[2011 Harvest New England Agricultural Marketing Conference and Trade Show](#)

[2013 Harvest New England Agricultural Marketing Conference and Trade Show](#)

Harvest New England Website: www.harvestnewengland.org

Harvest New England Brand Manual:
<http://www.harvestnewengland.org/hne-logo/>

Light post banners on the Avenue of States:



Getting it On the Air: Promoting the availability of Connecticut specialty crops to Connecticut radio listeners

Connecticut Department of Agriculture, Marketing Unit

Contact and Email: Jaime Smith, jaime.smith@ct.gov

Awarded: \$20,000

Spent: \$20,000

Project Summary:

In late summer the agency assessed the status of all sub-grantee projects under the 2010 FY SCBG program. It was determined not all of the funds originally awarded to the sub-grantees would be expended by the grant year end. At that time the agency concluded the best use of funds would be to reallocate the unspent balance on a new project which would solely enhance the competitiveness of Connecticut specialty crops.

Through the pre-approved reallocation of SCBG funds, specialty crop-specific radio advertisements were conducted from September to December. September's focus was apples, October was mums and pumpkins, November was wine, December's was Christmas trees. This project allowed for promotions of Connecticut specialty crops in an area that is often too expensive for small state commodity associations to take advantage of.

The funds were encumbered before September 30, 2013. The project was completed and funds were expended prior to by December 29, 2013. The following radio promotions were conducted for apples, pumpkins, mums, wine, and Christmas trees:

- 75 sponsor ids
- 225 promotional spots
- 160 15-second marketing spots,
- 15 weeks of a rotating sponsor banner on WNPR's website
- Inclusion in all print and e-blasts from WNPR.

Project Approach:

This new project was intended to bring awareness to Connecticut consumers about the availability and diversity of Connecticut specialty crops in the 'off growing season'. The late fall, holidays, and early winter are a time in Connecticut when consumers stop thinking about buying local farm products. This project reinforced the year-round availability of specialty crops through specialty crop-specific radio promotions.

The radio marketing campaign focused on five specialty crops: apples in September, mums and pumpkins in October, wine in November, and Christmas trees in December. While apples, mums, and pumpkins are more commonly recognized, wine, and Christmas trees are often forgotten as an available specialty crop in Connecticut. This radio marketing campaign will work to change that mentality and increase sales on all five of the featured specialty crops.

Goals and Outcomes Achieved:

The goal was to increase site visits to the agency website where consumers could find information on where to buy Connecticut specialty crops as a result of the radio marketing campaign. We aimed at increasing website visits by 10% over the baseline. The following was accomplished:

- Apples: 7.67% increase
- Greenhouse/Nursery (mums) and pumpkins: 14.02% increase
- Wine: 16.76% increase
- Christmas Trees: 17.5% increase

Overall the average increase of visitors to the website was 13.9%.

Beneficiaries:

Connecticut has 72 orchards, 332 pumpkin growers, at least 500 nursery/greenhouses growing mums, 32 farm wineries, and 73 Christmas tree growers. All of whom benefitted from the project. In addition, Connecticut consumers also benefited from increased awareness and purchasing availability of Connecticut specialty crops.

The close proximity of neighboring states also gave the focused specialty crops an advantage given the broadcast area of the radio stations. Consumers in border states were made aware of Connecticut specialty crop products when they may not have known otherwise.

Lessons Learned:

Utilizing unspent funds of sub-grantees was a very beneficial way for the agency to continue to solely enhance the competitiveness of Connecticut specialty crops. Once the project was approved, the process of working with the radio station went smoothly and promotions ran on time without any problems.

Additional Information:

Language for the radio promotions for each month along with the banner ads can be found here: <http://www.ct.gov/doag/cwp/view.asp?a=3243&Q=537198&PM=1>