Specialty Crop Block Grant Agreement No. 12-25-B-1493

Final Performance Report to USDA-Agricultural Marketing Service

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Submitted by

VERMONT
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Project 1: Life Beyond Chilean Nitrate: Identifying Mineralization Rates of Organic Nitrogen Sources – Final Report (Previously Accepted)

PROJECT SUMMARY

The commonly-used product Chilean nitrate, NaNO3, is scheduled to be removed from the OMRI-approved list of organic fertilizers. Also called Natural Nitrate of Soda, Chilean nitrate is mined in northern Chile, and is an effective fertilizer for cold soils and regions like Vermont. Chilean nitrate has an N-P-K analysis of 16-0-0 and is comprised of soluble, plant-available nitrogen, so it does not require biological activity to immediately release nitrogen into an available form for plant uptake.

Nitrogen can be a limiting factor in successful organic production, and must be managed carefully. Without Chilean nitrate as a source of immediately available nitrogen, organic producers will need to identify strategies to replace this product and continue to meet the nutrient requirements of their crops. If the timing of a fertilizer application does not provide available nitrogen in the soil at similar phases of plant development, the removal of Chilean nitrate could be debilitating for organic producers. In addition, certified organic fertilizers can often be prohibitively expensive, therefore, understanding the most appropriate application rate will maximize production without over-application, saving farmers money and protecting natural resources. Information on substitute soil amendment products, along with regionally-specific recommendations for their application will allow the transition away from Chilean nitrate to be successful, mitigating profit losses and crop failures.

According to the USDA National Organic Program Rule, Chilean nitrate is allowed on certified organic farms but can only account for 20% of the farm's total nitrogen requirements (National Organic Standards Board Technical Advisory Panel Review, 2002). This means that many farms are already using other organic fertilizers as soil amendments in order to meet the nutrient requirements for their crops. However, many fertilizers approved for use on organic farms have low levels of nitrogen and slowly mineralize into plant available N when soils have warmed to a level conducive for microbial activity. Because ideally, nitrogen availability would occur simultaneously with plant uptake, understanding the rate of mineralization from other organic fertilizers is crucial. The goal of this project was to assess the characteristics and nitrogen availability of Chilean nitrate alongside several other common organic amendments.

This project will allow growers to continue to compete in the organic market by facilitating the successful production of vegetables, berries, and specialty crops. By working to come up with recommendations that can meet nitrogen requirements for specific crops, without the use of Chilean nitrate, the project has the potential to benefit farmers tremendously. This is a pressing issue, as Chilean nitrate may no longer be approved for organic use and organic producers will need technical assistance in replacing the product with other soil amendments.

The project did not build on any SCBGP-funded projects awarded to us in the past, but coincides well with work done through UVM Extension, and the Northwest Crops & Soils Program specifically, regarding nutrient management, soil health, and successful organic production.

PROJECT APPROACH

Activities performed throughout the project are summarized in Table 1.

Project Activity	Who	Timeline
Determine alternative N amendments	NW Crops & Soils Team	July 2012
	VT Veg & Berry Assoc.	
	NOFA-VT	
Source soil, fertilizers, & supplies	NW Crops & Soils Team	August 2012
Analyze amendments for N content	UVM AETL	August 2012
Incubation study	NW Crops & Soils Team	September – October 2012
End of first incubation study due to power outage and faulty incubator.	NW Crops & Soils Team	October 2012
Present initial findings at VT Veg & Berry Association Meeting	NW Crops & Soils Team	January 2013
Resample soils and purchase amendments for rerun of trials	NW Crops & Soils Team	June 2013
Setup experiment and began resample of treatments	NW Crops & Soils Team	July 2013
Sample incubation treatments bi-weekly	NW Crops & Soils Team	July - September 2013
Present project and current results at Annual Northwest Crops Field Day	NW Crops & Soils Team	August 2013
Analyze samples for nitrogen and plant available nitrogen	UVM AETL	October - December 2013
Analyze data, summarize results	NW Crops & Soils Team	January – May 2014
Present results at summer field days in Randolph, Westfield, and Alburgh	NW Crops & Soils Team	July, August, September 2014
Present final results to farmers stakeholders at NGGA, NOFA, VEG meetings.	NW Crops & Soils Team	January – March 2015

Materials and Methods for Incubation Study Conducted

Amendments

The treatments for this project were soil amendments frequently used by organic producers in northern New England to supply nitrogen (N) to their crops. The amendments evaluated were composted dairy manure (Moo Doo, Addison, VT); blood meal (Oliver Seed, Milton, VT); Chilean nitrate (North Country Organics, Bradford, VT); Giroux's poultry litter (Giroux's Poultry Farm, Chazy, NY); Kreher's poultry manure (Kreher's Poultry Farms, Clarence, New York); commercially available blended fertilizer ProGro (5-3-4 North Country Organics, Bradford, VT); locally produced seed meals (soy, canola, and sunflower); and Feather meal (Northeast Ag).

Amendments were stored at 4ºC until the project began at purchased moisture levels. Total nitrogen content of the amendments was analyzed by grinding dried amendments (105ºC for 24 h) to pass a 2-mm sieve, and then combusting the dried and ground samples, with thermal conductivity detection using a FlashEA NC Soil Analyzer (Thermo Electron Corp., Milan, Italy).

Table 1 Nutrient analysis of amendments*

Sample Name	Soy meal	Mustard meal	Sunflower meal	Canola meal	Pro-Gro	Kreher's	Dried Blood	Poultry Litter	Dairy Manure Compost	Chilean Nitrate
total dm %	88.7	93.3	87.7	87.7	92.0	90.2	92.6	55.8	32.7	99.4
total C %	44.7	50.3	51.1	48.7	23.1	31.4	51.3	42.6	24.2	37.0
total N %	8.19	5.68	3.36	5.57	5.07	5.41	15.2	1.68	2.01	16
total P %	0.74	0.99	1.06	1.27	2.46	2.26	0.29	2.78	0.78	--
total K %	2.35	1.06	1.49	1.31	5.04	2.58	0.16	3.41	1.47	--
C:N ratio	5.5	8.9	15.2	8.7	4.6	5.8	3.4	401.9	14.4	18.4
NH4-N (mg/kg)	115.5	137.2	432	247.1	2485	4253	181	6.01	4220	633
NO3-N (mg/kg)	1.57	22.6	18	15.7	22771	18.2	22.5	8.55	6.96	160000

*based on analysis provided by University of Maine Soil Testing Laboratory. All values are given on a dry matter basis.

Soils

Two soils that had been in annual crop production for at least 5 years were selected (Table 2). The first soil was a Winooski very fine sandy loam from a conventional vegetable farm in Windsor, VT, and the

other was a Vergennes clay from a conventional grain farm in West Addison, Vermont. These two soils were chosen because they represented typical examples of agricultural soils in Vermont of two very different textures. Soils were air-dried (96.5% DM clay, 97% DM sandy-loam), passed through a 2-mm sieve, and stored at room temperature until the project began. Soils were brought to 60% water filled pore space (WFPS) and were pre-incubated for 1 week at room temperature so that a flush of N-mineralization upon re-wetting would not cloud amendment affects (Griffin et al. 2007).

Table 2 Properties of soils

	Soil A	Soil B
Soil Series	Winooski Fine Sandy Loam	Vergennes Clay
Location	Windsor, Vermont	West Addison, Vermont
Management History	Conventional continuous vegetables	Conventional soybean/corn rotation
Organic Matter (%)	1.6	5.1
pH	6.7	7.2
Available P (ppm)	35.4	7.5
K (ppm)	197	228
Mg (ppm)	108	587
Al (ppm)	18	14
Ca (ppm)	1037	4905
Zn (ppm)	0.7	0.8
Effective CEC (meq/100g)	6.6	30.0

Mixing, Sampling, and Analysis

Calculating an acre furrow slice based on the natural bulk density of the respective soils (1.38 g/cm^3 Vergennes clay and 1.43 g/cm^3 Winooski fine sandy loam), amendments were added to soils at a rate equivalent of 100 lbs N/acre. Amended soils at 60% WFPS were thoroughly mixed and placed in polypropylene bags and compressed to the natural bulk density of the soil before being randomly placed in an incubator at 23.5-24.5ºC. Controls with no amendment for each soil type were treated similarly. Bags were left open to facilitate air exchange. Sampling occurred at days 1, 7, 14, 28, 42, and 70. At each sample date, all bags were weighed and brought back to 60% WFPS. Each polypropylene bag contained 150 g of amended soil (60% WFPS) with 4 replicates and 6 sample dates. At each sample date, 4 bags of each amendment/soil type were removed from the population and destructively sampled. These subsamples were dried at 38 ºC and ground to pass through a 2-mm sieve, and extracted with 1 M KCL (4 g, 20 mL, shake 15 minutes). After filtering through Ahlstrom 642 paper, they were analyzed on a Lachat QuikChem 8000 automated ion analyzer for nitrate-N (sulfanilamide/N-1-naphthylethylenediamine dihydrochloride method following cadmium-reduction to nitrite) and ammonium-N (salicylate method). A laboratory reference sample and a duplicate soil were run with each set of 10 samples.

Dissolved inorganic N analyzed by Lachat methods (Flow Injection Analysis, QuikChem 8000, Hach Company, Loveland, CO):

- NH_4^+-N: ammonia is heated with salicylate and hypochlorite in an alkaline phosphate buffer to produce an emerald green color (absorbing at 660 nm); the color is intensified by the addition of sodium nitroprusside. Lachat QuikChem Method 10-107-06-2-O.
- NO_3^- - N, also used for TN persulfate digest: nitrate is quantitatively reduced to nitrite by passage of the sample through a copperized cadmium column. The nitrite (reduced nitrate plus original nitrite) is then determined by diazotizing with sulfanilamide followed by coupling with N-(1-naphthyl)ethylenediamine dihydrochloride. The resulting water soluble dye has a magenta color which is read at 520 nm. Lachat QuikChem Method 10-107-04-1-B.

Total carbon and nitrogen were determined by combustion of dried and ground samples, with thermal conductivity detection using a FlashEA NC Soil Analyzer (Thermo Electron Corp., Milan, Italy).

Results for the Incubation Study

Data was analyzed using PROC GLM on ranks to determine amendment, soil and soil*amendment effects on each sampling date. (Table 3) LSD was used for pairwise comparison of treatments ($\alpha = 0.05$) (Tables 4-6).

Table 3 p-values for PROC GLM on Plant Available Nitrogen (PAN) rank

	Day 1	Day 7	Day 14	Day 28	Day 42	Day 70
Soil	0.1033	0.0001	0.4638	<0.0001	<0.0001	0.0012
Amend	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Soil*amend	0.2158	<0.0001	0.0897	<0.0001	<0.0001	<0.0001

Table 4 PAN from amendments in clay soil

	Day 1	Day 7	Day 14	Day 28	Day 42	Day 70
Chilean nitrate	109.4 a	95.2 ab	118.8 a	102.2 a	95.1 a	81.2 a
Dried blood	0.3 fg	17.7 c	20.2 e	79.2 ab	71.7 b	69.4 b
Soy	-0.1 gh	18.2 c	24.8 de	63.1 bc	72.6 b	67.6 b
Canola meal	- 0.1 gh	9.0 d	18.2 e	39.4 d	47.3 c	58.9 c
Pro-gro	48.3 ab	74.6 a	72.5 a	78.3 ab	58.7 c	53.2 cd
Kreher's	4.9 c	27.6 b	45.4 b	51.0 c	50.4 c	49.5 d
Mustard meal	0.8 ef	7.0 de	7.6 f	34.9 de	37.2 d	41.0 e
Sunflower meal	1.2 de	15.5 c	30.4 cd	28.8 e	26.5 e	33.8 f
Poultry Litter	30.1 b	29.8 ab	32.4 bc	37.4 d	32.6 de	28.5 f
Dairy Compost	3.4 cd	2.6 e	3.3 f	6.1 f	0.6 f	1.4 g

Table 5 PAN from amendments in loam soil

	Day 1	Day 7	Day 14	Day 28	Day 42	Day 70
Chilean nitrate	115.8 a	101.0 a	95.9 a	92.9 a	84.5 a	87.1 a
Dried blood	0. 02 f	14.5 e	3.2 f	26.4 ef	26.9 d	36.9 c
Soy	0. 03 f	15.9 e	26.1 cde	43.0 bc	42.5 bc	38.3 c
Canola meal	0.17 ef	10.3 g	16.4 def	39.2 cd	42.5 bc	46.3 bc
Pro-gro	46.7 ab	46.6 b	70.5 ab	52.3 b	49.1 b	50.4 b
Kreher's	11.4 c	21.6 d	33.2 bc	42.7 bc	40.7 bc	46.8 bc
Mustard meal	1.2 ef	13.3 f	30.8 cde	42.1 bc	47.4 b	51.6 b
Sunflower meal	2.2 de	5.6 h	25.3 cde	30.8 de	36.6 c	42.4 bc
Poultry Litter	24.2 bc	33.3 c	28.4 cd	25.7 ef	20.3 d	18.3 d
Dairy Compost	2.7 d	0. 4 h	17.0 def	7.3 f	7.3 d	7.0 d

Table 6 PAN from amendments in both soils combined

	Day 1	Day 7	Day 14	Day 28	Day 42	Day 70
Chilean nitrate	112.6 a	98.1 a	107.4 a	97.6 a	89.8 a	84.1 a
Dried blood	0.2 e	16.1 d	11.7 ef	52.8 de	49.3 d	53.2 b
Soy	- 0.3 f	17.1 d	25.5 cd	53.1 bc	57.5 b	52.9 b
Canola meal	0.6 e	9.6 e	17.3 de	39.3 e	44.9 cd	51.6 b
Pro-gro	47.5 b	60.6 a	71.5 a	65.3 b	53.9 bc	51.8 b
Kreher's	8.1 c	24.6 c	39.3 b	46.8 cd	45.6 cd	48.1 b
Mustard meal	1.0 e	10.2 e	19.2 de	38.5 e	42.3 d	46.3 b
Sunflower meal	1.7 d	10.5 e	27.8 bc	29.8 f	31.5 e	38.1 c
Poultry Litter	27.2 b	31.5 b	30.4 bc	31.6 f	26.5 e	23.4 d
Dairy Compost	3.0 c	3.1 f	7.6 f	6.7 g	3.9 f	4.2 e

Figure1 shows the background levels of N mineralization occurring in the unamended soils during the incubation. These numbers may be artificially high due to the fact that control soils were mixed each time that the amended soils were mixed and sampled. The clay, which had an initial organic matter level of 5.1 percent showed a higher level of nitrate than the loam, which had an initial organic matter level of 1.6 percent.

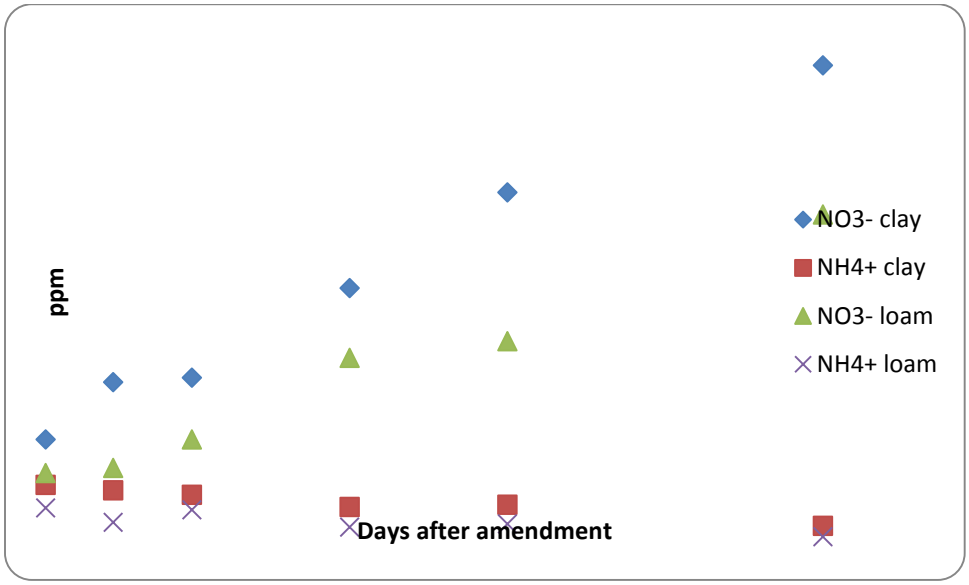
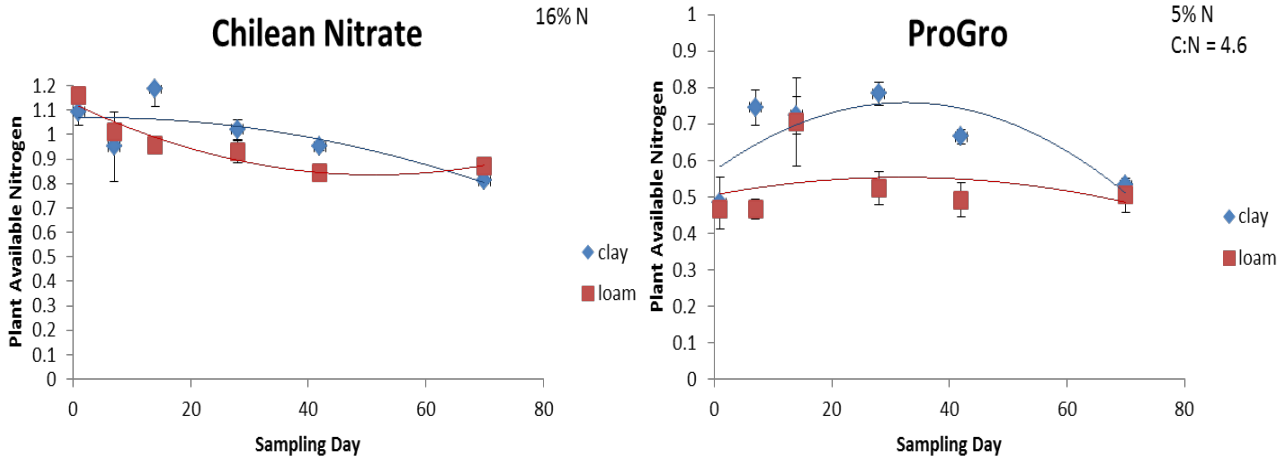
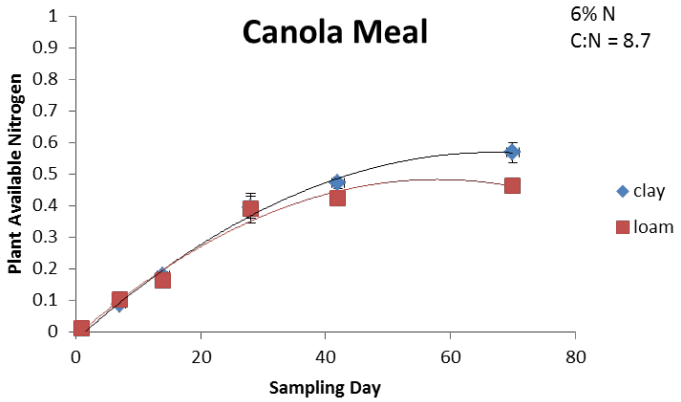
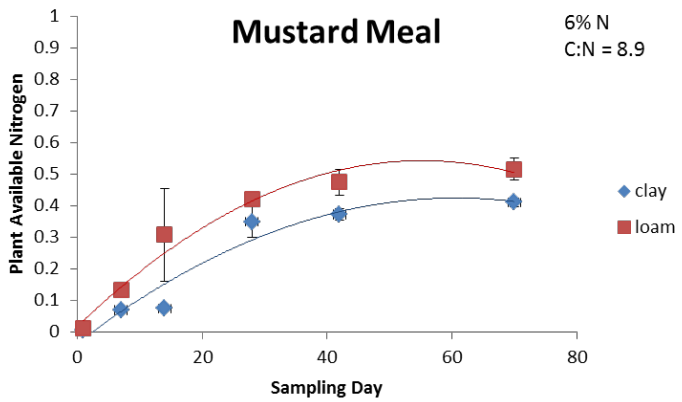


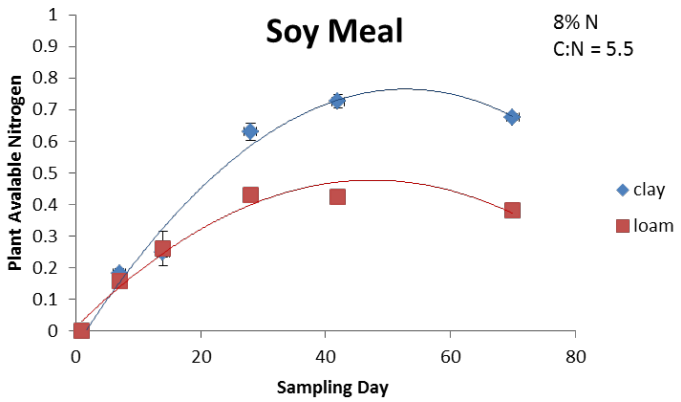
Figure 1. Plant available nitrogen (PAN) from soil only during incubation.

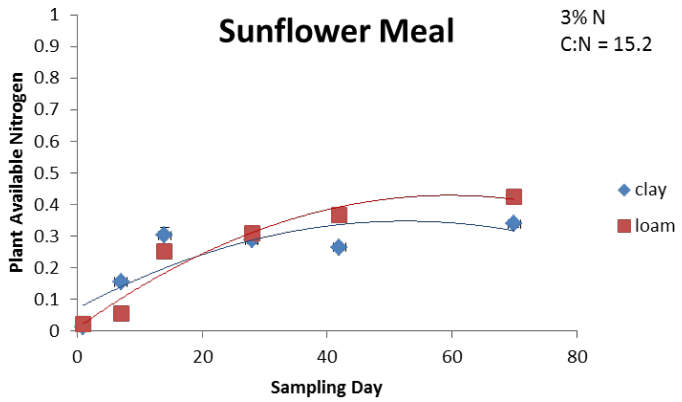
Figure 3 outlines PAN of organic amendments by sample dates. In both soils, the Kreher's and Pro-Gro bagged fertilizers and the seedmeals showed an initial rapid release of nitrogen, which slowed or leveled off around day 28. The dairy compost had a low level of release that showed little variation during the incubation. The poultry litter showed higher initial levels of PAN than many of the other amendments, but stayed fairly level throughout the incubation. The Chilean nitrate, which is soluble and is expected to have an initial N availability of 100%, showed a steady decline in PAN during the 70 day incubation. Presumably this was due to denitrification and loss of N as NO and N_2O gas, though this was not measured in the experiment. It would not be unusual for this to happen under the extremely high NO_3^- levels in the soil with such a high application of Chilean nitrate (Ross, personal communication 2014).




Canola Meal
6% N
C:N = 8.7
Plant Available Nitrogen
Sampling Day
clay
loam


Mustard Meal
6% N
C:N = 8.9
Plant Available Nitrogen
Sampling Day
clay
loam


Soy Meal
8% N
C:N = 5.5
Plant Available Nitrogen
Sampling Day
clay
loam


Sunflower Meal
3% N
C:N = 15.2
Plant Available Nitrogen
Sampling Day
clay
loam

p

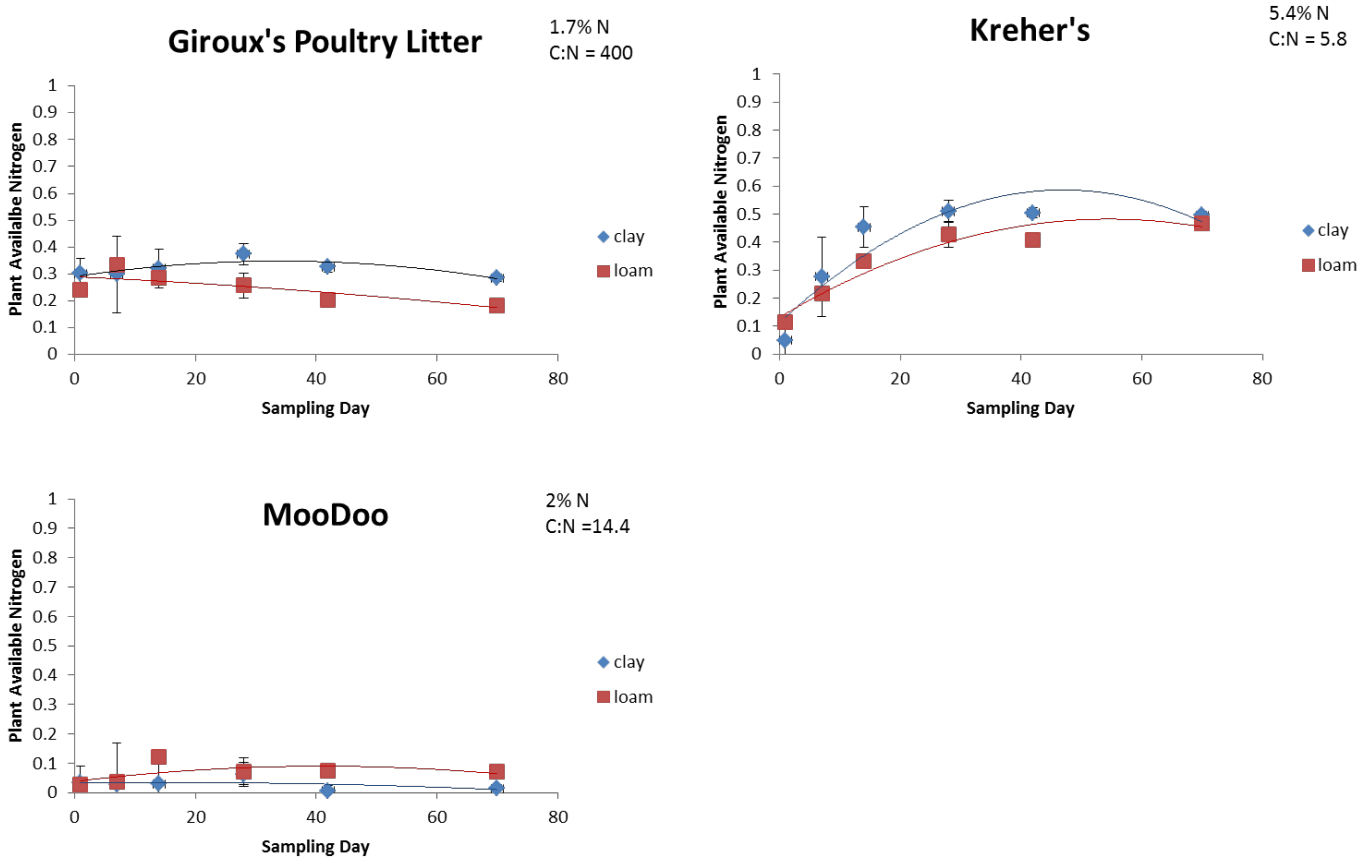


Figure 3. PAN of organic amendments across sampling dates.

Because amendments were applied at such high rates in this study, mineralization may have been inhibited by high soil nitrate and ammonium levels. Repeating this incubation using more typical rates of application, especially for the high N amendments, may give a better indication of what happens at more realistic levels. Another shortcoming of this type of incubation study is that it does not account for leaching of nitrate through the soil profile or daily and seasonal fluxes in soil temperature that would occur in a field setting. These factors, in addition to nitrogen release from amendment, should be taken into account when planning organic amendments rates to meet crop N need.

While amendment C:N has been established to be a good predictor of N release, this did not seem to apply equally to both soils (Figure 2). The clay soil followed the predicted pattern between amendment C:N and N release more closely (R^2=0.84), while the loam soil did not show as much correlation between C:N and N release (R^2=0.48).

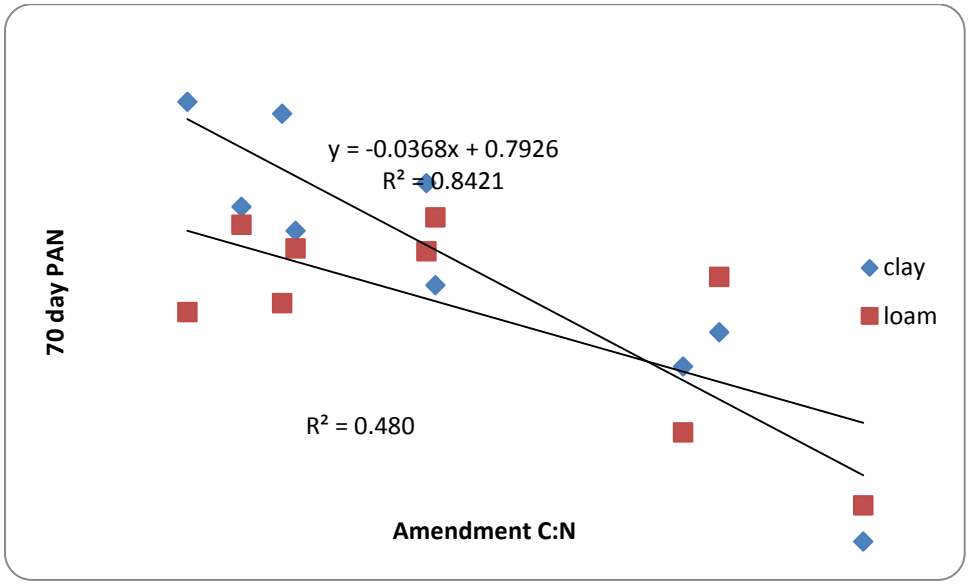


Figure 2. C:N ratio versus 70 day PAN for clay and loam soils

Nutrient Budget and Cost of Plant Available N

With the 70 day PAN determined, it is possible to calculate how much of each amendment would be needed to provide a set level (in this case 100 lbs/acre) of plant-available nitrogen. The P and K contributions from this level of amendment can be determined as well as the cost per lb. PAN. (Table 7) There is wide variation in P and K contribution between amendment types, which could make using one of the seedmeal or bagged fertilizers helpful in maintaining an environmentally friendly soil nutrient balance. While the value of nitrogen fertilizer is often calculated on a $/lb total N basis, it would be logical to instead calculate $/lb 70-day PAN to reflect the value of fertilizer within the same growing season. While amendments also contribute N beyond the first growing season and have value for increasing organic matter, usually the primary reason for applying a fertilizer is to provide nutrients for this season's crop and cost comparisons should reflect this fact.

Table 7 Amount of each amendment needed to contribute 100 lbs. of plant available N during the 70 days after incorporation

Sample Name	Soy meal	Mustard meal	Sunflow. meal	Canola meal	Pro-Gro	Kreher's	Dried Blood	Poultry Litter	Dairy Manure Compost	Chilean Nitrate
70 day PAN (%)	0.5292	0.4631	0.3808	0.5160	0.5180	0.4812	0.5317	0.2337	0.0418	0.8413
Amt needed (dm basis)*	2348	3827	7832	3520	3807	3841	1241	25470	119022	744

Amt needed (wet basis)*	2647	4102	8930	4013	4138	4259	1340	45645	363982	744
PAN*	100	100	100	100	100	100	100	100	100	100
Total N*	192	217	263	196	193	208	189	427	2392	119
P*	17	38	83	45	94	87	3.6	708	119	0
K*	55	41	117	46	192	99	1.98	869	928	0
$/lb N**	$2.87	$7.80	$6.79	$4.09	$6.12	$3.12	$6.99	***	***	$3.50
$/lb PAN**	$5.75	$15.0	$17.86	$8.02	$10.87	$ 5.87	$12.72	***	***	$4.46

*All amounts are given in lbs/acre

Members of the Vermont Vegetable and Berry Association assisted with the selection of amendments that were evaluated in this study. Through the email listserve members were surveyed as to common soil amendments used on their farm. From this list of approximately twenty amendments the most popular were selected for nitrogen mineralization potential. In addition the Association also helped distribute results through the listserve and their annual meeting.

GOALS AND OUTCOMES ACHIEVED

The goal of this project was to provide at least 1000 stakeholders with recommendations for use of alternative organic fertilizers based on cost, availability, and timing of plant available nitrogen release. Of these 500 farmers we expected that 500 would make changes to their fertility practices.

To achieve the goals and outcomes project information or results were presented at several events throughout the project period. Through the events and online media listed below we provided project information to 1598 stakeholders. Specifically online media has received 881 lifetime views (53% from US; rest from 62 other countries). Hence we were able to meet our goal of reaching at least 1000 stakeholders.

- Northwest Crops and Soils Annual Field Day, Alburgh, August 2013, 175 attendees.
- Vermont Vegetable and Berry Association Annual Meeting, Montpelier, January 2014, 200 attendees.
- Northeast Organic Farming Association Annual Conference, Burlington, February 2014, 52 attendees.
- Northwest Crops and Soils Annual Field Day, Alburgh, July 2014, 225 attendees.
- On-Farm Field Days in Randolph and Westfield, July and September 2014, 97 attendees.

Results were compiled and distributed to farmers through the Northwest Crops and Soils website www.uvmextension.edu/cropsoil, at farmer field days, and at VT Vegetable and Berry Growers Association meetings.

Outcome: We predicted that at least 500 farmers would use the information to modify current fertility practices on their farms. Based on post event surveys returned by 110 farmers the following outcomes were highlighted:

- 92% of farmers responded that the information would enhance their farm's profitability
- 92% responded that they learned information that would improve the way they produce their crops
- 96% said they found out about a new fertility product that will likely implement
- 95% said that as a result of attending the meeting they would do at least one new or different fertility practice in the coming season.

Ninety-seven growers said they would do something different in the coming season as a result information obtained about the project, including:

- Presentation advanced importance of the analysis of N available (various sources) Very useful.
- Better use of fertilizer
- Better use of nitrates, nitrogen
- Monitor pH & N better
- Heather's research on N in organic sources is going to be VERY helpful
- Change my nitrogen fertilizer application rates & timing
- Nitrogen management
- Analyze N availability of organic fertilizers vs crop needs
- The way I use & apply fertilizer when it comes to N.
- Paying more attention to N release times
- Add soymeal to my N resource for blueberries
- More soil testing
- Look at when my crops need nitrogen & look at when my nitrogen source will be available to that crop & adjust timing of feeds & sources used
- Regulate soil nutrients differently
- Apply organic Nitrogen sooner
- $ per lb of N fertilizers
- Will change some of our N application systems, possibly high tunnels for strawberries
- Type of fertilizer for N applications
- Take soil samples
- Pay attention to nitrogen application times & rates
- Maybe insect cover for high tunnel peach production
- Amend N at a different (earlier) time
- Evaluate timing & use of different fertilizers
- More calculated decisions about N applications
- Changing my organic fertilizing to preplant instead of sidedressing due to N release times
- Choose different N sources based on release times
- N management/how I think about it

Survey results collected at outreach events helped monitor progress towards our final outcome of farmers modifying fertility practices. Given the short term nature of this project we were unable to definitively document that 500 farmers are making positive changes to their fertility system. However we did receive

much positive feedback from farmers after they had attended an educational event focused on fertility and nitrogen management. Delivery of final project information in 2015 will allow the project to identify further outcomes and impacts.

Project	Planned	Actual
Goals	Deliver information to 1000 stakeholders	1598
Outcomes	500 farmers indicate change	110

Data collected by surveying farmers after events have been a reliable way to collect outcome data for many project. However surveys returned can be low especially for in-field events where attendees freely come and go throughout the day. Delivery of final project information in the winter of 2015 will allow the project to further document the outcomes and impacts of this project.

BENEFICIARIES

There were numerous beneficiaries of the project results. Beneficiaries included organic farmers from a variety of sectors including dairy, livestock, grains, and vegetables. Other beneficiaries included agricultural consultants, NGOs, organic certifying agencies, and agricultural industry. Soils and fertility have a broad audience as they are the foundation to all farms and hence the information was of interest to many stakeholders.

Based on a survey of Vermont vegetable and fruit growers over 50% responded to using Chilean nitrate in their production systems. Hence the removal of the fertility source would likely pose production challenges for many farmers in this state. The data that has been of most interest to the farmers is the release of plant available nitrogen from a variety of common organic amendments. Farmers were interested in least cost nitrogen source with quickest mineralization rate. Of all the amendments soybean meal was the most promising alternative to Chilean nitrate as it released 60% of its nitrogen within 70 days of amendment. It was also the cheapest option when compared to Chilean nitrate.

LESSONS LEARNED

When the trial was initiated in the late summer of 2012 a malfunction with the incubator caused extreme temperature fluctuations over several days. Since the samples were only sampled weekly the temperature malfunction was not caught in time to save the samples. Therefore the experiment had to be conducted second time in 2013 once the incubators were fixed and temperatures were stabilized. Reliable incubators are essential to this type of work.

Much was gained from conducting the project but the results lead to additional work that needs to be conducted in a field based setting. Work will begin in 2014 to evaluate release rates of soybean meal nitrogen in the field.

N release from organic amendments appears to vary between soil textures, though this was not true for all amendments. It may be more effective to calculate fertilizer value based on PAN for this season, rather than total N, though this method does not take into account N carried over to the next season or the value of organic matter additions.

Where available, seed meals may offer a good alternative for organic growers who are trying to avoid excessive P application.

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Project 2: DigInVT.com Public Awareness Campaign – Final Report (Previously Accepted)

PROJECT SUMMARY

According to the Travel Industry Association of America, 60% of American leisure travelers indicate that they are interested in taking a trip to engage in culinary activities within the next 12 months. The Vermont Agriculture and Culinary Tourism Council (VtACT) built a link between these motivated travelers and the farmers and food producers of Vermont. In 2010, fourteen statewide agriculture and tourism entities came together to build the collaborative site DigInVT.com. Through their combined databases, the site has 300+ locations, events and trails where tourists can experience Vermont's food and farms.

The site is an interactive platform that provides visitors and Vermonters access to authentic, quality experiences through beautiful visual and written content highlighting Vermont's farm and culinary experiences. Prior to DigInVT.com's creation there was no single website for introducing visitors to on-farm experiences, markets for local foods, restaurants that support local farmers, and Vermont's working landscape.

The professional website design, visuals, and educational information (funded under earlier phases of the project) offer producers a presence on an attractive, comprehensive site that few Vermont farmers could afford to build on their own. Site visitors can use the site to find individual businesses, build itineraries for trails that take them to farms, food production sites, and restaurants, select from recommended trails, and build trips that take advantage of the best agricultural and culinary experiences in Vermont.

Two years of careful work went into development of DigInVT.com. VtACT secured the best possible content, design and collaboration between agriculture and tourism organizations. But the site only becomes effective when it enters into public use. This grant focused on building public awareness of the site—to increase the number of travelers who know about the features and functionality of DigInVT.com, which in turn will increase the number of travelers who interact with Vermont's specialty crop producers and farm communities. These interactions build today's local food economy and set the foundation for lasting connections between visitors and the people and foods of Vermont.

PROJECT APPROACH

The overarching goal of this DigInVT.com project was to increase the number of visitor interactions with Vermont farms and food producers, and to translate those interactions into economic benefit for the local food system.

For the scope of this grant, we are measuring the efficacy of the outreach campaign in driving consumers to the DigInVT.com website. We believe that people visit the site for the purpose of planning visits/trips to establishments listed on the website. The majority of the establishments listed on DigInVT.com are specialty food producers and the rest of the listings are businesses that purchase product from specialty food producers. If we increase the visitors to the site, we will increase the visits to the establishments listed on the site there by effectively increasing the competitiveness of specialty crop producers. This grant helped us build marketing material, participate in outreach events, build a digital community using

social media and host workshops; all to support the primary goal of maximizing DigInVT.com site visits and site usage for itinerary information.

We set a performance goal of 25,000 unique visits to the site over the course of the grant year, and tracked the goal with Google analytics. We experienced 22,133 unique visits and 31,187 total visits to the website during the course of this grant. Our top referral sites are google, mapquest, vermontvacations.com, DigInVT.com's facebook page, and travel.nytimes.com. Over ½ of the visitors are navigating directly by typing in the url – diginvt.com, which means that our promotional outreach is responsible for over ½ of the sites visitors. We did not reach our target goal of 25,000 unique visitors. Our selection of 25,000 unique visitors was optimistic for a new website but having ½ of those visitor typing in the url leads us to conclude that our outreach events and material are driving traffic to DigInVT.com.

We hoped to reach 2,000 people through Facebook as part of our social media campaign, which was to be tracked by "likes". We currently have 568 Facebook friends, but fan engagement may be measured by more than just Facebook "likes". From April 1, 2013 till Dec 30, 2013, we have had an "organic reach" of 4,269 people. Facebook defines "organic reach" as "The number of people who visited your Page, or saw your Page or one of its posts in news feed or ticker. (Unique Users)". We actively began posting on our Facebook page in March 2013.

We had 2,000 downloads of an itinerary or a collection of places to visit as a performance goal. At the time of this grant Google Analytics could not track downloads (it can now). We did track the number of visitors who navigated to the trails page and how many went on to view a specific trail. A visitor investigating a specific trail is a reasonable proxy for downloading an itinerary because they are viewing all of the locations linked by a particular trail. We found that 3,310 visitors navigated through the website to the primary "trails" page and 2,900 went on to view specific trails.

Because DigInVT.com was in its initial public launch phase at the beginning part of this grant, we have no baseline numbers. However, the measured outcomes from this grant have created baselines for future years.

DigInVT.com is a project of the Vermont Agriculture and Culinary Tourism Council, which is made of fourteen Vermont based agriculture and tourism organizations. The VtACT has a part-time coordinator who maintained the site content and implemented the social media strategies as well as the outreach event participation logistics. Each organization participated by providing content to the site and taking DigInVT.com outreach material to events. In addition, each council member that provided listings for the website paid $10 per establishment to support the cost of maintaining DigInVT.com. The Vermont Department of Tourism and Marketing and the Vermont Agency of Agriculture, Food and Markets collaborated to provide a $30,000 digital and print advertising campaign for DigInVT.com. The Vermont Fresh Network was the fiscal agent for this project and managed the financial accounts, providing daily guidance and support to the VtACT coordinator, and was the primary liaison between VtACT and the design firm Skillet. Skillet developed the outreach material and consulted on the development of the marketing plans.

GOALS AND OUTCOMES ACHIEVED

This project created our public outreach campaign for DigInVT.com. Funds from the Vermont Specialty Block Grant Program helped DigInVT.com build a social media strategy, develop and distribute marketing materials, and participate in food and agricultural events such as county fairs, food shows, and other opportunities for reaching tourists, whether first-time visitors to Vermont or lifelong Vermonters exploring their home state.

The following activities were completed to support the performance goals of web traffic and social media interaction with DigInVT.com.

- Development of long term marketing plan, including public relations strategy, social media strategy, and a timeline for editorial content
- Established system to track website and social media goals, using Google analytics and social media metrics
- Built a 940 person email contact list
- Created 5 seasonal engagement blurbs for inclusion in partner organizations newsletters
- Post consistent content on Facebook and other social media outlets
- Develop Marketing Materials for Roadshow Kit/Trade Show Booth/Tourist Give-aways and High Traffic Locations
    - 3 Logo Flags
    - 1 Large Banner
    - 6 Table Top Informational Stands
    - 1,500 Trail Cards
    - 2,500 Brochures
    - 5,000 Magnets
    - 100 Temporary Tattoos
    - One minute informational video about DigInVT.com
- Participate in 11 regional food events
    - Direct Marketing Conference – Presentation – South Royalton – Jan. 13
    - JR Iron Chef – Table – Essex – Feb. 2
    - Harvest New England – Presentation – Feb. 28
    - Maple Open House Weekend – Promotion – 23 & 24
    - Taste of Vermont – Table – Washington D.C. – May 16
    - Strolling of the Heifers – Table – Brattleboro - June 9
    - Grafton Food Festival – Table - Grafton – June 22 & 23
    - VT Cheese Festival – Table - Shelburne – July 21
    - VFN Annual Forum – Table – Shelburne – Aug. 4
    - Full Palette – Table – Stratton – Aug. 31 & Sept. 1
    - Taste Trekkers Food Conference – Presentation – Providence, RI – Sept. 21

Present a workshop and informational table at the Taste Trekkers. There were 56 participants in the workshop. All of them experienced the form and functionality of DigInVT.com in real time and enhanced by a 4 course tasting of Vermont grown products paired with Vermont produced Ice Cider, prepared by a Vermont chef. The menu is provided in the supplementary material

BENEFICIARIES

The farm listings on DigInVT.com are: farmers who offer the public an opportunity to interact directly with them and the land that produces our food; sellers of local products to local chefs and at farmers' markets, farmstands, and/or u-picks; producers of artisanal specialty food products with ingredients they or their neighbor have grown; operators of diversified farms and/or maple producers. The site promotes direct interaction between visitors and producers meeting these criteria, as well as the wineries, distillers, brewers and chefs who purchase their raw ingredients from this diverse group of farmers.

To date there are 410 place listings on DigInVT.com: 52 farms, 45 farmstands & U-Picks, 84 farmers markets, 10 farmstays, 17 wineries, 20 breweries, 26 cheese makers, 26 maple producers, 28 food markets, the remainder are eateries, inns and B&B's that serve local food.

Fifty seven percent of the listings on DigInVT.com are specialty crop producers; 32% of the listings are establishments that purchase product from specialty crop producers.

We can estimate the potential immediate economic impact of connecting tourists to agriculture by using data from the Vermont Department of Tourism and Marketing. In 2009, there were 7 million visitors to Vermont who stayed overnight. They spent an average of $292.77 per visit per party (not all stayed in commercial lodging). If DigInVT.com could entice 25% of these visitors (party of 2 - 875,000 couples) to spend 7 additional dollars on a Vermont farm or local food experience, then DigInVT.com could bring over 6 million new dollars into the Vermont farm and food economy. If the 22,133 unique visitors to the DigInVT.com website visited just one location using DigInVT.com and spend $7, we may have had a $154,931 impact on specialty crop producers in Vermont.

LESSONS LEARNED

We had planned on only tabling at 6 regional events this year. Because of our collaborative nature many of the food events waived the tabling fee, therefor we were able to participate in 11 events.

During our development of the long term marketing plan, we realized that the member organizations of VtACT could benefit from participating in a training focused on social media, PR trends and marketing campaign strategies. We adjusted the workplan of Skillet to include production and implementation of this workshop. The workshop took place on Dec. 5, 2013 and nine people from seven organizations of VtACT were in attendance. Each of the organizations that participated in the workshop was a staff person of a producer group association of specialty crops, so to the extent that the workshop was beneficial; the benefit went solely to the enhancement of specialty crop producers. The goal of the workshop was not only to help each individual organization understand how to leverage the social media networks to forward consumer awareness of their organization's mission but more importantly to help us all understand how to collaborate on promotions such that we broaden the reach of all of our messages. We believe the workshop was successful because it was the genesis of a commitment to 4 cross-promotional marketing initiatives in 2014. Each initiative is based around a specialty crop producer outreach event. Each organization will expose their network to the event using a storyline that will resonate with their constituents as well and providing a blog post about that storyline to DigInVT.com. This workshop launched future collaborative marketing efforts amongst specialty crop producer organizations; therefore we consider the workshop a success.

Due to travel costs we were not able to attend the World Culinary Tourism Conference. We instead participated in a national food tourism conference called Taste Trekkers held in Providence, Rhode Island. We were selected to present a 60-minute workshop about DigInVT.com as well as hosted an informational table.

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ADDITIONAL INFORMAITON

http://www.diginvt.com/home/criteria/

Project 3: Biennial Brassica Seed Production in Unheated High Tunnels – Final Report

PROJECT SUMMARY

We proposed to develop specific guidelines for biennial brassica seed production (including kale, cabbage, turnips, broccoli, mustard greens, Asian greens), in unheated high tunnels in Vermont, where these crops cannot otherwise survive the winters and require a longer growing season for maturing seed.

The seeds for these crops are quite valuable, especially when grown organically, and there is limited capacity for growing small specialty varieties in the few regions – the Pacific Northwest and coastal California – where they can be grown outside. This project will thus provide an expanded economic opportunity for Vermont growers while also expanding seed offerings for organic vegetable farmers.

PROJECT APPROACH

In order to over winter brassicas for seed production in Vermont the plants need two very important things: protection from the cold. In 2012 we doubled our capacity to grow over wintered seed crops with the addition of another high tunnel which was funded by this grant. The charts below show the crops planted in each house along with summarized data we collected over the two years of the experimental phase.

Over the course of three seasons we planted ten different crops in the high tunnels to assess the efficacy of the high tunnel growing system for seed production of these ten crops. From this work we were able to cluster crop types as being fully amenable to the system, partially amenable to the system, and not amenable to the system. Fully amenable were the mustard greens, Asian greens, cresses, turnips and kales. Partially amenable were the cabbage, broccoli, kohrabi, and onions. Not amenable were the beets and carrots.

From this work we created a manual for potential seed growers to use in developing high tunnel seed production on their own farms. (See "Additional Information.")

Throughout the work we created slide presentations describing the results that we presented at farming conferences, to both university and high school students, and to High Mowing staff. Jodi Lew-Smith was the project leader who helped develop the research plan and helped oversee the work. She developed and delivered five presentations on the work as it was ongoing. Katie Traub was the Farm Manager who directly oversaw the planting, care, and harvest of the seed crops. Koi Boynton was our Outreach Coordinator who assisted with outreach activities in years two and three.

GOALS AND OUTCOMES ACHIEVED

In year one of our SCBG we were able to keep on track and accomplish all of our goals for the time period outlined in our grant application. In the fall of 2012 we erected our new research high tunnel and selected 10 brassica varieties to plant in the tunnel for overwintering from fall 2012 to spring 2013. Each variety was chosen for its ability to meet the direct market needs of our diversified organic farmer customer base by providing seed of varieties that were not otherwise available as organic seed. They were a blend of

salad mix components, largely targeted to winter greens production, together with biennial cole crops for outdoor production, such as broccoli, kale, cabbage, and turnips.

The ten varieties that we planted in the fall of 2012 were fertilized, weeded, and staked throughout the growing season, and then harvested, cleaned, and germ tested in the later summer and fall of 2013. Six of them attained our rigorous quality standards of 85% or higher germination rates and are now featured in our 2014 catalog. Two of the six varieties (Tokyo Market and Hinona Kabu turnips) are new to our catalog and represent the very first sales of organic seed of salad turnips. Another variety, Copenhagen cabbage, would have otherwise been dropped from our catalog despite its strong sales and farmer interest.

The long term outcome is to have farmers in Vermont adopt organic seed production as a rotation crop for unheated high tunnels. To this end we have our first farmer scheduled to plant a contract seed crop in a tunnel this coming fall, the details of which will be worked out in June. The farmer is Hannah Davidson of Good Earth Farm in Brandon, VT.

The following charts show the work plan and the results for three years of seed crop production in unheated high tunnels.

2012-2013

Crop Type	Species	Variety	#	Spacing	Actual # Transplants	Actual Seeding Date	Actual Transplant Date	Survival %	Location	# of seed-bearing plants	Seed yield total	Seed yield per plant	Germ Rate
Beet	Beta vulgaris	Badger Torch	A	6"	64	8/8/12	8/30/2012	39	Trials HH	13		0	35.0%
Beet	Beta vulgaris	Badger Torch	B	6"	49	9/7/2012	10/15/2012	100	Trials HH	28		0	35.0%
Cabbage	B. oleracea	Copenhagen cabbage	A	12"	100	9/14/2012	10/18/2012	94	KB HH	91	9.86	1.7336264	83.0%
Cabbage	B. oleracea	Copenhagen cabbage	B	12"	183	10/11/2012	11/13/2012	96	KB HH	160	10.2	1.02	86.0%
Asian green	B. juncea	Golden Frill	A	6"	50	9/14/2012	10/18/2012	98	KB HH	49	3.3	1.077551	86.0%
Asian green	B. juncea	Golden Frill	B	6"	50	10/11/2012	11/12/2012	100	KB HH	50	3.8	1.216	89.0%
Turnip	B. rapa	Hinona Kabu	A	6"	49	9/14/2012	10/15/2012	84	trials HH	68	3.6	0.8470588	95.0%
Turnip	B. rapa	Hinona Kabu	B	6"	45	10/11/2012	11/11/2012	78	trials HH	68	3.6	0.8470588	95.0%
Broccoli	B. oleracea	Rosalind broccoli	A	12"	76	9/14/2012	10/15/2012	95	Trials HH	65	1.89	0.4652308	81.0%
Broccoli	B. oleracea	Rosalind broccoli	B	12"	60	10/11/2012	11/11/2012	35	Trials HH	22	1.52	1.1054545	81.0%
Kale	B. napus	Siberian Kale	B	6"	94	9/14/2012	11/13/2012	99	KB HH	93	8.96	1.5415054	94.0%
Kale	B. napus	Siberian Kale	A	6"	77	10/11/2012	10/15/2012	100	trials HH	76	7.2	1.5157895	79.0%
Kale	B. napus	Siberian Kale	B	6"	33	9/14/2012	11/13/2012	100	trials HH	33	3.04	1.4739394	72.0%
Turnip	B. rapa	Tokyo Market	A	6"	52	9/14/2012	10/18/2012	94	KB HH	46	2.75	0.9565217	95.0%
Turnip	B. rapa	Tokyo Market	B	6"	50	10/11/2012	11/12/2012	98	KB HH	46	3.15	1.0956522	92.0%
Radish	Raphanus sativus	Watermelon radish	B	12"	DS	10/18/2012	NA	high %	KB HH	70	1.61	0.368	85.0%
Carrot		Dragon	A	6"		8/17/2012	NA	high %	trials HH	121		0	21.0%
Onion	Allium spp	Rossa di Milano	A	6"	77	5/1/2012	6/15/2012	97	trials HH	20		0	62.0%
Onion	Allium spp	Rossa di Milano	B	6"	51	6/5/2012	7/25/2012	94	trials HH	23		0	68.0%
Onion	Allium spp	Rossa di Milano	C		71	6/25/2012	7/25/2012	77	trials HH	23		0	42.0%

2013-2014

Crop Type	Species	Variety	#	Seeding Date	Transplant Date	#Plants surviving	%Survival	Date of seed maturity	# of seed-bearing plants	Seed yield total (lbs)	Seed yield per plant (oz)	Germ Rate
Kohlrabi	B. oleracea	Azur Star	A	9/17/2013	10/16/2013	46	45.10%		30	0.90	0.03	59
Kohlrabi	B. oleracea	Azur Star	B	10/2/2013	11/1/2013	22	10.78%		26	0.60	0.02	61
Asian green	B. rapa	Purple Mizuna	A	9/17/2013	10/16/2013	41	78.85%	7/4/2014	34	0.45	0.21	83
Asian green	B. rapa	Purple Mizuna	B	10/2/2013	11/1/2013	48	88.89%	7/4/2014	38	1.20	0.50	78
Beet	Beta vulgaris	Shiraz	A	8/21/2013	10/2/2013	0	0.00%					in testing
Beet	Beta vulgaris	Shiraz	B	9/10/2013	11/1/2013	22	14.67%	9/23/2014	46	3.52	1.22	in testing
Broccoli	B. oleracea	Waltham broccoli	A	9/17/2013	10/15/2013	24	85.71%		22	1.29	0.93	81
Broccoli	B. oleracea	Waltham broccoli	B	10/2/2013	11/1/2013	18	60.00%		18	1.13	1.00	86
Garden Cress	Lepidium sativum	Wrinkled Crinkled Cress	A	9/17/2013	10/15/2013	57	100.00%	7/28/2014	60	3.30	0.88	96
Garden Cress	Lepidium sativum	Wrinkled Crinkled Cress	B	10/2/2013	11/1/2013	58	98.31%	7/28/2014	67	4.00	0.95	93
Upland Cress	Barbarea verna	Belle Isle Cress	A	9/17/2013	10/15/2013	93	97.89%	7/28/2014	94	8.28	1.40	93
Upland Cress	Barbarea verna	Belle Isle Cress	B	10/2/2013	11/1/2013	103	98.10%	7/28/2014	103	7.89	1.23	84
Asian green	B. rapa	Vitamin Green	A	9/17/2013	10/15/2013	31	52.54%	7/16/2014	30	3.70	1.97	97

2014-2015

Crop Type	Species	Variety	Seeding Date	Transplant Date	Location	number of plants	expected yield	contracted amount
Cabbage	B. oleracea	Copenhagen Cabbage	9/11/2014	10/17/2014	Trials HH	470	33	25
Turnip	B Rapa	Hinona Kabu	9/11/2014	10/17/2014	Trials HH	940	80	60

BENEFICIARIES

Because this project was so visual and intriguing we were able to conduct outreach well ahead of the time frame we originally proposed. We have led multiple tours through the tunnels, including a high school biology class from People's Academy, farmers from Arcana Greenhouse, and the attendees of the national Home Gardener's Seed Association conference that was held in Vermont for the first time this year. We also hosted a focused workshop about seed production in tunnels in partnership with the NOFA-VT Twilight Walk series. While only sparsely attended as few have heard of this new technique to date, we are confident that with further outreach we will begin to attract more and more high tunnel growers to learn about seed production in tunnels.

A side benefit of the tours and walks we conducted this season was that we were able to capture a tour on video and it was featured in our 2014 catalog, which will circulate to about 120,000 people throughout the year. We also featured a short video about the project on our blog at http://www.highmowingseeds.com/blog/pushing-the-boundaries-experimenting-with-seed-production-on-our-farm/.

We were extremely pleased to have found success not only in the quality and marketability of these varieties but also for the research and documentation of production practices that will allow us to continue to improve our success with these crops. By employing multiple succession plantings we were able to determine the best planting date for optimal survival and highest seed yields. In most cases the second succession of planting provided the highest yield and germination rate, meaning that planting dates that keep plants small going into winter is key for winter survival.

We have further learned that employing removable row cover is crucial for root development in fall and throughout the winter and for plant development in the spring. The row cover is essential for keeping the plants warm in the winter, but it also inhibits air circulation so must be removed whenever possible to give plants better air and light. We use the same row spacing in the high tunnels as we do in the field so as not to crowd plants. This provides good air circulation that inhibits disease and ample room for growth and staking. Staking the plants is important to minimize disease pressure and prevent lodging.

LESSONS LEARNED

Overall we are incredibly happy with our success in producing organic brassica seed at a commercial volume. One big challenge with respect to understanding and analyzing our results was that our new SCBG-funded high tunnel (herein named "Kate Brook") outperformed our original tunnel (herein named "warehouse") located next to our warehouse on Rte. 15. The Kate Brook tunnel is larger but is also located on our river bottom fields along the Lamoille River, which is a much more fertile location. Every crop at the Kate Brook tunnel showed superior yields and high germination rates, all of which translated

into commercial quality seed that we are now selling. In contrast, our Warehouse tunnel produced comparatively low yields and low germination rates.

The one successful crop from the warehouse tunnel was Hinon Kabu salad turnip, which is extremely valuable seed as we have never been able to sell this variety before. The success of this single crop from the poorer-fertility tunnel highlights the distinctions between different brassica crops for ability to produce good seed under varying conditions. Basically, turnips are the least demanding of these crops for being able to make seed under less-than-ideal conditions. In comparison, Siberian Kale was planted in both high tunnels and made a good amount of seed in both locations, but the seed from the Kate Brook tunnel germinated at 94% while the seed from the warehouse tunnel germinated at only 76%.

All of these results have caused us to focus much more intensely on soil health in the tunnels such that we have tested and supplemented the soil in the warehouse tunnel in multiple ways to attempt to achieve results comparable to those we observed in the Kate Brook tunnel. In order for this project to succeed we must be able to make clear recommendations to growers about requirements for soil nutrition with respect to seed crops.

CONTACT PERSON

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ADDITIONAL INFORMATION

See *High Tunnel Manual* below.

HIGH MOWING Organic Seeds
100% Certified Organic Seed Since 1996

Seed Production in Unheated High Tunnels

A Step-by-step Manual

High Mowing Organic Seeds

Wolcott, Vermont

Jodi Lew-Smith, Ph.D.

Katie Traub, Farm Manager

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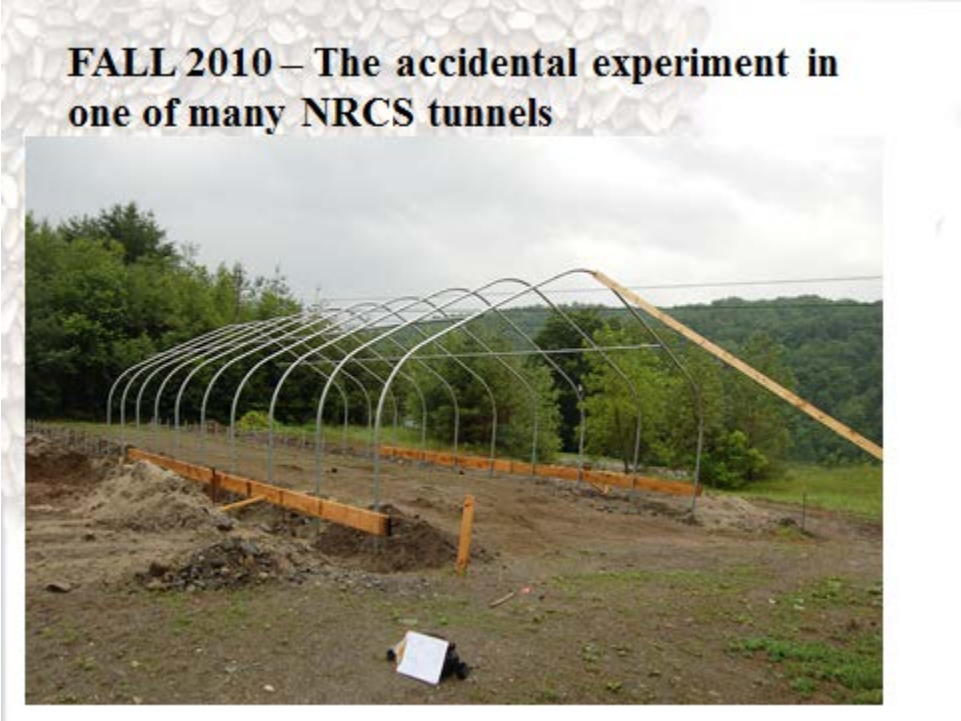
History of the project

2010-2011 – The accidental experiment

High Mowing erected an unheated tunnel in fall of 2010 for the purpose of doing winter greens trials. To our surprise, a number of the varieties in the trials survived the winter better than expected and then immediately bolted once the weather warmed. We allowed them to fulfill their cycle and were delighted by the copious quantities of seed we were able to harvest and how well it germinated



JANUARY

MARCH

APRIL

May - June

2011-2012 – The hopeful repeat experiment

Out of that experience we designed a more focused test to see if we could repeat the experiment and better determine which species and which varieties would succeed. Within our design we asked questions about timing of planting, winter survival, seed yield, and seed quality. Unlike the first year, we kept careful records of planting dates, plant numbers, seed yields, and seed germination rates.

From this year's data we primarily gained a better sense of which species were suited to this overwintering system and the timing required to ensure the ones with marginal survival ability had more than one succession in which to enter the winter at optimal developmental stage. Overall we learned that biennial plants generally survive best as small-framed plants of a rosette with some degree of root development. If the plants are seedlings that have not done any root development, they cannot survive. Similarly, larger-framed plants have more tissue that tends to freeze and rot, and generally survive with less success.

The other major conclusion from this year of experimentation was that certain species, and even certain varieties, are much more able to survive winters even at non-optimum plant size. For example, successions of Siberian kale can be planted two weeks apart and both successions will survive at nearly 100%, despite that one is the perfect small size and the other is either over-small or over-large. (depending on the weather during the autumn) In contrast, with two broccoli successions only the one at the optimum small rosette size will survive at even a moderate percent.

AGENCY OF AGRICULT

LET'S TRY IT AGAIN 2011-12
Primary question: What will survive?

Variety	Species	Succession	Spacing (ft)	Planned plants	Actual Plants out	Seeding date	TP date	%Survival	Conclusions
Hinona Kabu	B. rapa	A	0.5	50	27	5-Sep	6-Oct	11%	Planted too early
Rosalind	B. oleracea	A	1	50	23	5-Sep	6-Oct	29%	Planted too early
Golden Frill	B. juncea	A	0.5	50	30	5-Sep	6-Oct	50%	Planted too early, but not too fussy
Shanghai Green	B. rapa	A	0.5	50	35	5-Sep	6-Oct	3%	Planted too early
Hinona Kabu	B. rapa	B	0.5	50	28	29-Sep	18-Oct	96%	Planted on time
Rosalind	B. oleracea	B	1	50	15	29-Sep	18-Oct	100%	Planted on time
Golden Frill	B. juncea	B	0.5	50	33	29-Sep	18-Oct	97%	Planted on time but doesn't matter as much
Shanghai Green	B. rapa	B	0.5	50	35	29-Sep	18-Oct	49%	Perhaps planted on time but not hardy enough

2011-2012 Survival Data

Golden Frill mustard, June 2012

Rosalind broccoli, July 2012

Secondary question: how much seed will they make?

Variety	Species	Succession	%Survival	# of seed-bearing plants	Seed yield total (12-16M/oz)	Seed yield per plant	Germ Rate
Hinona Kabu	B. rapa	A	11%	too few to harvest			
Rosalind	B. oleracea	A	29%	6	.45 oz	0.08 oz	
Golden Frill	B. juncea	A	50%	15	27.4 oz	1.83 oz	
Shanghai Green	B. rapa	A	3%	too few to harvest			
Hinona Kabu	B. rapa	B	96%	25	17.96 oz	.718 oz	91%
Rosalind	B. oleracea	B	100%	18	12 oz	.67 oz	67%
Golden Frill	B. juncea	B	97%	31	39 oz	1.25 oz	95%
Shanghai Green	B. rapa	B	49%	16	29.6 oz	1.85 oz	89%

And is the seed any good?

2012-2013 – The mega expanded experiment

Given a highly successful season the previous year, we designed an expanded test to ask about more crop types. Specifically we wished to see whether the crops that had not yet succeeded in producing saleable seed could be modified as to planting date, fertility, or protection from over-hot temperatures to improve outcomes. The crops in this category included beets, onions, broccoli, and carrots.

To this end we erected a second hoophouse specifically dedicated to seed production and used it as a second isolation for testing different varieties of the same crop species, such as broccoli and cabbage. In the new house we put larger plantings of crops we knew would succeed reliably, while in the older house we had a hodgepodge of smaller experimental crops.

New Hoophouse (Kate Brook) April 2013 – 5 crops

Copenhagen cabbage ⇧ Tokyo market turnip

Siberian kale

APRIL 2013
Reliable Crops

Same house JUNE 2013

Copenhagen Cabbage June 16

Yellow beet Purple carrot Red onion

MAY 2013
Experimental biennial crops

2013-2014 – The refined experiment

The next winter we refined what we were able to ask by adding a third house and experimenting with some additional crops we expected to be somewhat more difficult for seed. These included kohlrabi, purple mizuna, a different beet, a garden cress, an upland cress, and an Asian green.

Winter of 2013-14 – Used a third house and tried some finicky crops

Crop Type	Species	Variety	Succession	Seeding Date	Transplant Date	%Survival	# of seed-bearing plants	Seed yield total (lbs)	Seed yield per plant (oz)	Germ Rate	Conclusion
Kohlrabi	B. oleracea	Azur Star	A	9/17/2013	10/16/2013	45.10%	30	0.90	0.03	in testing	
Kohlrabi	B. oleracea	Azur Star	B	10/2/2013	11/1/2013	10.78%	26	0.60	0.02	in testing	
Asian green	B. rapa	Purple Mizuna	A	9/17/2013	10/16/2013	78.85%	34	0.45	0.21	83	better than outside
Asian green	B. rapa	Purple Mizuna	B	10/2/2013	11/1/2013	88.89%	38	1.20	0.60	78	better than outside
Beet	Beta vulgaris	Shiraz	A	9/21/2013	10/2/2013	0.00%				in testing	
Beet	Beta vulgaris	Shiraz	B	9/10/2013	11/1/2013	14.87%	46	3.52	1.22	in testing	
Broccoli	B. oleracea	Waltham broccoli	A	9/17/2013	10/12/2013	85.71%	22	1.29	0.93	81	Waltham did much better than Novalimd
Broccoli	B. oleracea	Waltham broccoli	B	10/2/2013	11/1/2013	80.00%	18	1.13	1.00	86	Waltham did much better than Novalimd
Garden Cress	Lepidium sativum	Wrinkled Crinkled Cress	A	9/17/2013	10/12/2013	100.00%	60	3.30	0.88	96	Good seed with good quantity
Garden Cress	Lepidium sativum	Wrinkled Crinkled Cress	B	10/2/2013	11/1/2013	88.31%	67	4.00	0.96	93	Good seed with good quantity
Upland Cress	Barbarea verna	Belle Isle Cress	A	9/17/2013	10/12/2013	87.89%	94	8.28	1.40	93	remarkable yields with decent quantity
Upland Cress	Barbarea verna	Belle Isle Cress	B	10/2/2013	11/1/2013	88.10%	103	7.89	1.28	84	remarkable yields with decent quantity
Asian green	B. rapa	Vitamin Green	A	9/17/2013	10/12/2013	62.64%	30	3.70	1.97	97	much better than outside

Belle Isle Cress 2014

May 13

May 19

Azur Star kohlrabi 2014

May 13

May 22

CONCLUSIONS FROM 2013-2014:

1. For finicky crop types, main crop "workhorse" varieties will yield seed in the tunnels where more finicky specialty types will not. This tells us the tunnels are providing sub-optimal but borderline sufficient conditions for seed production.
   - E.g. Waltham broccoli did better than a specialty purple broccoli
   - E.g. Shiraz red beet did better than a specialty gold beet

2. For individual annual brassica varieties that require more idealized conditions to make seed, the high tunnels can make the critical difference. In this case the outdoor conditions are sub-optimal while the tunnel creates a more optimized environment.
   - E.g. purple mizuna and vitamin green. These crops make very small amounts of seed outside in Vermont, but gave decent yields in the tunnel.

2014-2015 – whole-house production

In this year we moved from experiment to straightforward seed production in the tunnels.

Crops Suited to Unheated Tunnels

Brassica Family

Brassica rapa (mild Asian greens, turnips)
Brassica juncea (spicy mustard greens)
Brassica oleracea (broccoli, cabbage, curly kales, kohlrabi, others)
Brassica napus (Siberian kale, Russian kales, rutabaga)
Lepidum sativum (garden cress)
Barbarea verna (upland cress)
Raphanus sativus (radish)

In general the Brassica family crops are the easiest to grow in unheated tunnels. With the exception of some of the B. oleracea crops, such as broccoli, they all have the cold hardiness to reliably survive winters under tunnels even in northern Vermont. The more cold hardy among them, such as the turnips, mustards, and Siberian/Russian kales, can even be planted with a single succession date because they are so reliable for winter survival. This group has a wider range of developmental stages at which they are still cold tolerant.

Chenopod Family

Beta vulgaris (beets, chard)
Spinacia oleracea (spinach)

The chenopod family can be successfully overwintered in tunnels with adequate protection, however the challenge is obtaining high quality seed. This family is especially sensitive to temperature during pollination and seed set, and they generally require steady cool temperatures in that window that are difficult to provide in the tunnels. They do produce seed, however the quality is not the best and may not be saleable.

For this group, the tunnel production system (without additional temperature controls) is perhaps better suited to breeding work than commercial production. With the option of using the tunnels to make seed, we can make selections on these crops either out in the field or in the tunnels and then harvest seed of the best plants. For field selections the best plants are transplanted into the tunnels with a timing that allows them to enter winter at the appropriate developmental stage. This strategy is easiest for beets and somewhat more difficult for chard and spinach.

Allium Family

Allium cepa (onions, shallots, scallions)
Allium porrum (leeks)

We have had mixed success in producing onion seed in tunnels, however we believe the system could be optimized for seed production without the addition of more controls. Unlike the chenopods or the brassicas, the allium family is acclimated to heat and doesn't mind heat during pollination.

Further, as onions are easy to store as bulbs, we can introduce a selection stage by growing onions to full size, sorting bulbs to keep only the best ones, store those, and then replant in the early spring for seed production.

Carrot Family

Daucus carota

We have only tried carrot in a limited way and the seed quality was very poor, for reasons we don't understand. Carrot seed production is typically conducted in areas much like onions, all of which have more heat, so we think there is potential for carrot seed in tunnels. It may be the case that, like the chenopods, carrot seed production in tunnels may be better suited to breeding and selection work than to commercial seed.

Planting Dates

Well-timed fall planting is essential to success with high tunnel seed production. The rule for seeding date is September 15th, with a transplant date of October 15th. If a second succession is required to assure plants are small enough to survive the winter, the timing for that is two weeks after the first seeding. For most crops this is October 1st seeding with a transplant date of November 1st.

Slow-growing crops require more time and thus an earlier seeding date. This applies mainly to onions but is likely to apply to carrots, though we haven't work out this timing with any precision.

Brassica Family

COLD HARDY TYPES: require only single succession

September 15th seeding, **October 15th** transplant

LESS COLD HARDY TYPES: mostly B. oleracea, requires a second succession planted later to assure plants are small enough to overwinter with a small frame

October 1st seeding, **November 1st** transplant

Chenopod Family

BEET and CHARD: slow growing and of moderate hardiness, so require two successions, one a little earlier than the standard. Despite that beets can be direct seeded outdoors, it's too warm in the tunnels at this time of year to expect a strong stand.

August 21st seeding, **October 1st** transplant
September 15th seeding, **November 1st** transplant

SPINACH: quick growing and cold hardy, only one succession required. Despite that spinach can be direct seeded outdoors, it's too warm in the tunnels at this time of year to expect a strong stand.

September 15th seeding, **October 15th** transplant

Allium Family

ONION and LEEK: slow growing and of moderate hardiness, so require two successions, both considerably earlier than the standard

June 1st seeding, **July 15th** transplant
June 21st seeding, **August 7th** transplant

Winter Survival

We continue to revise what we think we know about winter survival. In a typical winter in Vermont, with temperatures dipping below zero many nights and a few low points of -25 or -30 ºF on the coldest days, a single row cover over crops within the tunnel is generally sufficient to protect from freezing a well-acclimated plant. Acclimation is key, and for this reason we try to get plants cool and keep them there throughout the window when temperatures are potentially damaging. This is especially relevant in the transition periods in the fall and the spring, in which daytime and nighttime temperatures fluctuate wildly. The general thinking is to attempt to mimic a temperate climate such as the coast of Washington, where temperatures hover around the freezing point for a long stretch of time.

In the fall this means we leave plants uncovered as long as possible before hard freeze settles in for the winter. All of these crops can take light frost and it's best to get them as much as possible before they're subjected to hard freeze. Throughout the winter we find it works best to avoid mulch or close plantings that prevent the sun from warming the soil. Any sunlight that reaches soil will help maintain temperatures in the target range of + 20-30 ºF. We haven't yet experimented with black plastic but we expect it might improve survival rates.

Then, in the spring, with the first warmish days we uncover at least during the day, to prevent the plants and the soil around them from getting warm enough to begin growth when the nights are still damagingly cold. This is a critical time when most plants are not dead from cold but can still be killed by the transition from deep cold into a cycle of freeze and thaw. Keeping their growth slow and steady is best.

In colder winters we are learning that plants need more protection than we originally realized. The winters of 2013-2014 and 2014-2015 were unusually cold and we had much higher winter losses than we'd had in previous years. Our houses that had foam insulation set into the ground around the house did better than the ones that did not, and we have now made it standard practice to insulate any new houses.

Brassica Family

This is generally a cold-hardy family that tolerates a lot of heavy freezing. The exception is the members of the Brassica oleracea, which are not as tolerant and require more careful handling. Within the B. oleracea group, the kales and cabbage are somewhat more hardy than the broccoli, but none of them are nearly as hardy as most any other species in the family with whom we've had experience.

Chenopod Family

This is a family of mixed hardiness, with the spinach among the most cold hardy of all greens, the beets intermediate, and the chard of low to moderate tolerance.

Allium Family

This is also a family of mixed hardiness, with average leek much hardier than the average onion. That said, the onions survive the winter better as small-bulb seedlings than they do as full bulbs, which readily freeze and rot. The larger the bulb, the lower the winter hardiness. We typically plant two successions (see previous section) because we see big differences in survival between the smaller plants and the larger plants, but it is not always easy to predict which one will survive better. There are environmental factors that we don't understand with this crop.

Carrot Family

Within our limited experience carrot is extremely hardy, with every planting surviving at near 100% as long as the roots have a chance to develop in situ. Tiny seedlings do not do well, and transplanted roots are difficult because they dry out very quickly.

Care Throughout Bolting and Flowering

Fertility

Seed crops require a great deal of fertility to produce abundant seed. We either spread compost or cover crop prior to planting, and then we typically side-dress with a nitrogen-rich (though non-nitrate) granular mix just as the plants begin to bolt. It's important to have current soil tests on your high tunnels and be aware of any potential deficiencies.

Pollinators and Isolation

Our tunnels are typically open to the outdoors and we are careful not to plant crops that would cross with our tunnel crops within a half mile. We have many wild bees and syrphid flies that visit our crops, but we also supply additional purchased bees to ensure that pollination is completed. For a number of years we have used bumble bees in small portable hives, however importation of any bees creates a risk of spreading disease to native pollinators and thus we're working to develop a different mechanism.

One major difficulty in doing carrot seed even in high tunnels is that the weedy species known as Queen Anne's Lace will cross with it and destroy the genetics. It might be possible to isolate carrot crops by closing down a house once Queen Anne's lace begins to flower, but this is still a risky practice. A fully screened house with self-contained pollinators is likely the only safe method.

Temperature Control

Tunnels tend to get hot as the season warms up. This is especially a problem for the brassica and chenopod crop, which cannot tolerate higher temperatures during pollination with a concomitant decline in seed quality. As mentioned above we keep our tunnels open to the air in part to cool them down. We have also used shade cloth over crops to keep temperatures lower during pollination. We haven't yet done these as experiments with controls to see if this is effective, but it doesn't hurt. We see over and over that some crops are more "robust" and others

are more “finicky,” and responses to heat during pollination is one area where this difference is displayed, as evidenced by seed quality and quantity at the end of the season.

Watering

Overall the pattern for water is that we provide moderate water during establishment in the fall, make sure the bolting and flowering plants in the spring and early summer have sufficient water, and then wean it away as the seed matures in the mid to later summer.

If there is a mid-winter thaw and the plants wake up, watering may be necessary, but otherwise the plants should be fine during winter if adequate water was provided during fall. Overhead watering is fine when the plants are young and growing fast, but when they start to flower and set seed pods drip irrigation is recommended. Drip irrigation helps avoid wet leaves and spreading of disease.

Once the seed is mature the plants will need to dry down, so no water would be applied once plants are in dry-down stage, usually the last week before harvest.

Seed harvest

The majority of seed crops are ready for harvest in the mid to later summer, usually mid July to mid August. Our rule of thumb is to harvest at 70% brown: 30% green. If you wait until later to harvest you get a high degree of shattering of pods. If you do it earlier you have a high percent of immature seed.

Beginning to dry down

Ready to thresh

Once plants are cut or pulled, they are typically stacked on tarps to continue drying down in the house prior to threshing. This “curing” stage is important for allowing maximal seed development, as the maturing seed continues to receive sustenance from the full plant. Make certain to avoid contaminating seed with soil from roots, either by cutting stems at harvest or just prior to threshing.

To thresh, we typically break pods by stomping or driving over small lots sandwiched between two tarps. After this we would screen the chaff away from the seed using box screens, followed by winnowing in front of one or more box fans. Winnowing is accomplish by pouring a stream of seed in front of a fan and allowing the lighter seed and chaff to blow away from the heavier seed, which drops into a catch basin below the fan. The heavy seed is the good seed.

Project 4: The Lunchbox: A Mobile Farmers Market Increasing Access to Specialty Crops in Underserved Areas – Final Report (Previously Accepted)

PROJECT SUMMARY

The project addressed the lack of access to specialty crops and improved farmers' access to markets by establishing a mobile farmers' market to distribute specialty crops to senior nutrition programs, low-income housing sites, and community centers in food desert and low-income communities in Orleans and Essex Counties, VT.

Residents of Orleans and Essex Counties, Vermont face extraordinary challenges. Not only is the region remote, the counties ranks last in per capita income among all Vermont counties and residents experience the highest rates of poverty and unemployment in the state. The prevalence of major chronic diseases (diabetes, heart disease) is higher than elsewhere in Vermont and the average resident has a shorter lifespan than those living elsewhere in the state. These low-income communities lack access to specialty crops for a number of reasons, including limited availability of grocery stores, inaccessibility of stores, cost of healthy food options, and individual resource constraints, such as income and transportation.

At the same time as consumers in our community lack access to specialty crops, there are gaps, barriers, and bottlenecks in our food system that limit farmers' access to markets, including: lack of adequate distribution and handling or processing infrastructure; difficulty in meeting quantity and quality demands from various markets; seasonal nature of local food production; and inadequate understanding of needs and challenges of consumers in food deserts (such as the lack of knowledge about the market or consumers in underserved communities).

PROJECT APPROACH

This project enhanced the competitiveness of specialty crops, supported Vermont farmers, and strengthened local economies by improving and expanding the Lunchbox, a mobile farmers market serving Orleans and Essex Counties of Vermont. The project addressed the lack of access to specialty crops and improved farmers' access to markets by establishing a mobile farmers' market to distribute specialty crops to senior nutrition programs, low-income housing sites, and community centers in food desert and low-income communities in Orleans and Essex Counties, VT. The project aggregated products from multiple farmers and delivered a wide variety of specialty crops to places where people live, work and congregate, making it easy and convenient for people, even those without transportation to purchase and consume specialty crops foods.

Specifically, this project expanded the mobile market by:

- Increasing the number of communities served by the mobile market from four to five,
- Launching a workshop series for consumers to increase nutritional knowledge and specialty crop consumption,
- Producing and distributing an informational brochure about where to purchase specialty crops in the Northeast Kingdom,
- Piloting on-farm culinary workshops and dinners for Vermonters and visitors at specialty crop farms in the Northeast Kingdom.

In the 15 weeks the Lunchbox Mobile Farmers Market was on the road, 39 markets were held in 5 food insecure communities, over 200 free meals were served to children 18 years and younger, and $5,676 dollars of local food was purchased from 20 specialty crop producers.

GOALS AND OUTCOMES ACHIEVED

Increased the number of communities served by the mobile market from four to five.

We conducted outreach to specialty crops growers with a priority being beginning, emerging and often limited-resource specialty crop producers to participate in the mobile market in 2013. Outreach methods included phone, email, and mailing. This outreach resulted in 20 specialty crop growers participating in the mobile market for 2013, a 100% increase from the previous year. It proved challenging to find a date for an orientation meeting that worked for all the specialty crop growers. In lieu of an in person, we provided a printed packet of orientation materials and followed up individually with each specialty crop producers. 100% of farmers reported that the project helped them reach new markets.

We contracted with five community sites to host the mobile market in 2013. Sites included a variety of types of sites with a focus on serving places where community members, especially low-income community members, already gather.

Mobile Market Site	Site Type
North Troy	Early Childhood Center
Irasburg	Town green
Derby	Low-income apartments
Newport	Municipal parking lot/Senior housing
Canaan	Community meal site

We partnered with a local nonprofit organization to expanded off-truck refrigerated storage for storage of crops and prepared foods between market days and on-farm events. The organization had a kitchen facilitate that was under-utilized and we were able to rent their kitchen space and refrigerated storage space. Access to this facility was critical to the market's ability to carry over inventory from one market to the next.

Advertising to promote the mobile farmers' market and specialty crops were carried out via weekly notices in the county paper, "alert now" direct messages to school communities, posters, and newspaper articles. We were able to utilize signs from Hunger Free Vermont that could be left at the site to advertise the summer meal program. In the future, we would like to install permanent signs with information about the market's hours of operation and services.

Launched a workshop series for consumers to increase nutritional knowledge and specialty crop consumption.

We launched a 12-week workshop series for consumers to increase nutritional knowledge and specialty crop consumption, serving over 949 customers. We piloted several models for nutrition education at the market including inviting farmers to lead workshops, taste testing local food recipes, and leading hands-on cooking workshops. We encountered challenges in getting a critical mass at workshops in order to

hold a more traditional 30-minute lesson for a group of participants. As a result, we adapted our model to a more informal taste test and cooking demo. The cooking demo and food samples attracted audiences and allowed participants to engage in the nutrition education whenever they arrived at the market.

We developed pre- and post-surveys for consumers on nutritional knowledge and specialty crop consumption. Interviews of customers reported that the market has had a positive impact on community and increased this access to specialty crops. Many reported that the market served as a gathering place for the community where they could connect with their neighbors.

In customer surveys, reasons people listed for visiting the market included:

- To obtain a "Free summer meal for a child"
- "To find food that's not offered in town"
- "To find info/goods for healthy eating"
- "To use Farm to Family Coupons"
- To "visit with friends"

Of the people surveyed 75% or more of participants said they agreed to this statement: "because I visit the market I now…"

...eat more fruits and vegetables

...eat more organic food

...eat food that is fresher (less packaged food)

...feel better about where my food comes from

Produced and distributed an informational brochure about where to purchase specialty crops in the Northeast Kingdom.

We created and distributed 500 tri-fold brochures highlighting locations purchase specialty crops in the Northeast Kingdom including local farms, CSAs, farmers' markets, and farm stands.

While customers responded enthusiastically to the resource, when we completed follow-up surveys with locations mentioned in the informational brochure, given all the factors that affect sales, they were not able to attribute any change in sales as a result of the brochure.

Piloted on-farm culinary workshops and dinners for Vermonters and visitors at specialty crop farms in the Northeast Kingdom.

We researched existing models for on-farm culinary workshops and dinners and identified specialty crop producers in Orleans and Essex Counties to host the on-farm culinary workshops and dinners. In total, we hosted 4 on-farm culinary experiences at 4 specialty crop producer farms.

In our original proposal, we planned to conduct the on-farm culinary events from March – August. After contacting our farm partners, we learned that the summer is a busy time to hold events at farms and that our partners would prefer to host events in the late fall. Responding to this feedback, we scheduled events in September and October. This timing worked well because it allowed farms to invite their CSA members and customers to their farm at the end of the season to celebrate the growing year and look ahead at the coming year. Due to this delay, we were not able to hold our training for farmers on best practices learned from the on-farm culinary events. In lieu of the training, we have created an "On-Farm Culinary Events Manual" based on the best practices we developed this fall. This manual has been distributed directly to our farm partners via email.

We conducted follow-up phone interviews with specialty crop producers who participated in the on-farm events as a part of this project. 2 of 4 farms continued to implement on-farm culinary experiences in 2014.

BENEFICIARIES

This project benefited 20 specialty crop producers by marketing, distributing, and selling their products through the mobile farmers market. In particular, the project prioritized beginning, emerging and often limited-resource specialty crop producers. The market provided $6,000 in additional farm income for the specialty crop producers. In addition, 4 specialty crop growers in the region benefited from on-farm culinary events.

The project also impacted nearly 1,000 low-income individuals by providing expanded access to Vermont-grown specialty crops and increased nutritional knowledge.

LESSONS LEARNED

Each community is unique.

What worked for the market in one area did not necessarily work in another. For example, the Irasburg and Newport locations where in prominent locations with significant drive by traffic to ensure regular attendance at the market. Other locations like North Troy and Island Pond did not have similar central locations. In those cases, we moved our location to a child care center and an apartment building where we could rely on a consistent number of children and parents for the summer meal program. Experimenting with the right parking location had a positive effect on participation. For example, at our North Troy site we began parking at day care center that was situated outside a low-income apartment complex in addition to parking at our usual senior meal site. This change increased our participation by 780%.

For the coming market season in 2014, the mobile market will visit additional sites, including retail stores, senior meal sites, low-income housing sites, and schools. We are partnering with interns from Sterling College to spend this winter researching communities in Orleans and Essex Counties to determine ideal sites for the market based on community need.

Staffing capacity

Having an adequate level of staff to support the market has been an on-going challenge. Running five markets, coordinating purchasing with farmers, preparing meals, delivering educational programming, and driving the truck, staffing the market, and managing paperwork and reporting, has been a significant load for one full-time staff member and an intern. Looking forward to next season, we will be evaluating our model and looking to identify ways to share job responsibilities across multiple staff.

Partnerships

Partnerships were vital to enhancing outreach and success of the market. We have partnered with RuralEdge (housing organization) and the Area Agency on Aging for Northeast Vermont (senior meals organization) to develop additional coupon programs to encourage residents and seniors to utilize the market. Both organizations purchased coupons from the market to distribute to their constituents. We have received approval to accept Farm to Family (VT Department of Health) and Harvest Health (NOFA-VT) coupons to increase access to healthy foods for low-income Vermonters.

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Project 5: Explore Your Local Food System – Final Report (Previously Accepted)

PROJECT SUMMARY

Explore Your Local Food System creates hands-on educational experiences in order to increase consumption of locally-grown specialty crops and to build the capacity of specialty crop producers to incorporate agritourism into their businesses. This pilot will incorporate a number of partners including Vermont Farms! Association, the Rutland Area Food Co-op, PEG TV, local caterers and chefs, area farmers, local schools and colleges, and area food shelves and meals sites involved with our Grow a Row program.

In order to develop an effective methodology for increasing local food demand, we contemplated two types of research. First, consumer communications research by Frameworks Institute concluded that in order to reach beyond the "typical" local foods audience, something more than a simple "buy local" message campaign is needed. For people who are not immersed in "local food", there needs to be some "framing" of the issues so that people begin to make a direct connection between their food choices and how that action is connected to and influences the overall way in which food is produced and distributed. Second, research on teaching adults puts a heavy emphasis on participatory learning, something that fully engages the audience so they can question, examine and determine for themselves the best course of action.

Combining these two well-researched concepts, RAFFL's **Explore Your Local Food System** will create lasting behavior change … leading to an increase in the food dollars spent on locally-grown specialty crops. This year-long pilot will introduce new customers to specialty crops and serve as an introduction to agritourism for interested specialty crop farms.

1. **Farm Tours.** RAFFL will coordinate educational farm tours designed for Vermonters and visitors. Tours will explore how the farm is part of a "food system". In addition to highlighting the farm's growing techniques, we will share information about how the farm's products are prepared for and delivered to various market outlets. The tours will include an option for participating in a meal featuring the farm's products at a nearby venue.
2. **Consumer Workshops.** RAFFL will coordinate workshops led by knowledgeable educators that increase participants' understanding of specialty crops' nutritional value and how to best prepare and preserve local food.
3. **Agritourism Promotion.** RAFFL will work with local farms experienced in agritourism to teach best practices to interested specialty crop producers.

Despite national trends of farm closures and consolidation, vegetable farms in Rutland County rose 57 percent from 39 to 61 farms from 2002 to 2007. Similarly, fruit, nut, and berry producers jumped 75 percent from 24 to 42 farms. However, surveys conducted by the Rutland Area Farm and Food Link (RAFFL) suggest that demand for local food lags in the Rutland area when compared to other Vermont counties. A recently completed survey of 65 area farmers (completed with AIC funds) showed that farmers continue to look to RAFFL to educate area consumers about local food – helping to build demand

for their products. Without a rise in demand for local food, growth in locally-grown specialty crop production is at risk of becoming stunted.

PROJECT APPROACH

There were three elements to this project:

1. Agritourism workshop for farmers
2. 6 farm tours
3. 6 culinary workshops

Agritourism Workshop

A copy of the outreach flyer and a full agenda for the workshop is included in the materials.

Farm Tour Series

As we began planning the farm tours, we created a set of criteria those farms needed to meet:

- Specialty crop producers
- Geographically dispersed around the county
- Able/willing/interested in hosting farm tours

The combination of these criteria resulted in many of our farm tours happening at farms that are a bit "out of the way". This made the goal of our project – to link the farm tours with after tour dinners – difficult. Per our mid-term progress report, we eliminated this element.

Farm Tour Locations

April	Tangled Roots in Shrewsbury (mushrooms)
May	Breezy Meadow in Tinmouth (heirloom orchard, vegetables and rice)
June	Second Nature in Wells (herbs)
July	Two Dog Farm in Danby (vegetables and blueberries)
August	Wellsmere Farm in Wells (vegetable preservation)
September	Yoder Farm in Danby (beans, heirloom apples, and vegetables)

All of these farms are specialty crop producers. The farm called Breezy Meadow produces a wide variety of products, a small amount of which is rice, a non-specialty crop. We decided to include Breezy Meadow farm in our farm tour series because they adhere to some unique and innovative farm practices that are based in biodynamic and permaculture practices. Based on those principles they incorporate a diverse range of crops and animals on their farm. For the purposes of our tour we had them focus on their

specialty crop production but allowed them to explain how their land and the overall environment benefit by utilizing diversified farming methods.

As you can see from the educational materials that were produced from for this farm tour, as well as others the focus of the tours was on specialty crops, their health benefits, useability, and fun tips to encourage people incorporate them into their diet.

Marketing Approach

RAFFL used many different approaches in order to market the farm tours. Our goal was to reach as many different audiences in the Rutland area as possible, with special effort towards outreach to lower income people who, statistically speaking, are less active in purchasing local food.

To reach the RAFFL audience who is already quite engaged with local food, our primary marketing strategy was: advertising on the RAFFL website, sending email blasts to the RAFFL listerv (1,016 subscribers) and advertising on the RAFFL Facebook page (1,036 "likes.") These strategies, for the most part, proved successful; when asked how they found out about the tours, 37% of respondents reported seeing the event posting on the RAFFL website, 26% reported seeing an email advertisement sent by RAFFL, and 5% of respondents reported seeing a Facebook post about the tours. This means that overall, 68% of people who registered for the tours heard about them from some form of online marketing.

In order to reach audiences who are not currently engaged with RAFFL, we knew we'd have to go beyond website updates, emails to the listserv, and Facebook posts. We approached this by engaging with the wider community. This involved submitting the tour information to twelve local newspapers' calendars, hanging over thirty flyers around downtown Rutland businesses, and forwarding seven Rutland institutions the email campaigns to be sent to their listservs. These institutions included The Rutland Regional Medical Center, The Vermont Country Store, and the Department of Health WIC clinics.

Additionally, we emailed PDFs of the flyers (to be hung in their office) to Rutland institutions which typically service lower income people. These included institutions like Rutland County Parent-Child Center, Rutland County Women's Network and Shelter, and Community College of Vermont. In posting the tours in local newspapers (some of which are free, all of which are inexpensive,) and hanging flyers around institutions where some populations of lower income people may find themselves in their day to day lives, the hope was that they would hear about the tours, learn about the benefits of buying from local farmers, and start a chain reaction of behavior change. Additionally, in an effort to keep the tours as accessible as possible to all income levels, the tours' fee was a sliding scale of $5-15 for adults, free for kids, and there was a free transportation service option from Rutland to each tour.

Culinary Workshops

When planning this series we knew from past experiences that getting people to attend classes is not always easy. With that in mind, and the intention of reaching varying demographics of the Rutland population, we set off to offer our events in multiple locales, settings and times of day and week.

Workshop Locations

Event # 1: April 2013 Bean, Grain and Greens Demo with GMC students at PEG-TV studios

Event # 2: May 2013 Onion Demo with Hilary Adams at Asa Bloomer (state office) Building

Event #3: June 2013 Grilling Vegetables with Randal Smathers at NW Community Garden

Event # 4: July 2013 Lisa Donahue at Downtown Rutland, Friday Night Summer Series

Event #5: Aug 2013 Cooking Healthy and Affordably with Lisa Fennimore at Stafford Tech

Event #6: Sept 2013 Pizza Making with June Osowski at Godnick Adult Center

Marketing Approach

Same as farm tours. See above.

In January 2013 RAFFL hosted a workshop "Grow Your Business with Farm Tours" for specialty crop producers in our region. Beth Kennett of VT Farms! Association worked closely with RAFFL staff to plan the agritourism workshop. The workshop featured a panel of experts representing various points of view.

Panelists were:

- Best Practices Beth Kennett of Vermont Farms Association
- Safety and Liability Kevin Durkee of Durkee Insurance
- Food Safety Londa Nwandike of UVM Extension
- Farm Education Rachel Cadwallader-Staub and Cat Wright of Shelburne Farms
- Case Study BJ Hathaway of Hathaway Farm and Corn Maze

Key partners on the farm tours were:

- The six specialty crop farmers that hosted us
- PEGTV which taped and aired the farm tours on their local cable access station
- The Good Bus which provided transportation for those who needed it
- Shelburne Farms which provided input and advice to our staff for helping the farmers to make the farm tours education and engaging
- VT Farms! Which shared best practices with us that we then used when working with the farmers to design the farm tours

Key partners on the culinary workshops were:

- Green Mountain College: presented a workshop which was televised on PEG-TV
- Stafford Technical Center: presented a workshop led by their lead culinary educator and students

GOALS AND OUTCOMES ACHIEVED

Target: 280 individuals will attend farm tours and/or culinary workshops.

Result: 83 people attended farm tours. 122 attended culinary workshops. Total: 205 total.

Target: 30% of farm tour attendees will be low-income.
Result: 20% of farm tour attendess were low-income.

Target: 18,000 will gain access via PEG-TV
Result: 18,000 gained access via PEG-TV

Target: 15 farms with an emphasis on specialty crops will gain ability to incorporate or expand agritourism on their farms.
Result: 13 specialty crop farms received training.

Target: 6 farms with emphasis on specialty crops will gain experience.
Result: 6 farms with emphasis on specialty crops gained experience.

Target: 6 area chefs/caterers will be highlighted on tours.
Result: It was determined early on that this part of our proposal was not feasible. As we began planning the farm tours, we created a set of criteria those farms needed to meet:

- Specialty crop producers
- Geographically dispersed around the county
- Able/willing/interested in hosting farm tours

The combination of these criteria resulted in many of our farm tours happening at farms that are a bit "out of the way". This made the goal of our project – to link the farm tours with after tour dinners – difficult. The distance that would need to be traveled presented a barrier, the sheer amount of work it would take to get a caterer out to the farm was a barrier, and… it is also awkward to arrange for a meal that only some of the participants will be able to participate in (we said we'd charge a fee to cover the cost of the meal) given our emphasis on encouraging participation by lower income people. So, in the end, we requested in the mid-term report that this element of the project be eliminated. Instead, we provided food samples and recipes that encouraged participants to try making dishes that included the ingredients at home.

Surveys: Findings are described in the responses below. A full set of survey results is attached as separate documents.

BENEFICIARIES

Agritourism Workshop
Twelve farmers representing 7 specialty crop farms and 2 that weren't specialty crop attended the workshop. The workshop was free to specialty crop producers and the others (which were small-scale fiber and meat farms) paid a fee to attend.

The key issues farmers reported learning "a great deal" or "a lot" about were Farm Tour Best Practices, Farm Tour Liability and Insurance, and Farm Based Education. As a result of the workshop, 67% reported they would change current practices when hosting farm tours and 50% would incorporate farm based education that they hadn't done before.

Farm Tours
Eighty-three people attended the six farm tours. We found that attendance in the late spring and early fall was best. The attendance at tours conducted during the height of summer was very low despite a lot of interest in the topic from people who "wished" they could attend.

We analyzed tour participant demographics by asking them information about themselves on the registration. Personal information included occupation, how often they purchase locally grown food, and how much fruit and vegetables are a part of their diet. In analyzing this data, we were able look at trends of people's involvement or exposure to local food through their occupation, their current shopping behaviors and consumption of fresh produce.

A few trends were as follows: 75% of the 40 survey respondents reported buying local produce "every week" and the remaining 25% said they were not very involved with local food. 23% had never been on a farm. Clearly people who are interested in local food are more likely to attend a farm tour. For this reason we offered transportation from downtown Rutland to remove the barrier of not owning a car and/or feeling comfortable driving into the rural areas. This option was used by people for 4 of the 6 tours.

We have concluded that, by and large, farm tours may be most relevant at a different stage of behavior change than we had thought. We envisioned this being a great introduction, a fun way to present information to people not yet avidly supporting the local farm economy. Twenty-three percent (23%) of the tour attendees had never gone onto a farm but the vast majority of attendees were aspiring farmers, homesteaders and/or local food shoppers. Farm tours seem to attract people already interested but wanting to "go deeper".

That said, the tours still produced results we were seeking. Of the 40 participants who responded to a survey, 94% stated they "gained useable skills and knowledge" and "will be able to apply them to making different choices about where I buy my food". Eighty-seven (87%) "feel more comfortable visiting a farm and talking with farmers because of this workshop" and 88% said "as a result of this tour I plan to be more involved in the topic".

From the farmer perspective, hosting the farm tours was a great experience they would repeat. We surveyed the farmers about their experience. The responses, unfortunately, can not be translated into percentages as the farmers often responded in narrative form. See the attached for a full report on the feedback. Meantime, here are two direct quotes:

From Ellen Malona, Second Nature Herb Farm
I really enjoyed participating in the farm tour; it was fun to have that number of people discover our farm and explain to all of them what we do and how and why we do it. Their appreciation added to my enjoyment of growing all these herbs and passing them onto folks who will grow and use them. Thank you again for the opportunity to show off!

From Maeve Binchy, Tangled Roots Farm
We hosted a workshop on our farm this season. Thanks to the sponsorship and support of RAFFL, it was a great success. RAFFL took the lead on advertisement and registration, which allowed us to focus on the content and logistics of the educational programs. Further, the follow-up press and evaluations were really helpful in growing our sales and creating interest in future workshops. While we love educating

and connecting with the community, we would have a had a great deal more difficulty hosting such successful first public events without the hard work and great ideas of the fantastic RAFFL staff.

Culinary Workshops
A total of 122 people were reached, not including viewers of the PEG-TV (cable access) show. A majority of participants (61%) already purchased local produce on a weekly basis. But, clearly we were reaching a new audience as 32% only sometimes bought local produce and 7% rarely bought local produce. Of the participants who completed a survey, the following results were reported:

- 82% strongly agreed and 18% agreed that "I gained useable skills and knowledge and will be able to apply them at home when making choices about cooking and using local foods."
- 86% strongly agreed and 14% agreed that the workshop "helped me to understand how to better us local food and to do so healthfully".
- 72% strongly agreed they would "buy more local food in the next month", 14% agreed with the statement, and 14% were unsure.

These results tell us that we achieved our goal of giving people more knowledge and skills to purchase specialty crops in the future.

LESSONS LEARNED

Lessons Learned from Agritourism Workshop

The attendance at this workshop was a bit lower than we had hoped. However, a recap of the important highlights of information from the panel was posted to our farmer blog: What's Growin' on. This blog is a communication tool for farmers in our region. The post about the workshop has received 54 views to date. In addition, staff used the information learned from the workshop in our communications with farmers who hosted farm tours as part of the series.

Lessons Learned from Farm Tours

The content of the farm tours were very educational. RAFFL staff worked closely with the farmers in the weeks leading up the tours to walk the farm and think about how to effectively work with the public coming on to the farm, how to develop interesting content, and how to incorporate interactive activities. We found that we had underestimated the amount of staff time it would take to do this properly. We ended up using our general funds to supplement the Specialty Crop funds.

Lessons Learned from Culinary Workshops

The best attended workshop that required people to intentionally attend, versus drop by, was the one led by Lisa Fennimore. Lisa is a known entity. She is the chef instructor at Stafford Technical Center and the event was held in the facilities at her school. She definitely drew in people from a broad cross-section of the community on a weekday evening during the summer. We surmise that having confidence in the presenter may be one of the critical factors for people when deciding whether or not to make the time to attend a cooking workshop versus not.

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ADDITIONAL INFORMATION

PEG-TV Rutland filmed most of the farm tours and some of the culinary workshops:
http://vp.telvue.com/preview?id=T00969&video=152015

Project 6: An Emerging Problem for Vermont Christmas Tree Growers: Root Aphids – Final Report

PROJECT SUMMARY

Root aphids have become a problem in Christmas tree production in Vermont. Root aphids in New England Christmas tree plantations are believed to be a relatively new problem that may have developed due to current production practices. Infested seedlings are stunted, chlorotic and susceptible to root rot. They slow tree growth, delay maturity and impact revenues. In most plantations and cut-your-own operations, trees are cut intermittently throughout the field as they reach salable size and shape. Growers fill gaps with young seedlings, planted adjacent to stumps of trees harvested earlier in the year. Stumps from multiple generations may occur side by side (Fig. 1). Corn field ants transport root aphids from harvested trees to viable roots of the seedlings through channels they make in the soil. In the past growers have relied on imidacloprid insecticides for management. *Stratiolaelaps scimitus* (formerly *Hypoaspis miles*), a commercially available predatory mite, has been shown to be effective against a wide range of soil-dwelling pests, including root aphids, black vine weevil, thrips and strawberry root weevil. The goals of this project were to determine the species of aphids infesting Christmas trees and evaluate the efficacy of releasing the commercially available soil dwelling predatory mite *S. scimitus*.

PROJECT APPROACH

Task provided in the Work Plan: Determine the root aphid species attacking VT Christmas trees.

Fig. 1. Chlorotic fir seedling infested with root aphid, planted in gap from harvested tree, (red arrow points to stump of harvested tree).

Significant results, accomplishments. Adults are required for definitive species identification. Adults were trapped in the fall because that is commonly when other root aphids emerge from soil to fly to alternate hosts. In two VT Christmas tree plantations with root aphids, 10 symptomatic balsam fir trees were randomly selected. The presence of root aphids was verified by carefully loosening and lifting each tree and examining them for signs of root aphids. After infestations were verified, in the plantation that we selected for the predaceous mite trials, we placed yellow sticky cards (12 x 20 cm) under the canopy of 24 random fir trees which were part of the plot design (6 blocks of 12 trees each). In each block four trees were selected for card placement with two placed horizontally and two placed vertically. These were placed in the plantation in mid-May of both 2014 and 2015 to monitor root aphid dispersal activity. Cards were inspected or collected once per week and aphids identified under a dissecting microscope. The cards remained in place until late November or early December as long as aphids are being trapped. Identifications were made using keys by Smith (1969) and verified at the USDA, Insect Identification facility, Beltsville, MD, and other experts. Because of the close association of ants with root aphid populations, ant specimens found amongst the root aphids were also collected and sent out for positive identification.

Aphid and ant specimens were sent to the USDA for identification, but they were not able to provide a definitive species id. Research Entomologist Gary L. Miller of the USDA's Systematic Entomology Laboratory (SEL) in Beltsville, MD, identified the aphid specimens as belonging to the genus *Prociphilus*, stating, "Group needs revision; adults not identifiable to species. In December 2013 winged adult aphids were collected from *Abies* roots at our research site in Bakersfield, VT. These specimens were sent to the USDA, but we are still awaiting word on their identification. At the same time, samples of the winged adults were sent to the aphid specialist Dr. Colin Favret of the Universite de Montreal, Department de Sciences Biologiques, Centre sur la Biodiverite, Montreal, Quebec, Canada, who definitively identified them as *Prociphilus americanus* (Walker 1852). Little is known about this group of aphids, including their life cycle or alternate hosts.

Several species of ants are known to "tend" aphids, moving them from place to place, protecting them from natural enemies and feeding on the "honeydew" excreted by the aphids. In January 2013 we received an SEL identification report stating that research entomologist Matthew Buffington identified 10 ant specimens from our Bakersfield, VT site, associated with conifer root aphid as *Tetramorium bicarinatum* Nylander and 10 other ant specimens as belonging to the genus *Formica*, stating, "Group needs revision; adults not identifiable to species." *T. bicarinatum* is an exotic species known to be an agricultural and natural environment pest but has also been used as a biological control agent against crop pests (Dr. Olivier Blight, Institut Mediterraneen d'Ecologie et de Paleoecologie, Universite Paul Cezanne, Europole, Mediterraneen de l'Arbois, Aix-en-Provence, France, personal communication).

In September 2013 four samples of additional ant specimens collected at the Bakersfield site from *Abies* tree roots infested with conifer root aphids were identified by Univ. of Vermont entomologist Dr. Ross Bell as: *Brachymyrmex depilis* (Emery), the little hairless ant; *Camponotus novaeboracensis* (Fitch), the New York carpenter ant; *Formica incerta* (Emery), the uncertain ant; and *Lasius neoniger* (Emery), the Labor Day ant. All tend aphids and coccids and *B. depilis* is known to specifically tend root aphids. These determinations were verified as likely correct by O. Blight (pers. comm.).

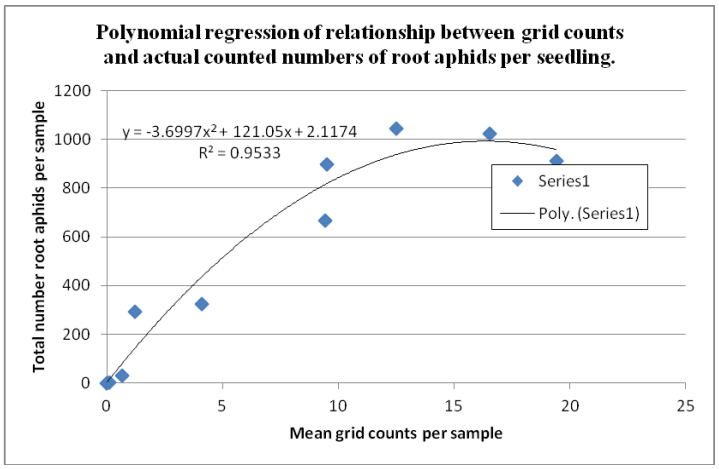

Fig. 2. Polynomial regression equation developed for estimating root aphid numbers from the grid counts.

Task provided in the Work Plan: Assess the efficacy of *Stratiolaelaps scimitus* against root aphids.

Two different areas both located at a Bakersfield, VT Christmas tree farm were used for our trials to determine the efficacy of *S. scimitus* for management of root aphids Three trials were planned. The first trial would be initiated in October 2013 and entailed the random selection of 7 blocks of trees located in area 1, three of which would be treated with *S. scimitus* mites, three used as untreated controls, and 1 block of 12 trees used to develop a sampling protocol. The second trial was initiated in June 2014 in area 2, and included 12 blocks of 12 trees each, three to be treated with *S. scimitus* predatory mites, three to be treated with Mycotrol® O (a registered organic insect-killing fungus, *Beauveria bassiana*), three to be

treated with the commercial pesticide Imidacloprid, and three to be used as untreated controls. The third trial was initiated in October 2014 and located in area 1, using 9 blocks of 12 trees each not previously used in trial 1. Three blocks were treated with the *S. scimitus* mites, three blocks with Mycotrol® O, and three used as untreated controls.

Prior to initiating the actual field trials it was essential to develop a sampling procedure to determine numbers of root aphids in the ground (i.e. on the roots). The 12 trees in the seventh randomly-selected plot from area 1 in trial 1were excavated and returned to the laboratory to determine a reliable procedure for estimating total numbers of root aphids per tree. Using a modified method published by Straw et al. (2000), transparent 5cm x 5cm grids each with 25 squares were used to count either aphids or the waxy wool left behind on each seedling. The fir seedling was laid out as flat as possible with most of the soil removed and three of the grids placed randomly on top of the root system. The number of squares where the observer looking straight down through the grid, could see an aphid or the waxy material were counted. The procedure was repeated on the opposite side after flipping the seedling. Using these data, a mean number of squares counted per tree were generated. Immediately after doing the grid counts, the root system of each tree was carefully dissected under a microscope and the total number of aphids counted. This task took over 8 hours per tree, demonstrating the need for developing a more rapid system of assessing aphid populations. The total number of aphids was correlated with the grid counts using a polynomial regression and an equation generated (Fig. 1). This equation can be used for determining aphid counts using the grid technique for any subsequent sampling.

First trial. We released an estimated 18,000 predatory mites, *S. scimitus,* on 18 Oct., 2013, applying 25 ml of a pasteurized peat/bran mixture containing 15-20 predators/ml (total of 500 mites/tree) to each of 36 Canaan fir trees in three randomly-selected plots (12 trees/plot). Three additional plots, located in the same field, were left untreated.

In late September 2014 the three treatment plots and three control plots were carefully dug up and root aphids counted using the clear grid technique (Fig. 5). This was done in the field after which the trees were replanted and watered. After consultation with a UVM Statistician (A. Howard), a Generalized Mixed Model ANOVA (Proc GLMMIX) was done on these data and determined that the difference between the *S. scimitus* treated trees and the control trees was not a significant one ($f=1.42$, $df=4$, $p=0.303$). This in spite of the fact that the average number of root aphids on the *S. scimitus*-treated trees was 114 compared to 174 aphids per tree on the control trees. The problem was the large variability in the total numbers between the trees.

Second trial. The study described above was replicated in a field adjacent to the first (area 2), also at the Bakersfield location in June 2014. Conditions were similar except that the new area has slightly older fir seedlings. Two additional treatments were tested, an insect-killing fungus (*Beauveria bassiana*) in the commercial formulation Mycotrol® O, and the commercial insecticide Imidacloprid (AmTide Imidacloprid 2F). Twelve plots of 12 trees each were flagged and treated in early June. Three random plots were treated with the *S. scimitus* mites at the same rate used in the earlier treatment (500 mites per tree), a second three plots were treated with Mycotrol® O at the recommended concentration for root aphids (2 liters Mycotrol® O/378 liters water) at 0.5 liters/tree as a root drench, and three plots were sprayed with the commercial pesticide Imidicloprid as per the label for root aphids. In addition, three plots were left untreated as controls.

The trees were carefully lifted in October of 2015 and root aphid numbers assessed using the clear grid technique developed earlier. Out of each block of 12 trees three were randomly chosen for lifting and counting. This was again done in the field with the trees being carefully replanted and watered after aphid counts were made. The data were analyzed using a nested random effects model ANOVA (Proc Mixed, SAS). In this trial, all three treatments had significantly fewer root aphids than did the control (table 1). However, none of the comparisons between the treatments were significant, i.e., we can't say that the mites worked better than Mycotrol O or Imidacloprid or visa-versa.

	Treatment means			
	Mites	Mycotrol	Control	Imidacloprid
	21.26	21.68	88.87	21.68
	21.68	15.16	45.70	14.75
	53.39	77.06	146.63	2.12
Mean	**32.11**[A]	**37.97**[A]	**93.73**[B]	**12.85**[A]
f=4.53, df=41, p<0.001				

Table 1. Mean number of root aphids /tree by treatment. Means by plot and then by treatment.

Third trial. In October 2014 a third replication was initiated in the same area as the first trial (area 1), using the remaining seedlings not used previously. The remaining nine unused 12-tree plots were randomly assigned to one of three groups, one set of three for application of *S. scimitus* mites, another three for a soil drench with Mycotrol® O (*Beauveria bassiana*), and the last three as untreated controls. Application rates were the same as those used in the earlier trials (*S. scimitus* mites at 500 mites per tree, Mycotrol® O at 0.5 liters/tree as a root drench).

After approximately one year, all of the trees were carefully lifted and root aphids counted using the clear grid technique (October 2015), on the same day as the trees were dug in trial two. There were no significant differences between the treatments and control in this trial although the means show a trend especially comparing *S. scimitus* predatory mites to the control. Again, high variability between individual trees is to blame for the non-significant results.

	Treatment means		
	Mites	Mycotrol	Control
	28.69	121.13	86.61
	43.14	49.35	97.87
	34.08	64.39	15.05
Mean	**35.3**[A]	**78.29**[A]	**66.51**[A]
f=0.91, df=6, p=0.452			

Table 2. Mean number of root aphids/tree by treatment. Means by plot and then by treatment. N = 108 trees.

Significant contributions and role of project partners. The entire project was performed at Larry's Tree Farm, Route 108, Bakersfield, Vermont 05441. The owners and operators were Mr & Mrs. Larry and Linda Krygier. Their roles in this project were to allow us to not only use their farm but to dig young fir seedlings to investigate the presence of conifer root aphids.

GOALS AND OUTCOMES ACHIEVED

Activities completed:

Determine the root aphid species attacking Vermont Christmas trees. Result: the root aphids were *Prociphilus americanus* (Walker 1852).

Assess the efficacy of *Stratiolaelaps scimitus* against root aphids. Three separate trials were conducted, each time releasing predatory mites, *Prociphilus americanus* in the soil around the bases of fir tree seedlings. Although results generally were not significantly different there were lower numbers of *P. americanus* on the roots of the seedlings treated with predatory mites.

In the first trial the average number of root aphids on the *S. scimitus*-treated trees was 114 compared to 174 aphids per tree on the control trees. The problem with obtaining significance was the large variability in the total numbers between the trees.

In the second trial all three treatment trees had significantly fewer root aphids than did the control.

In the third trial there were no significant differences between the treatments and control although the means showed a trend especially comparing *S. scimitus* predatory mites to the control. Again, high variability between individual trees is to blame for the non-significant results. Base line data for each trial is presented above.

BENEFICIARIES

Outreach Activities. A presentation regarding conifer root aphids was given to 75 members of the NH/VT Christmas Tree Association at their annual summer meeting in Greensboro, VT on June 28, 2014. All 75 participants were in attendance at our presentation. Information on root aphid identification, biology, and damage to host trees was presented. Biological control was discussed in regards to the root aphid and our research was introduced. Most of the audience was receptive and many asked questions. Exit surveys were not given out because we were invited speakers and were not present at the end of the conference. We are currently making arrangements to give another presentation with some results of our experiments at either their upcoming winter or summer meetings. We gave a follow-up presentation including results of the first trials at the NH/VT Christmas Tree Association winter meeting on January 27, 2015, with approximately 50 members in attendance).

Extensive interaction with several individual Christmas tree growers in Vermont has taken place during our search for plantations with root aphid infestations. These discussions have increased awareness among growers to the potential damage caused by root aphids and how to look for them. For example, the growers with a plantation adjacent to the test site in Bakersfield had no idea they had high root aphid populations infesting their trees until UVM researchers inspected their site. The owners of both farms are concerned about the negative consequences of using imidacloprid to control root aphids and are hopeful that our work will lead to the development of viable environ-mentally-friendly alternative methods of control. Though it is premature at this time, when available, research results will be disseminated to New England growers. We will be able to provide suggestions for how and when to sample for root aphids to assess population levels and impact, as well as suggestions for biological control options for this underground pest.

LESSONS LEARNED

In a Christmas tree plantation it is difficult, if not impossible, to locate young fir seedlings with a consistent number of aphids infesting their roots. The variability is large and thus it is hard to obtain significant reductions in numbers (results) throughout a trial.

In general the taxonomy of insect pests is in a state of change. As with the aphids, expert taxonomists are scarce and those available are extremely busy and cannot supply entomologists with answers to their inquires in a timely manner.

To develop an accurate sampling procedure for underground insect pests is time consuming and not all growers are willing to allow one to dig up their trees.

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Project 7: Building New Markets for Specialty Crops in Schools through the USDA Fresh Fruit and Vegetable Program: Phase Two – Final Report (Previously Accepted)

PROJECT SUMMARY

The purpose of Phase Two of this project was built on the 2011-12 Vermont Specialty Crop Block Grant (SCBG) goals and to further increase purchasing, consumption, and education in schools and among families of Vermont fresh fruits and vegetables through the implementation of the USDA Fresh Fruit and Vegetable Program (FFVP). This program provides fresh fruits and vegetables to schools with a significant population of low-income children. Phase Two of this project expanded the training and technical assistance initiated in Phase One to reach more schools, parents and families, to increase local produce purchasing, and to develop and distribute new training materials.

As a result of our partnership and our work during the 2011-12 SCBG, the VT Agency of Education (AOE), Child Nutrition Program (CNP) that oversees the FFVP, revised its school claim for reimbursement form to specifically track Vermont fruit or vegetable purchases. Since this revision in January 2012, preliminary data suggests that nearly all fruits and vegetables purchased in January-February of 2012 are from sources outside of Vermont. However, based on analysis of a sample of purchase records from the academic year to date (September-February), 10-20% of fruit and vegetable purchases made in January and February could be fulfilled locally. In the autumn (September-November), the proportion that could be purchased locally is 33-50%. Tracking mechanisms such as this greatly inform training and technical assistance efforts as they provide real school purchase pattern data. Phase Two funding allowed us to fully implement this tracking system and maximize the application of resulting data.

In the 2011-12 school year, 113 of 320 Vermont schools who participated in the FFVP were encouraged and given resources, such as food hub and farmer contact information, to develop partnerships with local and regional fruit and vegetable producers. The majority of the participating schools purchase limited amounts of local produce in the first two months of the school year. Few continue to purchase during the rest of the school year with the exception of Vermont apples.

Communication between the school food staff and the teaching staff continues to be a barrier in many schools. Thus, the fresh fruit and vegetable snacks are often disconnected from classroom activities and education. Given that the training and mentoring of the 3 school teams in 2011-12 and resulting nutrition and cooking activities conducted for students were successful and led to more classroom and cafeteria communication, we repeated the model for 4 additional schools in this grant cycle. The F&V materials we created were also well received and, based on the feedback from the 2011-12 schools, we edited the existing 4-months' worth of materials and developed the remaining 9 months' materials.

This project is the continuation of the 2011-12 SCBG project conducted by Shelburne Farms as a partner of Vermont FEED. It provided trainings in 3 schools for food service personnel on how to purchase and prepare local fruits and vegetables; modeled for teachers how to use the FFVP snacks as part of a nutrition education experience in the classroom; and piloted food and nutrition lessons and other curricular resources to educate students about these foods' benefits. Based on the success of the training workshops, initial evaluations and lessons learned within the current SCBG, Phase Two funding

extended our active model to benefit 4 new schools through training, technical assistance, and supporting materials and resources, to further engage parents and families.

PROJECT APPROACH

Briefly summarize activities performed and tasks performed during the grant period.

(See accompanying evaluation report)

The second phase of the program began in Fall 2012 and lasted through early Fall 2013. We included the following components:

1. Tracking local produce purchasing in FFVP schools to inform ongoing programming *(see accompanying evaluation report)*
2. Expanding training and technical assistance for FFVP recipients on how to access VT fruits and vegetables *(see below for workshop and training details)*
3. Expanding Northeast-specific fruit and vegetable educational materials for teachers, food service staff, and students *(see accompanying tool kit of materials)*
4. Training and mentoring classroom teachers and food service staff in hands-on nutrition education activities for three new schools
5. Developing materials for parents and families related to using seasonal and local produce, recipes, and other agricultural and nutritional information
6. Providing technical assistance for food service staff through local and regional Farm to School partners or food hubs conducting regular sales calls
7. Presenting the materials developed to the 2013-2014 FFVP recipients and the Northeast Farm to School Network

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

We worked with the Vermont Agency of Education, Child Nutrition Program to include in the monthly FFVP reporting for school year 2012-13, a specific column to record VT produce purchased. We provided CDAE at UVM, our evaluating partners, the names of particular schools that attended our August 2012 training and/or received 2012 or 2013 nutrition education training and intervention. They have collected those monthly records and analyzed them in comparison with schools that did not receive training. In addition, interviews and pre/post assessments of the schools that received nutrition education training and mentoring were conducted and a full report accompanies this grant report. Finally, a comparison was made between the FFVP schools with Farm to School Programs and those that did not.

In order to help schools develop new and local purchasing relationships, we engaged regional Farm to School partners to reach out and do some 'sales calls' to the schools that attended the 2012 training or participated in the nutrition education mentoring to help them buy more local fruits and vegetables for their FFVP. They did additional calls in August and September.

GOALS AND OUTCOMES ACHIEVED

<u>Outcome #1:</u> Increase purchase and use of VT fruits and vegetables by participating FFVP schools.

The data and analyses of the data are contained in the accompanying evaluation report.

This 2nd year of the project included hiring regional Farm to School partners to do sales calls to 18 schools that had participated in either year 1 or 2 of the summer workshop or nutrition education training. While it was difficult for them to 'cold call' some of the schools they were not yet familiar with in their area, most calls were somewhat successful. Jessica Griffen of Green Mountain Farm Direct, reported,

"Overall I had mixed results. Most were very positive and directly resulted in local purchases as well as exchanged ideas. Some of the foodservice directors are amazingly creative and also receptive to new ideas. The more challenging were with schools that we had no previous relationship with, especially if we had incorrect or incomplete contact information."

See 'Lessons Learned' for more about local purchasing results.

Outcome #2: Increase the number of schools participating in the FFVP that implement nutrition and cooking education activities featuring VT fruits and vegetables.

During the 2012-2013 school year, four schools participating in the FFVP nutrition education grant opportunity implemented nutrition education activities using Vermont fruits and vegetables. All schools received group trainings from Vermont FEED education staff and the Agency of Education Child Nutrition Program on the FFVP program, local purchasing connections, and curricular connections. Additionally, all participating food service professionals and classroom teachers received an in-class mentoring session by Vermont FEED modeling successful classroom cooking techniques, nutrition education activities and information directly linked to the elementary school curriculum. As a result of both the training and mentoring, all four schools were able to successfully plan and implement their own classroom cooking activities and nutrition education lessons focusing on a local, seasonal Vermont product.

All four schools also reported that the training with food service staff, regional food partners, administrators and classroom teachers coupled with an in-class mentoring/modeling session enabled them to successfully conduct their own nutrition education lessons and classroom cooking activities with increased confidence. Both the training and mentoring session successfully increased communication between classroom teachers and food service staff across all four schools. They also reported that the availability of Vermont focused educational materials developed through this grant helped them more easily turn snack time into a teachable moment. A teacher from the Salisbury School shared that *"Vermont FEED provided timely and fun teacher and classroom training. The supporting materials were colorful and inviting. The support we have received made the implementation of FFVP much easier."*

Participation in this opportunity also provided school teams with a chance to plan, collaborate and coordinate increased nutrition education opportunities school wide. For example, as a result of this opportunity, the Northfield and Roxbury Schools developed *"Taste Test Tuesday's,"* a monthly FFVP taste test opportunity highlighting a local fruit or vegetable. All students participate in the taste test and results are directly impacting the fruit & vegetable offerings in the lunch and snack programs. One teacher reported that *"our students have loved sampling new fruits and veggies and a number of the choices have made their way to the regular menu!"* It was clear that participation in this FFVP Nutrition Education grant opportunity gave schools a chance to plan new and effective strategies for implementing programming beyond their work with Vermont FEED.

This grant opportunity also confirmed the importance of in-class mentoring for teaching staff. Vermont FEED and Shelburne Farms strongly believe in professional development models that support classroom teachers through modeling and mentorship. Many teachers have limited experience with nutrition education, classroom cooking and integrating food into the curriculum. Through observation and participation, teachers gained the confidence to continue cooking and introducing new food experiences to their students after our work with them. Collaborative, innovative and comprehensive approaches to professional development through training, modeling, and mentoring can create healthier school environments.

In addition to working with four Vermont schools through training and mentoring, Vermont FEED and the Agency of Education Child Nutrition staff presented the new materials, nutrition education activities and program information at a variety of venues throughout Vermont and New Hampshire. These included:

- VT Child Nutrition Program Summer Institute 2012: Fourteen schools received training from Vermont FEED and the Agency of Education Child Nutrition Program on the FFVP program, local purchasing connections, and curricular connections.
- Tri-state (VT, NH, ME) School Nutrition Association Conference in May 2013 (13 schools' food service staff attended)
- Windham County Farm to School Conference May 2013 (20 school personnel attended)
- VT FEED FTS Institute with 10 schools (teams of 5-6 for each school) June 2013
- August VT Child Nutrition Program Summer Institute 2013 (18 school personnel attended)

We have completed the nine additional FFVP Monthly F&V Nutrition Education sheets, with vegetable facts about local and seasonal vegetables, as well as recipes to use this produce, that meet the FFVP requirements, and food-based educational activities. We chose not to highlight a particular vegetable each month since the availability of local produce will vary. Rather, we highlighted an existing monthly celebration that schools might already be focusing on, and show them a way to incorporate the daily or weekly FFVP. These materials will be available on the schoolmealsvt.com website *(a full set accompanies this report)*.

In addition, we sent to all FFVP participating schools an electronic spring and early summer, fall, and late fall newsletter with tips for using seasonal and local vegetables and fruits in classroom lessons and directed them to the websites. Three parent handouts were created and sent in early spring, summer and early fall for participating schools to send home with their students to encourage parents to buy and serve more local and seasonal fruits and vegetables at home. FFVP managers appreciated the newsletters and parent handouts, however we did not have the resources to track which schools sent them out to school staff and parents.

BENEFICIARIES

There are several categories of beneficiaries for this project and they are as follows:

- Sales calls and local produce purchasing coaching to 18 school food service directors May and/or October.
- School-based nutrition education training and mentoring:

  - 4 schools in phase 2 of this project, each had 4-8 teachers plus school food service director participate in a nutrition education training session for a total of about 24 staff.
  - The mentoring was conducted at 4 schools in 1-3 classrooms impacting 16-20 children in each class. However, in Salisbury Elementary, the nutrition lessons were conducted in all 6 grades. I regret that we did not tally the exact amount of student participants in the mentoring of the nutrition lesson but estimate the total number of children to be about 240 children.
- Presentations of the materials we created occurred at 5 venues outlined on page 4 of this report that totaled 125 participants.

See evaluation report: http://www.vtfeed.org/tools.

LESSONS LEARNED

Overall, the 2 years of focusing on the FFVP did lead to increased awareness of the program and availability of local fruits and vegetables to food service and teaching staff in schools who participated in workshops or trainings. Food service staff and teachers who participated in the workshops planned to use the materials to hand out or share with others, both internally with other teachers and staff, as well as with parents and students. Teachers also reported that they would continue to cook recipes periodically through the FFVP after their mentorship was over.

As the evaluation report indicates, we did not see a clear positive result from our various forms of intervention in the cafeteria or the classroom. There is a theory of behavior change that explains about knowledge, intent, and behavior –and how you can't have behavior change without intent, but intent alone isn't enough. This project reinforced that there is no short cut; changing this kind of behavior takes time. This also applies to students eating new foods, even if they are presented well and as a free snack. One FFVP coordinator's biggest concern is getting kids to actually eat the healthy snack so it doesn't end up in the garbage. At this point she is not as concerned with sourcing local as she is about finding something the kids will eat; even if that means that the food is not novel and not local.

In addition, food service staff frequently reported that local food prices were too high. However, for the FFVP those costs are often ameliorated since the program is well funded. With this barrier removed, there was not a dramatic increase in local purchasing. Why? The lesson may be that price might be important, but it is not the only reason (and maybe not even the main reason) that schools don't buy local.

We also learned that schools tended to provide fruit snacks, even tropical fruits like star fruit, the majority of the time, to expose students to variety and because students tended to accept new fruits over new vegetables. Besides apples year round, there are a select few fruit farms in certain parts of the state that have other fruits beyond September/October. The few schools located near an orchard with a variety of fruits did increase what they purchased.

Vermont excels at growing vegetables that can be stored through the winter, which we highlighted in the materials we created. However, because the program requires that the produce must be raw, school food staff are not as familiar or comfortable serving beets, parsnips, cabbage, and celeriac, for example, in raw form. Nor are teachers open to raw vegetables! One food service director reported when she served

colorful raw beets, teachers responded, *"Kids won't eat this! What are we supposed to do with these?"* and most of the food was thrown out.

The FFVP allows for cooking of the vegetables with students once a week. Thus, we focused our training and mentoring on cooking these vegetables in classrooms. Teachers were very enthusiastic about cooking with students through the FFVP, but have to change their already tight schedules and coordinate with the school food service staff to get the vegetables, other ingredients and equipment that are required for even the simplest recipes. Again, the intent was there, but the behavior change necessary to carry out regular cooking through this program takes more infrastructure change and more than one session of mentoring.

Our experience working on Farm to School and, specifically local purchasing, over the years continues to show us that food buying and eating are behaviors that are slow to change. Still, we have seen many schools trying to develop a school food culture. Given that schools, especially school meal programs, already have too many programs to manage and report on, we do know that incorporating the FTS message through existing school food service training and programs, is the pathway for eventual sustainable success.

CONTACT

For questions or additional information, contact Abbie Nelson, NOFA-VT, abbie@nofavt.org or 802-434-4122

ADDITIONAL INFORMATION

Included with this report is the completed evaluation by Erin Roche of UVM's Center for Rural Studies. Also a tool kit with 12 FFVP Monthly F&V Nutrition Education sheets, fact sheets highlighting 12 fruits or vegetables, recipes to use this produce, that meet the FFVP requirements, and educational resources. We chose not to highlight a particular vegetable each month since the availability of local produce will vary. Rather, we highlighted an existing monthly celebration that schools might already be focusing on, and show them a way to incorporate the daily or weekly FFVP. These materials are available on the Vermont FEED (http://www.vtfeed.org - http://www.vtfeed.org/tools) and schoolmealsvt.com websites.

Project 8: Beyond the Localvores: Creating and Sharing Marketing Solutions to Increase Local Food Consumption in Vermont – Final Report (Previously Accepted)

PROJECT SUMMARY

The purpose of this project is to enhance the marketing efforts of specialty crop producers who sell products through direct-to-consumer channels, such as food hubs and related business models, by developing and implementing educational and marketing strategies that help current and potential customers understand the benefits of buying and eating locally grown specialty crops.

This project has 3 objectives:

- To better understand individual consumer buying and eating habits (Phase 1) to inform the development of marketing materials that will educate and engage consumers so that more of them purchase local foods on a regular basis (Phase 2)
- To better understand workplace food culture (everything from what gets served at staff meeting to wellness incentives to participation in the local food economy) in order to better articulate to potential business partners the benefits of participating in workplace CSA for employee satisfaction, recruitment, wellness and the bottom line (Phase 1), and
- To utilize data to provide recommendations to share with other businesses and an Intervale Food Hub specific marketing campaign geared toward increasing the amount of local food purchased and consumed in Vermont (Phase 2).

Through this work, we aim to increase the amount of locally produced specialty crops purchased and consumed in Vermont through all market channels. However, our principal beneficiaries are the 30 specialty crop producers who sell product through the Intervale Food Hub, an online market for local food, as we grow this enterprise from $400,000 in sales in 2011 to $775,000 in sales by 2017, measured by annual sales figures.

This project did not build on any previous SCBG project; however, we have received an award to fund Phase 2, beginning in 2014. What follows is a final report on the completion of Phase 1 of this project.

PROJECT APPROACH

Working with Skillet Design & Marketing, we collected data from existing internal information and reviewed industry and statewide research related to direct-to-consumer businesses' impact on employees, wellness programs and food-related programs. Skillet developed a research scope for data collection and implemented a marketing study, sending a survey to over 1,100 employees at four Burlington-based businesses, with 229 people responding. They also held focus groups at three businesses, conducted five one-on-one interviews at four businesses, and conducted a follow-up survey at two businesses to 146 employees, with 47 people responding. In brief, we found that about half of people reported purchasing more local food since joining the Intervale Food Hub with 44% reporting an increase in consumption of local food. 32% reported eating more fresh vegetables since joining with 12% having more conversations about fresh food with co-workers. In this way, the Food Hub is indeed influencing consumption patterns for some subscribers. In terms of workplace wellness, we found that offering healthy fruits and vegetables, garden plots, subsidies for local food deliveries, and educational

initiatives are all good strategies for increasing the consumption of fresh fruit and vegetables by employees.

We also completed a demographic profile of our customers in order to improve marketing strategies. Our average subscriber is a married woman, between 26 and 35 years old, who has graduated from college. Income varies with just over 20% earning less than $50,000 a year. They value wellness and the Vermont brand. For more details on findings and preliminary marketing strategies, please access the summary of findings available through our website (link below).

Over the summer, we developed the Farm-to-Business Impact Brochure (available online) and later completed a "Lessons Learned" report (available online) as a resource for other entrepreneurs and organizations looking to develop workplace delivery distribution models. This fall, we began sharing our findings more broadly and will continue to share findings throughout 2014.

Furthermore, we are in the process of sharing data with partners. We presented preliminary data to the Intervale Center's Board of Directors in July and will present data to Food Hub farmers at a producer meeting in January. We also participated in a workshop focused on Workplace Delivery at NOFA-VT's Direct Marketing Conference, sharing the data gathered through our research, strategies that we have found to be successful, and lessons we have learned. The workshop was called "Best Practices in Workplace CSA." Both of the co-presenters were vegetable growers. 10 vegetable producers were present. 5 additional participants were service providers who work with specialty crop producers.

Everything we did focused on fruits and vegetables to enhance the businesses of our specialty crop producers. The sale of specialty crops represents 75% of our business, and our goal is to get people to eat more fruits and vegetables. When we refer to "local foods," we mean "local fruits and vegetables." Our survey asked detailed questions on purchase and consumption patterns of fruits and vegetables specifically. We didn't gather data about non-eligible crops.

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GOALS AND OUTCOMES ACHIEVED

We proposed to measure the success of this project through increases in sales through the Intervale Food Hub. Based on 2013 actual sales, we have revised our pro forma to grow 12% annually moving forward. The business's growth trajectory is as follows:

2011 sales: $400,000

2012 sales: $484,000

2013 sales: $500,000

2014 sales: $560,000

2015 sales: $625,000

We are on track to achieve our revised sales goal in 2015.

BENEFICIARIES

The primary beneficiaries of this project are the 30 Intervale Food Hub suppliers of specialty crops, who make up over 70% of total purchases. In 2012, the Intervale Food Hub paid over $300,000 in total farm accounts; in 2013, this number rose to $340,000. As we continue to pursue our 2015 sales target, we anticipate farm receipts topping $400,000 in 2015.

In 2013, farm accounts ranged from $200 to $30,000, similar to $750 and $33,000 in 2012. The Intervale Food Hub continues to be an important account for our suppliers, and by investing in marketing of specialty crops for the Food Hub, we are investing in these businesses.

LESSONS LEARNED

For the most part, this project went as planned in our original proposal. Below are some thoughts on the few challenges that we experienced:

- Obtaining buy-in from the workplaces to do the surveys and focus groups was harder than anticipated. We struggled to persuade businesses to participate and communicate the value to them. Eventually, we did get four businesses on board, with three participating in surveys and focus groups.
- We also found that there is a lack of data on wellness program impacts and metrics in Vermont. Most businesses did not have data on employee productivity, attendance and reduced medical bills as a result of implementing wellness programs.
- Burton, which originally had agreed to participate in the full project, did not participate in the survey and focus groups, but did provide a one-on-one interview with the Sustainability Director to offer details on their wellness programs and Burton's commitment to the local food economy.

In 2013, we revised sales figures down due to lower than expected summer sales. The targets originally proposed were realistic based on the 25% growth rate that we experienced the first five years. However, as with many businesses, sales have reached a plateau in our sixth year. We have now revised our annual growth rate to 12%. Our revised goal is $625,000 in sales in 2015.

We learned that most employers today have some type of workplace wellness program. These initiatives vary based on the employer but you can see some of the common goals of wellness programs. It was surprising to learn that food is not often a cornerstone of workplace wellness programs. Fitness programs, gym memberships and health screenings are the more common incentives. Food is often overlooked because we do not have a lot of data that shows how eating fresh fruits and vegetables affect workplace attendance, productivity and medical bills. This is where there is the greatest opportunity for research and education.

We also found that the food culture at work can greatly influence people's food culture at home. However, we need to help workplaces create a food culture that values fresh, local fruits and vegetables

and this is not an easy task. Changing values and behavior will be challenging and will not happen overnight.

The most unexpected outcome of this project was that many of our assumptions about our audience were confirmed. Also, as a result of implementing this project, we strengthened our relationships with the workplaces in the study.

One unexpected outcome of this project is that we have added a new feature to our online subscription program. In response to data collected, we have begun piloting an "A La Carte" option, where subscribers can purchase weekly add-ons to their orders; so far, this option has not featured specialty crops.

CONTACT PERSON

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ADDITIONAL INFORMATION

Our completed materials can be accessed under the "Consumer Demand – Research" heading here: http://www.intervale.org/what-we-do/research/

(2013) Beyond the Localvores: Intervale Food Hub Market Research – Initial Findings
(2013) Beyond the Localvores: Lessons Learned in Exploring Food Consumption in Vermont
(2013) Intervale Food Hub: Building Healthy, Local Communities One Workplace at a Time

Project 9: Root Cellar Enhancements to Maintain Quality and Increase Sales of Specialty Crops – Final Report (Previously Accepted)

PROJECT SUMMARY

Food Works received a SCBGP grant to increase the organization's capacity to purchase and distribute locally grown specialty crops and value added products to traditionally underserved markets in our region. Many institutions which serve higher need populations –early childhood sites, schools, senior centers, health and mental health care facilities for example – struggle to purchase fresh local food to serve to those in their care. Likewise, our region's many small producers often struggle to reach this critical revenue-generating institutional markets. Food Works' mission has always been to alleviate barriers to food access while boosting the local food economy. Under recent economic conditions, our communities and food producers have needed this service more than ever. The SCBGP provided support which aided greatly in this mission – helping to generate revenue for our small producers while delivering fresh, nutrient-dense food to our most vulnerable neighbors.

PROJECT APPROACH

The SCBGP funds were used to purchase supplies to fortify the infrastructure of the Two Rivers Center storage and distribution facility, and to support Hazard Analysis and Critical Control Points (HACCP) training for the root cellar at Two Rivers Center. The facility, known as 'the root cellar' serves as the storage and packing site for Food Works' Farm-to-Table food distribution and education program, a food hub designed to aggregate and deliver specialty crops to traditionally underserved markets in the region. The root cellar also provides storage for specialty crops grown at Food Works' Two Rivers Farm (a production and educational farm) and sold through the Farm-to-Table program and other venues. HACCP training help to ensure the safety of specialty crops distributed through the Farm-to-Table program. Through this training, Food Works' Farm-to-Table staff learned essential skills to increase the effectiveness of the storage, processing, and distribution outcomes of the operation. This training helped Farm-to-Table evaluate and implements improved root cellar safety and processing protocols, leading to reduced waste and improved quality, thereby increasing the facility's capacity to deliver its services.

Over the course of the grant period significant improvements were made to the Two Rivers Center's food storage facility that increased Food Works' Farm-to-Table's capacity to store and deliver food to underserved markets. This enabled Food Works to boost sales for our farmers/producers, as well as increase both the quality and quantity of the food provided. Specific improvements made to the facility include: The installation of a compressor which runs the cooling system; extensive electrical and refrigeration work completed by Alpine refrigeration and Integrity Electric; and repairs to the plumbing system which mitigate risks of future flooding and septic issues. A Farm-to-Table staff member also attended a one-day Hazard Analysis and Critical Control Points (HACCP) training, assessment program.

GOALS AND OUTCOMES ACHEIVED

Over the course of the grant period, Farm-to-Table delivered thousands of pounds of fresh local food, including specialty crops, to institutions serving traditionally underserved populations. The program also added a number of farms, specialty crop and value added product producers including: Wellspring

Farm, Gaylord Farm, Santa Davida Farm, Robin Taylor Farm, Rhapsody, Nuissl Farm, Butterworks Farm, Pebblebrook Farm, Littlewood Farm, Dog River Farm, Templeton Farm, Vermont Raw, VT Bean Crafters, Fly Wheel Farm, Dodge Farm, Harvest Hill Farm, Champlain Orchards, Laughing Child Farm, and Earth Sky Time Farm. During this period, Farm-to-Table provided close to $120,000 in revenue to our local farmers and producers, delivering this local produce at significant discounts nearing $30,000 in subsidies over two years, resulting in increased purchasing power for high-need institutions. Though at present, the Farm-to-Table program is not running, the storage facility at the Two Rivers Center continues to hold the potential to serve as a great resource for crop storage for future use.

BENEFICIARIES

The increased capacity brought by the root cellar upgrades benefited specialty crop farmers/producers participating in the Farm-to-Table program, Food Works' Two Rivers Farm (which sells to Farm-to-Table and other outlets), workers, and consumers of specialty crops stored and packed for distribution at the root cellar. Residents at low-income housing sites, senior meals sites, schools, daycares, health facilities and others benefited from Farm-to-Table's capacity to deliver more and fresher foods at affordable prices. Eleven specialty crop farmers participated in the Farm-to-Table program, including new farmers and non-traditional farmers. Farm-to-Table also distributed value-added products containing more than 50 percent specialty crop ingredients from six local producers. Farm-to-Table and Two Rivers Farm workers and volunteers (approximately 20) have also benefited from the project, as have the thousands of people who have consumed the food delivered to and stored at the root cellar each year.

During this time period, farmers/producers have been impacted by having a reliable and growing market for their products and the associated revenues, as well as storage and re-packaging conditions and protocols that maintain freshness as long as possible and assure food safety. Staff and volunteers benefited from safer, more efficient conditions in the root cellar, and consumers benefited by receiving food that is of the locally grown/produced, fresh and of the highest quality.

LESSONS LEARNED

Food Works learned that the Farm-to-Table program was unsustainable as designed**.** The ownership of the produce as a middle man has proven untenable and high risk for an organization which is not a produce handling specialist. Broker-only services might have worked better for all parties involved.

CONTACT PERSON

Niko Horster, Food Works at Two Rivers Center, 802.223.1515, niko@foodworksvermont.org

Project 10: Direct-to-Consumer & Wholesale Apple Marketing – Final Report (Previously Accepted)

ACTIVITIES PERFORMED

1) **Fall direct-marketing campaign**: Activities included placing a full-color ad in the monthly *Kids VT* magazine, printing rack cards for distribution through Vermont's Welcome Centers and Visitor Information Centers, placing apples for sampling at Welcome Centers, providing website updates and participating in the 2013 Pick for Your Neighbor campaign with the Vermont Foodbank and the Apples to iPods promotion with the Vermont Department of Tourism. The marketing campaign began in late August and continued through the end of harvest in late October.

Twenty-five thousand (25,000) copies of KidsVT were distributed to over 800 family-friendly sites in Vermont. (The Circulation Verification Council, an independent publication audit and marketing company monitors distribution. According to CVC, 94% of KidsVT papers are picked up by parents each month. With strong pass-along appeal, KidsVT readership has been determined to be over 52,000 per month. Audit reports are available by calling 802-985-5482.) Children are major influences on parents' decisions to "go apple picking", an important factor in why VTFGA chose to place its only newsprint ad in KidsVT. School teachers are also important influences on whether or not school groups will take field trips to apple orchards.

In 2013, the number of orchards participating in the Apples to iPods promotion increased to 18, compared to 15 in 2012. Pick for Your Neighbor participation increased from 15 to 21 for that same period. The Pick for Your Neighbor campaign was conducted in cooperation with the Vermont Foodbank to provide fresh apples to needy Vermont families. VTFGA promoted orchards that participated in both programs in a Vermont Apple Orchards brochure.

To attract more young people to Vermont's apple orchards in the fall, VTFGA again teamed up with the Vermont Department of Tourism & Marketing for the Apples to iPods promotion. Each participating orchard is provided (by VDTM) with a wooden apple (a "voucher" apple to be redeemed at Small dog Electronics, a Vermont-based Apple™ computer/electronics dealership which has partnered on this program with VDTM for several years.) When consumers visited participating orchards in the fall, they would look for the voucher apple. Growers have found that the promotion has been particularly effective in drawing youngsters to their orchards in the fall, eager for the chance to win an iPod, iPad or other Apple® product.

2) **Vermont Food Industry Convention & Expo**: The Expo is Vermont's largest tradeshow for grocers and other food retailers. VTFGA provided literature, price cards and apples and apple products to grocers in attendance. Instead of providing apples for the annual "best bagger" competition as originally planned, VTFGA placed a full-page ad in the Expo program.

The Expo is Vermont's largest tradeshow for grocers and other food retailers. VTFGA provided literature, price cards and apples and apple products to grocers in attendance. The Expo organizer, the Vermont Grocers Association, is a networking alliance of merchants, retailers and suppliers organized to serve the Educational, Economic and Legislative needs of its members. VGA represents approximately 700 retail stores in Vermont. A short SurveyMonkey® survey was distributed to VGA members. Participation in

the survey was too low to provide any meaningful information, but significant show attendees were able to name their respective suppliers.

Given the increased apple production in 2013 compared with 2011 and 2012 production, VTFGA believes that retail grocers carrying Vermont apples increased substantially more than the targeted five (5) stores. As of January 1, 2014, apples in cold storage totaled 104,075 bushels, compared with 58,870 bushels in January 2013 and 83,985 in January 2012.

3) **Membership & communications support**: VTFGA provided monthly newsletters to growers, provided support to growers on the Food and Drug Administration's Food Safety Modernization Act rules, prepared and submitted comments to FDA on the proposed produce safety rules, participated in a meeting with U.S. Department of Labor representatives and others on farm labor issues, attended the VT Food Industry Expo and managed the fall direct marketing campaign. Over the course of the year, VTFGA worked on a strategic plan for the state's apple industry. The strategic plan will be helpful to VTFGA in determining future activities and actions.

VTFGA provided regular newsletters to growers, with information on FDA's Food Safety Modernization Act rules, prepared and participated in an in-state meeting with U.S. Department of Labor representatives on farm labor issues and attended the VT Food Industry Expo and managed the fall direct marketing campaign. Over the course of the year, VTFGA worked on a strategic plan for the state's apple industry. The initial planning meeting was held in Montpelier on March 7. The final report was adopted by VTFGA Board of Directors on November 11 and will be presented to the membership at the organization's next annual meeting.

The fall direct-marketing campaign and participation in the Vermont Food Industry Expo were focused on the 2013-14 marketing season. Membership & communications efforts, particularly the strategic planning activities, were meant to provide guidance to Vermont apple growers for several years into the future.

PROBLEMS AND DELAYS

None reported.

FUTURE PROJECT PLANS

To date, each of the planned activities has been carried out as anticipated. The overall project, *Direct-to-Consumer & Wholesale Apple Marketing Proposal,* included direct (retail) marketing as well as wholesale marketing and industry support. While the fall retail program has concluded, the wholesale marketing portion is expected to conclude by April or May. At that point, VTFGA will conduct an industry-wide survey to determine sales and prices. On February 13, 2014, VTFGA's membership will discuss the industry strategic plan, which is included as part of the 2013 Membership and Communications Support activity.

FUNDING EXPENDED TO DATE

All grant funds have been expended. VTFGA is committed to conducting the final survey to determine total sales of the 2013-2014 crop once the marketing season is completed. Since the 1950's, controlled-atmosphere storage has allowed producers of apples, pears and certain other crops to be kept for prolonged periods of time in an atmosphere in which oxygen, carbon dioxide and nitrogen concentrations as well as temperature and humidity are regulated. While the fall retail program has concluded, the wholesale marketing portion is expected to conclude by April or May. At that point, VTFGA will conduct an industry-wide survey to determine sales and prices.

Project 11: Technical Assistance for Vermont Vineyards – Final Report (Previously Accepted)

PROJECT SUMMARY

Vermont's first modern winery was established in 1985, with wines made from apples, pears, blueberries, currants and certain other cold-hardy fruits. With the introduction of cold-hardy wine grapes and the establishment of the state's first wine grape vineyard in the early 1990's, Vermont's grape wine industry has grown beyond all but the wildest of expectations.

Even though wine grapes can now be reliably grown here, due to the time needed to establish vineyards and optimize production (3 years or more), Vermont wineries still need to import substantial quantities of grapes from other areas to match processing capacity (the state has more winemaking capacity than we current have fruit to process). Continued importation of grapes from outside of Vermont imperils both consumer perceptions and the standards critical to building reputations for native Vermont wines. These factors decrease the full economic benefits of local wineries and to local farms and, consequently lead to a proposal to encourage establishment of additional vineyard acreage through the delivery of technical assistance by qualified cold climate viticulturist(s).

The current project builds upon the geographic indicators systems (GIS) mapping activity funded by Specialty Crop Block Grant Program funds in 2010 to identify sites throughout Vermont most suitable for establishing vineyards. That project was focused on identifying soil types and aspect of sites in Vermont considered most suitable for grape production.

PROJECT APPROACH

For this project, the Council proposed to provide technical assistance to grower members, as well as to *prospective* growers through educational workshops and field consultations. A committee of Council members developed a Request for Proposals which was distributed to experienced viticulturists and to universities having viticulture programs and experience with cold-climate grape cultivars.

Based on proposals submitted through the RFP process, committee members selected Mr. John R. Thull, a viticulturist with the University of Minnesota having extensive experience in cold-climate vineyard management. Mr. Thull's experience and credentials are summarized below:

Objectives
Produce the highest quality fruit for the particular end product (wine, juice, fresh).
Share successful vine management techniques and practices with fellow growers.
Education
University of Minnesota - Duluth
2002 B.S. Biology
experience
Vineyard Manager | University of Minnesota
February 2006 – Present
Vineyard Laborer | University of Minnesota

March 2005 – January 2006
Apprentice | Weingut Heinrichshof – Mosel - Germany
September 2003 – September 2004
Vineyard Owner | Oakshire Vineyards - Minnesota
Spring 2007 – Present
Vineyard Consultant / Custom Vineyard Work Contractor
2006 – Present
Awards
2013 – UMN Research & Outreach Centers Outstanding Performance Award
2011 – UMN Civil Service/Bargaining Unit Outstanding Performance Award
Skills
Practical experience in managing both commercial and research vineyards
Vast knowledge of growth habits of many cold hardy and tender cultivars
PowerPoint presentations for grower's conferences and regional seminars
Field tours and on-site clinics in establishing, pruning, and managing vines

Council members provided support to the project through several activities, including:

- Drafting and distributing the request for proposals to prospective contractors;
- Promoting the activity to Council members and to prospective viticulturists;
- Making arrangements for workshops;
- Providing vineyard sites for field consultations;
- Providing "after hours" meetings for John Thull with Vermont viticulturists.

GOALS AND OUTCOMES ACHIEVED

The overall goal of the project was to provide technical assistance to existing and future grape growers in Vermont, in an effort to stimulate vineyard expansion. Technical assistance provided through this project was to be focused on vineyard design and establishment, variety (cultivar) selection, canopy management, trellising and business planning, all skills critical to enhancing the competitiveness of Vermont wines.

Mr. Thull spent six days in Vermont, providing one full day of classroom workshops at Vermont Technical College facilities in Randolph Center, Vermont and five days of field consultations in nine vineyard locations throughout the state. Mr. Thull's presentations attracted 53 viticulturists and prospective viticulturists. A Council evaluation of presentations offered were very favorable, ranging from 4.61 to 5 for all topics covered, including vineyard management practices, determination of grape harvest, fertilization and pest management.

While some fairly immediate actions were anticipated, typical of the establishment of any long-lived perennial horticultural crops, this project should be considered *long term.*

A summary of planned vs. actual accomplishments is provided in the table, below:

Goal	Planned	Actual
Provide Technical Assistance to current & prospective growers	50 attendees	53 attendees
Increase planted vineyards in Vermont	11 acres (5% above 2012)	30 acres*
Establish new vineyards during grant period	3 new vineyards	6 new vineyards

*Council members were surveyed in December 2014.

The Council believes that it met or exceeded all of the goals of this project.

BENEFICIARIES

The overall goal of the project was to provide technical assistance to existing and prospective grape growers in Vermont to stimulate recognition of the potential for farm income through vineyard expansion. Since vineyard establishment in Vermont is most likely to occur in the spring and the technical assistance provided through the SCBGP was provided in July, the Council will not be able to determine the total effectiveness of the project until July 2015.

Mr. Thull provided detailed training and materials in each of the topics for which he was contracted. (Following the unusually harsh winter of 2013-14, he also provided a workshop and materials on the topic of recognizing cold damage.) Mr. Thull provided very thorough PowerPoint handout materials addressing:

1. Tailoring Viticultural Practices to Fit the Variety and Season;

2. Fertilizer and Spray Application in the Vineyard;

3. Ripeness Monitoring and Harvest Decisions; and

4. Recognizing Cold Damage.

These materials will be available to Council members and other prospective growers in digital format upon request.

Since grapes are a long-lived, perennial crop, capable of growing for 25 years or more, quantitative data resulting from the project will be long term. The Council believes that the overall technical assistance presented by Mr. Thull was outstanding and will serve Vermont's winery and vineyard industry for years to come. As evidenced above, the Council believes that it met or exceeded each of the stated goals and performance measures for education outreach, increased acreage and new vineyards established. As stated previously, benefits from the technical assistance is expected to accrue over the next several years.

LESSON LEARNED

Mr. Thull is a very experienced and effective viticulturist, and the Council feels very fortunate to have been able to attract him to Vermont for an entire week. While the quality of the PowerPoint presentations he left with the Council were of excellent quality, the Council laments that it was not equipped to videotape the workshops for viewing through its website. The Council also would like to have been able to reach a larger audience of potential viticulturists.

Overall, given that each of the goals and outcomes were met or exceeded, the Council is satisfied with that the project was completely worthwhile, properly executed and has a new source of technical assistance on cold-climate grapes through Mr. Thull.

CONTACT PERSON

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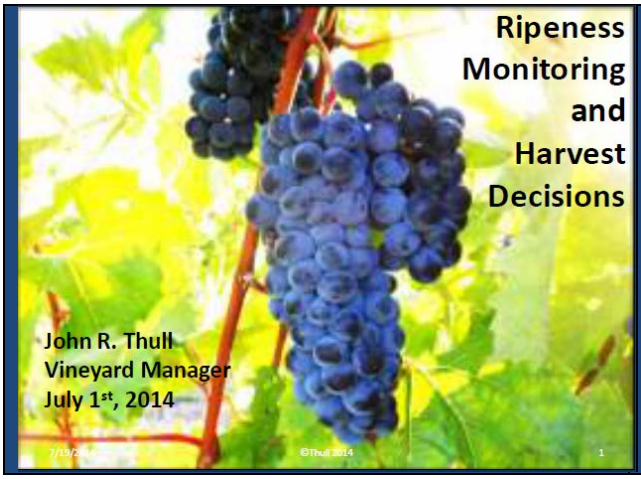
vermontwine@gmail.com

ADDITIONAL INFORMATION

Mr. Thull's PowerPoint presentations are available upon request to the Vermont Grape & Wine Council, at http://www.vermontgrapeandwinecouncil.com/.


Ripeness Monitoring and Harvest Decisions
John R. Thull
Vineyard Manager
July 1st, 2014
©Thull 2014
1

Recognizing Cold Damage
John R. Thull
Vineyard Manager
University of Minnesota
March 27th, 2014
7/19/2014
©Thull2014
1

Project 12: Production and Marketing Assistance for New Hampshire and Vermont Christmas Tree Growers – Final Report (Previously Accepted)

PROJECT SUMMARY

Both nationally and regionally the Christmas tree industry is in consolidation, with significant shifts within regions and smaller numbers of growers. There is also increased competition from Canada. In order to compete in this marketplace, tree quality and production and marketing efficiencies to maintain or improve profitability are of ever increasing importance. With this background, this project was intended to encourage participation at regional field meetings through the use of outside speakers to enhance agendas, increase meeting attendance and improve growers' knowledge.

PROJECT APPRAOCH

Following is a list of specific educational topics that were discussed at these meetings (in addition to a routine business agenda, sales forecasts and outcomes and information related to each specific farm venue): Employee Tax and Worker Compensation Issues, Soils Management and Liming, Off Farm Retail Sales Options, Soil and Foliar Testing, Analysis and Fertilizer Response, Shearing for Proper Tops and Density, Invasive Plant Species, Balsam Twig Aphid and Root Rot Issues, Introduction to Wreaths and Greens, Growing on Raised Beds, Income Tax Minimization, Social Media Marketing, Accepting Credit Cards via Mobile Devices, Biological Control of Root Aphids, National Check Off Marketing Effort, Composting as a Compliment to Commercial Fertilizers, Types, and Maintenance and Costs of Various Pumps.

GOALS AND OUTCOMES ACHIEVED

Three field meetings were held by NHVTCTA in 2013 and three additional field meetings were held in 2014.

Goal No. 1 was to increase meeting attendance by 20 percent. This goal was not accomplished. In retrospect this was not a realistic goal. Meeting attendance is in large part derived from NHVTCTA membership, although attendance by non-members is also solicited. But the fact remains that for many years there has been consolidation within the industry and membership is shrinking. To simply maintain attendance numbers is an accomplishment and represents an increased percentage of members who actually participate in meetings. In the end, average meeting attendance during the two year period of this grant exceeded baseline attendance by 7.4 percent. In 2012, the year immediately preceding this grant, total attendance at meetings was 271. During the two year period of this grant , average annual meeting attendance increased to 291 Given the declining membership and industry consolidation that occurred during the grant period, this is considered a significant accomplishment.

Goal No. 2 was to increase knowledge of meeting participants. The very nature of "field meetings" does not allow for specific testing of increased knowledge, but we did survey our membership and asked if they felt meeting speakers and agendas were satisfactory, if information was useful and if they benefited from the meeting agenda. Over 95 percent of those responding indicated that they were either satisfied or

very satisfied with the topics covered and with the information and knowledge that they gained by attending specific meetings.

BENEFICIARIES

Primary beneficiaries were members of the NH-VT Christmas Tree Association, although attempts were made to encourage attendance from non NHVTCTA members of the industry as well. Currently, NHVTCTA has 197 members.

LESSONS LEARNED

Goals were to increase meeting attendance by 20% and to positively impact attendees knowledge based up presentation by outside speakers. We believe that the knowledge based goal was met, but overall meeting attendance goals were not met. Many factors affect meeting attendance (weather and location being two significant factors) other than simply the agenda, and in retrospect we were optimistic in setting specific 20% increase in meeting attendance goals.

Goals were partially achieved. The number of meetings supported with this grant were as projected for both 2013 and 2014. But the goal of a 20% meeting attendance increase was not met, in spite of a 11.8% increase in 2013. Attendance in 2014 actually decreased to just slightly above baseline numbers. This is attributable to two factors. Membership in NHVTCTA continues to decline, mirroring the consolidation occurring in the industry both nationally and regionally. We actually experience an increase in the percentage of our members who attended meetings, but this is not the same thing as an actual increase in total attendance. Also, location of our meetings changes from year to year, and in 2014 meeting locations were not centrally located. Actual location can and often does have a significant effect on attendance.

CONTACT PERSON

James Horst, Executive Director NHVTCTA, (802) 447-0660, info@nh-vtchristmastree.org

Project 13: Implementing a Marketing Campaign in Vermont to Increase the Competitiveness of Vermont Certified Organic Specialty Crop Producers – Final Report (Previously Accepted)

PROJECT SUMMARY

This project addressed the dual goals of educating farmers and consumers about the benefits of organic production and certification. The project will help Vermont Organic Farmers LLC (VOF), the certifying program of the Northeast Organic Farming Association of Vermont (NOFA-VT), to expand the implementation of a marketing campaign statewide that was developed and tested as part of SCBGP #53 to effectively position certified organic specialty crops in the marketplace. We proposed this project because we found that there is a disconnect between the predominant reasons consumers say they purchase organic food (taste, health) and what farmers communicate to consumers about the benefits of organic food (environmental benefit, support local economy). Marketing research completed as part of our previously funded SCBGP #53 confirmed that consumers confuse local with organic and do not understand what certified organic means. At the same time, certified organic farmers do not have a clear picture of the organic consumer, nor do they have the marketing expertise (or marketing materials) to address this confusion. In addition, the growth of alternative labels (eg. local, natural) compete with organic in the marketplace, compromising the demand for organic labeling and confusing consumers, who don't understand what it means to be certified organic or who may not trust the national organic certification program, and therefore question the integrity of organic. The timeliness of this project was significant due to the fact that the market for local food in Vermont is growing in strength, and organic farmers are losing market share. In addition, there are a growing number of beginner farmers who we wanted to reach with this project, and provide information about the benefits of organic production, at the time that they are making decisions about how they are going to market their products.

PROJECT SUMMARY

Because this project deals with organic and locally grown products, which are not typically limited to specialty crops, we ensured that grant funding was used solely to enhance eligible specialty crops because the featured marketing materials were all for fruit and vegetable producers and all of the imagery on the materials were of fruits and vegetables. In addition, the marketing workshop at the Direct Marketing Conference and the NOFA-VT Winter Conference were promoted to fruit and vegetable producers. The majority of non-specialty crop producers in Vermont are dairy and field crop producers who do not use the certified organic logo because they do not retail or direct market. For example, with the exception of one farm that processes their own milk, the majority of the dairy producers (203 of 204 producers) sell to either Organic Valley or Horizon Organic, and the VOF logos are not used on those retail packages. Field crop producers (80 farms) produce hay or grains, predominantly sold wholesale for use by certified organic dairy and livestock producers. So, although non-speciality crop producers could have put the new certification logo on their barn, for example, it would not be used to enhance the competitiveness of their products. By contrast, the specialty crop producers used the certification logo to enhance their competitiveness by having the logo at their farmers market, farm stand or CSA pick-up, and on point of purchase promotions at food cooperatives.

The following activities were proposed (in bold) in our grant proposal work plan, followed by a summary of the activities performed.

Activity: Based on the results of the retail outlet pilot from SCBG #53, adjust marketing materials based on feedback from consumers.

Work accomplished: The first activity in SCBG-8-13 was to adjust the marketing materials. The only adjustment of the marketing materials, based on feedback from the retail pilot, was to create a window decal and a poster that say "look for this logo" with the new VOF logo embedded (attached).

Activity: Presentation of marketing plan to farmers at VOF annual meeting

Work accomplished: The marketing plan was presented to certified organic farmers attending the annual meeting on January 30, 2013. A power point presentation was developed to highlight the marketing materials that were developed, including: custom password protected web-page on www.nofavt.org with marketing materials available for download, VOF logo in hi-res and different sizes available for downloading, and metal sign with new logo, laminated price cards available for specialty crop producers who direct market, brochure outlining the 5 reasons to be a certified organic producer, and email marketing header custom graphics and facebook timeline custom graphics available electronically for downloading.

Activity: Expand the marketing and outreach project with farmers to provide marketing workshops and staff trainings at retail outlets and direct to consumer outlets (i.e. Food Hubs) statewide.

Work accomplished: A staff training was piloted at Healthy Living, an organic food retailer in South Burlington, Vermont to train the staff to talk about organic certification in an informed manner and to clear up misperceptions about the organic certification system. It was clear that many of the staff need training on when a specialty crop can be labeled/represented as organic and when something can be labeled/represented as "certified organic". The marketing and outreach materials were also shared with the Intervale Food Hub, a local foods market in Burlington, VT offering year-round delivery from 43 partner farms. The Intervale food hub is nonprofit-owned with the purpose of cultivating a local economy that sustains healthy food, farms, land and people.

Activity: Farmer marketing training by incorporating a workshop into the beginner farmer track at the NOFA Winter Conference on organic certification basics, and holding marketing workshops at conferences to train farmers in use of marketing materials.

Work accomplished: A workshop was held at both the Direct Marketing Conference, January 13, 2013 and the beginner farmer track of the NOFA-VT Winter Conference on February 16, 2013 entitled Marketing Local and Organic for Farmers. The workshop description read: How can you market local and organic? Vermont Organic Farmers (VOF), the organic certification program of NOFA-VT, recently developed a new marketing campaign to communicate the benefits of purchasing local and organic specialty crops statewide. Nicole Dehne from VOF and Nicole l'Huillier Fenton from Skillet Deign and Marketing will explain how the campaign was developed, showcase new marketing materials for specialty crop producers and offer social marketing tips.

We passed around a sign-up sheet for both workshops. 16 specialty crop producers attended the Direct Marketing Conference workshop and 23 specialty crop producers attended the Winter Conference

workshop. There were no non-specialty crop producers in attendance. Also in attendance were 2 service providers who work directly with specialty crop producers.

Activity: Roll out consumer outreach campaign by expanding creative graphic design campaign statewide to communicate benefits of purchasing local, certified organic products to a diverse population of organic consumers; Utilizing internet, print media, public relations, social media, and events to reach consumers; and Expanding retail promotions to include all food co-ops and specialty food locations.

Work accomplished:

- We updated the pages on our web-site to include the new VOF logo, updated all of our print materials (NOFA-VT Organic Farm and Food guide, NOFA-VT newsletter) to make new logo more prominent with a descriptor of "Why you should choose local *and* organic."
- We advertised in regional food hub local food guides (ACORN, RAFFL), Local Banquet magazine, Edible Green Mountains and the Burlington Free Press Savorvore section.
- We held 4 Celebrate Your Farmer events at organic vegetable CSA farms in July and August and invited the CSA shareholders and other prospective consumers. At 4 events, we had a total of 280 consumer participants. NOFA's mobile oven also featured the VOF outreach materials at the 48 consumer events held this summer and fall.
- New logo artwork was shared with retail outlets statewide for in-store product signage.
- Certified organic specialty crop producers who direct market were sent marketing materials to distribute materials at farmers' markets, CSAs and farm stands.

Activity: Video documentation of certified organic farmers. Based on creative direction of materials developed to raise consumer awareness, videos will be developed to effectively tell the farmer's story and their connection to certified organic. Videos will be marketed through all media channels and provided to farmers for their own promotion.

Work accomplished: A 9 minute video, entitled "Organic Matter" was created by filmmaker Michael Sacca and interviewer Helen Whybrow. The video highlights certified organic specialty crop producers, discusses the benefits and reasons of being a certified organic grower, and ties 'organic' with 'certified organic'. There is over 45 hours of film footage, and with additional funding, we will create 1 minutes shorts that detail specific issues that emerged – climate change, soil management, labor laws, etc. The video will be shown at the January 29, 2014 VOF annual meeting, and incorporated into a TED-style talk at the NOFA-VT Winter Conference, February 16, 2014. The video link will be shared with food cooperatives and provided to farmers for promotion on their websites. The video can be viewed online at: https://vimeo.com/85386708.

Project partners: NOFA-VT relied on many partners to make this project successful, as follows:

• Filmmaker Michael Sacca (of Michael Sacca Productions), Helen Whybrow, story development for the video, and the farmers who gave their time to be recorded and filmed for the production of the video.

• The Vermont Organic Farmers committed $5,000 from their marketing budget to contribute matching funds for development of the video.

• The food cooperatives and retail stores that sell organic specialty crops participated in surveys, and displayed our marketing materials.

GOALS AND OUTCOMES ACHIEVED

The outcomes that were anticipated for the project are in bold print below, accompanied by the progress made.

Outcome expected: The use of marketing materials by VOF members will increase. VOF will track the number of times that consumer-focused brochures are downloaded from the VOF website or requested from the office. We will also monitor the distribution and use of product pricing signs and the number of times that social media graphics are utilized by VOF.

Progress toward goal: Our goal was that the use of marketing materials would increase. Since the majority of the marketing materials are new and therefore had no utilization history, we can only compare the use of the new certification logo with the old certification logo. In 2012, farmers spent $2,261 on certification logos, ordered from our office. In 2013, with the new logo in use, farmers purchased $3,291 worth of logos. The price for the new logos was the same as for the old logos, so this increase in sales value represents a 46% increase in actual use. We did monitor the use of the new marketing materials in the following ways: In January, we mailed a letter to 144 certified organic vegetable and fruit producers to encourage them to use the marketing materials to reach their customers, including an order form, a hard-copy sample of the laminated price card, and a sample rack card detailing 5 good reasons to buy organic food. To date, 12 farms have ordered a total of 22 packs (25 per pack), and 54 farms ordered the stickers with new logo to promote their products. We also put together a special website for VOF producers, and gave them a password to access them, with the following marketing materials: social media graphics, talking points, and downloadable templates for posters and rack cards. We had 85 downloads from the nofavt.org/certified page this year: 54 of those were PDFs of print materials (primarily the 5 Reasons poster and the 3x5 cards), 27 were JPGs & GIFs for web use, mostly the Facebook banner, and 4 were the VOF logo bundle.

Outcome expected: Beginning farmers will attend the workshops at the Winter Conference, and engage in the outreach campaign, and choose to become certified organic.

Progress toward goal: We held a workshop at our winter conference, attended by 35 beginning farmers. We are not able to make a direct correlation between those farmers who attended the workshop and those who will choose to be certified, as it is a decision and process that often takes more than one year. Only one beginning vegetable farmer who attended the workshop applied to be certified organic this year.

Outcome expected: The retail stores that carry certified organic products will prominently display a sign with the VOF logo on it to market to their customers the fact that they carry Vermont certified organic products. In addition, the VOF logo will appear on individual product signs on merchandising shelves. As a result of this project, 50% of the food cooperatives and specialty food retailers that sell Vermont certified organic products will commit to display the VOF logo, which will be measured by a retailer survey.

Progress towards goal: We conducted a retailer survey of 15 food cooperatives and 32 specialty food retailers to ask if they would be interested in displaying the new logo that says (tentatively) "Vermont Organic Farmers products sold here. Certified Organic, Locally Grown." All 15 of the food cooperatives are interested in displaying a decal or poster (images attached), and 14 of the retail food stores, exceeding our expected outcome of 50%.

Outcome expected: The gross sales of Vermont certified organic specialty crop producers participating in the marketing campaign will increase 10% over the period of this project, measured by a survey of gross sales before and after the campaign.

Progress towards goal: For 2012, the gross sales from certified organic specialty crop producers were $15,333,242, and $20,085,531 in 2013, exceeding 10% growth. Although we assume that the marketing campaign contributed to this growth, there are many factors that impact gross sales including weather, length of harvest, market expansion, storage quality, etc…

Outcome expected: Consumers will increase their knowledge about certified organic specialty crops, and the value of certified organic food due to the marketing and outreach campaign.

Progress towards goal: The consumer outreach campaign had many components, including store promotions, print media, social media and specialty crop producers displaying consumer outreach materials at farmers markets, farm stands and CSAs. One component of the consumer outreach campaign that was unexpectedly successful were the Celebrate Your Farmer Socials held in July and August, 2013. We held four socials on organic farms that raise specialty crops. The purpose of the socials was to educate consumers about organic certification and organic practices, and to increase consumers' knowledge about farming with organic practices, the certification process, and why farmers choose to get certified. At each social, fruits and vegetables from the farm were used to create a meal for the consumer participants, there was a farm tour and a brief discussion, where host farmers responded to the question: Why are you certified organic and what do you find helpful or valuable about the process? We averaged 60 consumer participants per social, a much greater outreach tool than originally expected. The other consumer outreach tool developed as part of this grant which we expect to have broad consumer appeal and educational value is the video, Organic Matter. The 9 minute video highlights certified organic specialty crop producers, discusses the benefits and reasons of being a certified organic grower, and ties 'organic' with 'certified organic'. The film will be marketed this winter, and based on the quality of the production and the heartfelt testimonials and images of the farmers, we expect that it will reach consumers in different ways than print media and be an effective tool to communicate the value of certified organic food.

BENEFICIARIES

The primary beneficiaries of this project are certified organic specialty crop producers in Vermont. In 2011, there were a total of 157 specialty crop producers, growing on 1,485 acres. In 2012, the number of specialty crop producers increased to 167, growing on 1,557 acres. This represents a 6% increase in the number of specialty crop producers between 2011 and 2012. In our proposal, we estimated that there would only be a 2% increase in the number of certified organic specialty crop producers. We recognize that there are many factors that contribute to the increase in the number of certified organic specialty crop producers, and the outreach and marketing campaign is one important component.

LESSONS LEARNED

- Expand the marketing materials to address issue of price. Consumers need to understand why local & organic products cost more. Speak to the values of the farmers and the consumer to communicate why the product is more expensive. Perhaps develop an arm of the campaign that puts the issue front and center.. *Why Local & Organic is More Expensive than Conventional.* I think addressing the issue head-on would be a refreshing change for consumers.
- Increase the locations that showcase the marketing materials, including all co-ops statewide. In addition, reach out to smaller, local grocery stores that carry organic products and offer marketing materials to help communicate the value of local & organic products. I.e. Harvest Market in Stowe, Mac's Market statewide, The Village Market in Waterbury, etc.
- Develop a plan to build relationships with larger grocery store chains to showcase marketing materials. Start with a smaller grocery chain in Chittenden County that has expressed interest in increasing their local and organic offerings. Set up a meeting to discuss how NOFA/VOF and the store can work together to communicate benefits of local & organic products.
- Continue to reach out to VOF members to ensure they are using the new VOF logo and marketing materials. We recognize that this is an on-going campaign and that marketing never stops. There are new farmers to engage every year, and farmers who have participated who need support to get to the next outreach level.
    - Consider workshops with members on talking points, how to do presentations, better market themselves
    - Develop a "Why local and organic" power point presentation for downloading.
    - Offer plastic bags with VOF logo for members through NOFA Bulk Order

- After seeing the video, we learned the value of strong visuals to tell the story. Both the filmmakers and NOFA are interested in finding additional funding to develop some of the unused footage into video shorts that can highlight the "5 Reasons" messages we promoted.

CONTACT

Enid Wonnacott, Executive Director, enid@nofavt.org (802) 434-4122
Nicole Dehne, Certification Director, nicole@nofavt.org (802) 434-4122

ADDITIONAL INFORMATION

The link to access these materials is http://nofavt.org/certified.
The video is online at: https://vimeo.com/85386708

Project 14: Promotion of Vermont Maple Syrup – Final Report

PROJECT SUMMARY

This project was implemented for two primary reasons: 1) out of a need for a revised logo and branding for Vermont maple syrup and 2) as an effort to differentiate pure Vermont maple syrup from other pure syrups and low-cost non-maple competitors.

It had become apparent that Vermont Maple Syrup branding was in need of a revision when repeated references were made to the primary logo used in marketing Vermont Maple Syrup[1] as being a poor design. It has been included in Business Insider's "Top 15 Worst Corporate Logo Fails"[2] and was described by Vermont alternative weekly newspaper *Seven Days* as a "penis sign."[3]

The logo has been used primarily on signs and maple syrup bottles.[4] While the logo would have been enough reason to change the design, the containers themselves have been around with that design for quite some time. Many members felt that it was time for a revision and update to that design. At a strategic planning meeting held in July of 2014, these containers were described by some of our members as ugly and an impediment to sales.

Merits of a design aside, there were other reasons to consider revamping the branding used in association with Vermont Maple Syrup. With industry-wide adoption of a standardized grading system for syrup and more maple syrup using the same grading system as Vermont, finding new ways to differentiate Vermont syrup from maple syrup produced elsewhere is of the utmost importance to Vermont maple producers. Just as Florida Oranges, California Avocados, Washington Apples, Georgia Peaches, and Maine Wild Blueberries have branding associated to differentiate from products grown in other states or regions, branding developed for Vermont Maple Syrup will help set our product apart in the marketplace. Over the past twenty years, production of maple syrup in the United States has grown by 211%, and although this growth has been led by Vermont, there has been comparable expansion in New York, Maine, and Pennsylvania. In addition, approximately 75% of the North American production of maple syrup comes from Quebec. A renewed branding effort would help Vermont's maple producers to differentiate their products from maple syrup made in other states and provinces, capitalizing on the tradition and name-recognition that Vermont Maple Syrup already has.

A final reason for our rebranding effort also has to deal with differentiation in the marketplace but instead of separating Vermont Maple Syrup from other pure maple syrup, we feel there is value in giving consumers an easy cue to recognize that Vermont Maple Syrup is a truly unique and different product than artificially-flavored corn syrup products or flavored syrups such as maple-agave syrup.[5] Before this project, Vermont producers have had no cohesive branding materials that could be used to promote Vermont syrup in any sort of unified way, making it difficult to reach consumers with a consistent

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[1] See document "VTMapleSign.jpg"
[2] http://www.businessinsider.com/the-15-worst-corporate-logo-fails-2014-1?op=1
[3] http://www.sevendaysvt.com/vermont/wtf-vermonts-maple-penis-sign-chocolate-vaginas/Content?oid=2356061
[4] See document "VMSMA_Syrup_Cream_Label_Designs_Start.pdf"
[5] For example, http://madhavasweeteners.com/product/maple-flavored-agave/

message and visual presentation (either logo or thematic appearance) across either a range of packaging or across multiple consumer touch points (i.e. packaging, website, social media, advertisement, etc.).

PROJECT APPROACH

The main activities of this project have been to issue a Request for Proposals (RFP) for the graphic design and implementation of a new logo and branding, interview potential design firms to serve as a project partner, and to ultimately create a new logo and branding materials.

Our RFP was issued to Vermont design and marketing firms on December 8, 2014.[6] Initial proposals were due on January 7, 2015 and were reviewed by an advisory committee made up of members of the VMSMA Board of Directors and one non-maple industry member. Finalists were contacted and given the opportunity to discuss their process and proposal in greater depth. The advisory committee then made a recommendation to the Board of Directors at their January 27, 2015 meeting.

Select Design, based in Burlington, VT, was chosen to be the vendor for this project. An initial meeting was held on 2/18/2015 followed by a full team consultation on 4/8/2015 to review the competitive landscape of maple products and possible creative directions. Several conference calls between the advisory committee and Select Design ensued and Select Design presented a project review and update to the VMSMA Board of Directors on May 21, 2015.

Select Design presented an initial draft of potential creative possibilities on July 7, 2015.[7] These were reviewed by the advisory committee and went through several rounds of revision and refinement.[8] This culminated with a presentation to the VMSMA Board of Directors on September 3, 2015 of the final design direction and maple syrup jug labeling design.[9]

Our project partners in this effort included Select Design, the firm chosen to undertake the design and branding work on VMSMA's behalf, and to a lesser degree, Hillside Plastics which manufactures many plastic containers used to bottle maple syrup and is the exclusive producer of the VMSMA-branded maple syrup containers. Hillside Plastic assisted in reviewing the designs of the labeling so as to ensure that designs would be printable via the silk-screen process they use.

GOALS AND OUTCOMES ACHIEVED

In short, we have not yet achieved any of our performance goals or expected measureable outcomes due to running out of time. As will be noted in the following section, the timeline for this project proved to be too compressed in order to complete the needed assessment of the competitive landscape, a resource and process that Select Design does well and which attracted us to choosing them as a project partner. This in

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[6] Please see document "Vermont Maple Sugar Makers' Association Request for Proposals – Logo and Container Labels.docx"

[7] See document "Select_VMSMA_Visual_ID_Round_1.pdf"

[8] See document "Select_VMSMA_Visual_ID_Round_2.pdf"

[9] See documents "Select_VMSMA_Visual_ID_Round_3A.pdf" and "Select_VMSMA_Visual_ID_Round_3B.pdf"

turn led us to be reviewing design proposals at a time when we expected we might be rolling out the finished design and therefore able to measure our outcomes.

In the long-term, nothing has changed with respect to the ultimate goal of the project and we will continue forward as we have achieved the clear bulk of our expected work plan. It is expected that we will, in time, easily outpace our measurable outcomes due to the strength of the design work and creative content. At this time next year, once we have begun to fully roll out the new design toolkit to our members, it is expected that we would eclipse the goals we had originally set for this project.

BENEFICIARIES

The beneficiaries of this project include all of Vermont's maple sugar makers and specifically members of VMSMA. USDA's 2012 Ag Census counted 1553 farms in Vermont producing maple syrup, an increase of 18% over the 2007 Ag Census data. Over that same time frame, syrup production has nearly doubled in Vermont. It is difficult to put a precise, or even estimated, economic value on this project. Vermont's 2014 maple syrup crop was estimated by USDSA-National Agricultural Statistics Service to be valued at $44,550,000 but that price only reflects an average price per gallon for ALL Vermont maple syrup, over 80% of which is sold as bulk syrup that will eventually reach national and international markets. That amount of bulk syrup, sold at a lower per-gallon price to the farmer, sets the bar artificially lower. That same 2014 production sold at a retail price of $16 per pint would realize a value in excess of $170,000,000.

Maple syrup producers will benefit from having an attractive logo and branding to use on their product, website, and marketing material. New container labels will freshen the look of those bottles, helping to bring renewed consumer interest to design that has grown outdated. A new logo can be of used as a differentiator in the marketplace, setting apart Vermont maple syrup from syrup made in other states or in Canada as well as imitation products such as Aunt Jemima, Mrs. Butterworth's, or Log Cabin.

LESSONS LEARNED

The activities listed above under the Project Approach section match up well with the activities laid out in our adjusted work plan with only two items on our work plan not being fully satisfied at this time:

1. Introduction of New Logo (Summer 2015)
2. Point of Sale Items Disbursed to Retail Outlets (September 2015)

These two activities have not been completed due to scheduling over-runs through the summer as we revised the logo and logo treatments. In our original timeline, both within the revised work plan and the timeline that was created upon partnering with Select Design, we had envisioned the research and design phases to be able to be completed within three to four months. Ultimately, Select Design found the research process to take longer due to the unique nature of the maple syrup sales landscape. Maple syrup is inexorably linked to the geographic region (mostly state or Canadian province) from where it is produced and often marketed as such. In addition there are many small private brands, ranging from the larger and better known brands such as Maple Grove Farms of Vermont or Quebec's Citadelle Maple Gold to smaller, more artisan brands such as Tonewood or Crown Maple to the many farm businesses that dot Vermont and the entire maple-producing region of North America. This landscape is very different from beverages or active-outdoor clothing and the review process to create an assessment of the

competitive landscape took longer than originally expected. A further interesting distinction for maple syrup is that it is viewed by many as being more akin to a luxury item due to the price point and yet it is often used in the most unassuming of ways: topping pancakes or waffles. Studying consumer behavior with regard to our product has proven to be interesting, especially so given that many consumers from outside of the maple-producing region make no distinction between pure maple syrup and products like Aunt Jemima which are artificially-flavored corn syrup.

One of the principal lessons learned as a result of this would be to allow more time for the research phase of a rebranding or logo design project. It was clear to us in the beginning how important the research phase is to a successful project however the nuance and unique qualities of the pure maple syrup, and also the table syrup and sweetener, retail segments was not. Researching the competition, both direct (i.e. Quebec maple syrup) and indirect (i.e. table syrup, honey, agave syrup), as well as attempting to understand consumer viewpoints and attributes, provides the framework for all subsequent creative design.

Another lesson learned through this process was allow the proper time for reflection when reviewing new design elements for potential logos and branding material. In the Round 1 design (Visual Identity Round 1 – Design 07.07.2015), our review committee unanimously felt that the Time Honored 2 and Modern Craft 3 designs were the most promising to pursue. After a week or two of reflection, as a group we moved away from those designs as we began to feel that they were too intricate and less scalable (Time Honored 2) or, though unique and interesting, potentially not conveying to consumers a clear message (Modern Craft 3). One of the designs that did not initially jump out to the group as an obvious direction to pursue (Time Honored 5) would wind up, in a highly revised fashion, becoming our preferred design and the logo we ultimately chose. Allowing our group the time and opportunity to reflect on what we liked and did not like gave us a greater insight into what we believe would be the best logo.

In terms of a lesson that may help others expedite a similar process, in hindsight our advisory committee should have had more clear ground rules regarding decision-making, especially as it related to strategic direction. Had we outlined a clear process for what decisions could be advanced when something less than unanimous judgement was had, the entire process would have gone more smoothly.

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ADDITIONAL INFORMATION

Included in this Dropbox folder are a variety of items which were either created for this project or provide background information on the project:

https://www.dropbox.com/sh/xj1msy4z386onjs/AADb_JbBXe1WeFYYSR5UP-tia?dl=0

1. 955.JPG: *This is a good view of the existing maple syrup container design and logo.*

2. Select_VMSMA_Visual_ID_FinalRound.pdf: *This document provides the final design style, main identity type lockup, shield lockup, icon, and authenticity seal. The last two pages document the design exploration of the shield lockup shape.*
3. Select_VMSMA_Visual_ID_Round_1.pdf: *This document was the first round of design that was created by Select Design.*
4. Select_VMSMA_Visual_ID_Round_2.pdf: *Taking into account strategic direction from Select Design and feedback from the VMSMA Advisory Committee, this shows the beginning of fine-tuning of the designs presented in Round 1.*
5. Select_VMSMA_Visual_ID_Round_3A.pdf: *Further refinement from Round 2.*
6. Select_VMSMA_Visual_ID_Round_3B.pdf: *After Round 3A, our group felt that we should focus solely on Design 2a and 2b from Round 3A. This document was presented to the VMSMA Board of Directors and approved with minor changes.*
7. Select_VMSMA_VTMaple_Leaf_Icon_Dev.pdf: *One of the minor changes from Round 3B was a desire to alter the leaf icon. This document showcases the evolution of that icon as well as exploration of, and edits to, the authenticity seal and examples of usage including letterhead and t-shirts.*
8. Vermont Maple Sugar Makers' Association Request for Proposals – Logo and Container Labels.docx: *This is the RFP that was sent to design firms last year.*
9. VMSMA_Syrup_Cream_Label_Designs_Start.pdf: *This shows the current labels of our syrup and cream containers.*
10. VMSMA.1510.JugWrap_Mtns_Mech_Pths_85146.pdf: *This is the design for the test print in our primary Mountain design.*
11. VMSMA.1510.JugWrap_Shield_OrigWood_Mech-Pths_85146.pdf: *This is the design for the test print in our secondary Wooden Shield design.*
12. VTMapleSign.JPG: *The existing VT Maple Syrup logo that has become a source of derision.*