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FY 2009 – FB Specialty Crop Block Grant Program Final Report
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Virginia Department of Agriculture and Consumer Services
Division of Marketing

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Project #1: Monitoring Water Quality to Meet GAP Certification (Final)

I. Project Summary

Food Safety in the market place has become an issue of great importance for both consumers and producers of fresh produce in the United States. The US food supply is among the safest in the world. The overall high quality of life enjoyed by Americans can be attributed, in part, to an abundant, nutritious and relatively risk-free food supply. Nevertheless, every year an estimated 76 million people in the United States become sick, 300,000 are hospitalized and approximately 5,000 die as a result of the basic human activity of eating (US Centers for Disease Control, 2001a). President Obama, in his weekly address on March 15, 2009, has stated, "*There are certain things only a government can do, and one of those things is ensuring that the foods we eat, and the medicines we take, are safe and do not cause us harm.*" As the federal government moves to increase food safety efforts through the Food and Drug Administration, many state, region and local efforts have already been underway to achieve the same future goals of the government.

During the past two years, many Southwest Virginia fruit and vegetable producers have made a proactive effort to secure farm certification for GAP (Good Agricultural Practices) certification for their farming operations. According to current records from the Virginia Department of Agriculture, there are only six farms or farming operations in the state that are listed as GAP Certified. Currently, nineteen additional farm operations in the Carroll and surrounding county areas of Southwest Virginia are working toward certification.

The major portion of these efforts have centered on the development of a plan of action for the farm as to what they are doing to insure food safety in the products being produced. Farmers have met in formal educational classes to learn and work on their farm's effort to develop these plans. In many cases, there have been very positive results as to changes and innovations related to food safety requirements.

Activities since working on the plan have included worker training (including Hispanic H2A), sanitation practices, signage, warehouse sanitation, packing house equipment safety and awareness, recordkeeping, pesticide usage, field measurement and management efficiency.

Even with this effort, there are several other issues that need to be addressed in order to help these producers achieve full certification. A major area that has presented problems for both growers and packers is an understanding of water treatment for agricultural use as well as a reliable method to monitor and regulate water quality in all areas of the farm operation including well testing, spray and irrigation water monitoring, and packing/ wash lines. This project seeks to develop those methods for treating and monitoring water sources used for irrigation and packing wash lines.

The accepted method of treating water for agricultural use has been the incorporation of various chlorine compounds into the water to kill existing micro-organisms that can lead to food borne illnesses. Free chlorine, that part of chlorine compounds responsible for disinfecting, sanitizing and killing microbial contaminants varies as a function of pH and temperature. In order to optimize the effectiveness of free chlorine, the water and chlorine concentration must be monitored. To complicate matters, the paper test strips and colorimetric kits used to monitor chlorine do not distinguish between the presence of HOCl and a far less active chemical species,

hypochlorite (OCI-). Therefore, to maintain a given free chlorine concentration, it is necessary to monitor and adjust the pH of disinfectant solutions (Suslow, 2000). In recent years, newer methods have been developed to help in the monitoring of free chlorine. The basis of this grant opportunity will help to evaluate and collect data on new monitoring systems to be used for agricultural water usage as well as hands-on procedures for adjusting chlorine concentrations. Producers need the most accurate and efficient system while considering the economics of the procedure in relation to production.

In order to meet timelines for certification, this practice needs to be developed and incorporated into the plan of action as soon as possible. Existing monitoring methods and practices may or may not be acceptable as newer regulations are developed.

II. Project Approach

Goal: To develop the most economical method that will allow producers to test water sources and take corrective measures when needed to bring sources into compliance with requirements for GAP certification.

Some positive trends were observed (see Table 1 below). However, the tests were not as consistent as expected. This may require re-evaluating or evaluating additional options. In addition, these tests may be sufficient for a USDA food safety audit; however, these approaches will not suffice for other audit agencies. Audit agencies like Primus are now requiring monthly water samples beginning 2 months prior to water usage. They also require the testing lab to report counts, not just presence or absence or even ranges. Therefore, none of these testing methods will likely suffice for any audit agency other than USDA.

Table 1. Testing for Bacterial Fecal Coliform

Date	VDACS		WaterSafe	Coliscan				Notes/Location
	e.coli	TC		e.coli	#	TC	#	
7/28/2010	Present		Negative	P	1	P	>100	01: Stream at Snake Creek Farms 36deg 42' 19.78N 80deg 38'43.19
7/28/2010	Present		Positive	P	<100	P	<50	02: Pond at Snake Creek Farms 36deg 41' 50.59N 80deg 37' 39.71W
7/28/2010	Present		Positive	A	0	P	<10	03: Pond at Lights (Fox Pen) 36deg 41' 22.85N 80deg 33' 46.28W
8/3/2010	Present		Negative	A	0	P	>100	04: Hydrocooler, SWVA Farmers Market 36deg 44' 29.2"N 80deg 46'17.8" W
8/3/2010	Absent	Absent	Negative	A	0	A	0	05: Water Fountain SWVA Farmers Market 36deg 44' 29.2"N 80deg 46' 17.8" W
8/3/2010	Absent	Absent	Negative	A	0	A	0	06: Well B&D Greenhouse 36deg 40'9.04" N 80deg 45' 9.6"W
8/3/2010	Present		Negative	P	1	P	>100	07: Stream Crooked Creek Fishing Area 36deg 40' 32.8"N 80deg 48' 53.6"W
8/3/2010	Present		Negative	A	0	P	<50	08: New River 36deg 43' 1.2"N 80deg 57' 26.2" W
8/3/2010	Absent	Present	Negative	A	0	P	<10	09: Irrigation Reservoir Worrell 36deg 48' 25.6" N 80deg 50' 12.6" W
9/21/2010	Absent	Present	Negative	A	0	P	<5	10: Spring Walker Creek Farm 37deg 9' 30.57" N 80deg 51' 37.93" W

III. Goals and Outcomes Achieved

Evaluation of the water testing “techniques” was completed but with varied results. The lack of consistency of these water testing procedures is still in question and will need further evaluation. However, the biggest concern is whether they will be accepted by the majority of 3rd party audit agencies.

Some of the unfulfilled goals of this project were to evaluate chlorine monitoring systems on grading and packing lines. However, few growers in Southwest Virginia are using a washing / packing line and almost no chlorine is being utilized. The primary growers / packers that wash and pack from grading lines are using Sanidate instead of chlorine for sanitation. The primary advantage of Sanidate is that it is not pH sensitive like chlorine and therefore, no pH monitoring is necessary. It also appears to sterilize much faster than chlorine. Biosafe, the company that sells Sanidate has three different methods of evaluating the concentration of Sanidate and all three appear to be accurate.

The other unfulfilled goal was that of bioremediation of pond water for use in fruit and vegetable production. Again, this sounded like a good idea in theory. However, when the

rubber meets the road, in the open environment of field production, even water from a bioremediated water supply would still have to be tested and likely treated before it could be used in the production of fresh fruits and vegetables. This is especially if the water were to be used for spraying, washing or overhead irrigation. Therefore, bioremediation would be of little benefit to most of the fruit and vegetable producers of Southwest VA.

In the last 2 years, over a 100% increase in the number of growers in Southwest Virginia with some sort of GAP certification has occurred. All of these growers are doing some sort of water testing in order to receive that certification. However, they may need to make changes to be in compliance with future 3rd party audits for certification.

The goal to increase sales of local produce by 10 percent within five years is on its way to being met. Within 3 years approximately \$20 million of local produce was sold in the Blue Ridge Plateau Region in 2011.

IV. Beneficiaries

Beneficiaries include fruit and vegetable producers of the Commonwealth of Virginia, especially those of Southwest Virginia. Also benefiting from this information are people / companies that wash, grade and package produce.

More and more buyers of fresh fruits and vegetables are requiring producers and well as brokers to obtain some sort of 3rd party GAP certification. Therefore, producers and brokers have to make changes including water testing to comply with these audits. Over a 100% increase in the number of producers that have some sort of GAP certification has been observed in the last two years. The economic implication of GAP certification can mean the difference between selling product and not selling product. For example, as of November 1, 2011, Wal-Mart is now requiring everyone that sells fresh fruits and vegetables to them to have some sort of GAP certification. Even regional chain stores like Food City are requiring GAP certification for growers next year.

Sales of local produce has increased by 333% (from \$6 million to approximately \$20 million). Approximately 75 growers were directly impacted.

V. Lessons Learned

The water testing methods evaluated were not as consistent as needed for certainty in food safety. In addition, they may not be satisfactory for future 3rd party audit companies.

Future studies in this area must try to anticipate the changes that are occurring in the fresh produce industry as it pertains to food safety. Chlorination may still be feasible, but is being utilized less and less in the industry. Bioremediation of contaminated surface water may be beneficial in some ways, but will not likely be enough to make water safe for use in fresh fruit and vegetable production.

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Project #2: Sustainable Snap Bean Nitrogen Fertilization (Final)

Title: Sustainable Snap Bean Nitrogen Fertilization

PI: Mark S. Reiter, Assistant Professor/Extension Specialist

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Location: Virginia Tech Eastern Shore Agricultural Research and Extension Center

I. Project Summary

Nitrogen (N) fertilizer is the most difficult nutrient to manage in crop production systems because it can be lost or immobilized into unavailable N forms via numerous environmental pathways. Plant uptake and utilization of N fertilizer is a major concern to farmers because it impacts fertilizer use efficiency. Over the past several years, fertilizer prices have reached record highs and efficient use of fertilizer nutrients is imperative for farmers to survive economically and to continue providing cheap food to the general public.

Fertilizer sources and application timing can have appreciable effects on fertilizer use efficiency. Currently, farmers in Virginia use many different fertilizer sources that contain varying amounts of urea, ammonium, and nitrate forms. Plants can utilize all three of the different fertilizer N forms, but nitrate-N can be easily lost into the environment from two main modes of action. One main mode of nitrate loss is denitrification. Water saturated soil conditions can lead to denitrification, which can occur after heavy rains when soils remain saturated for several days. Another main mode of nitrate loss is leaching from excessive rainfall or irrigation, especially in sandy soils where the majority of snap beans in Virginia are grown. One way to avoid significant N losses is to apply the fertilizer in several split applications over the growing season, allowing plant uptake as the nutrients are applied. Another best management practice for increasing fertilizer use efficiency is by keeping N in the ammonia form to reduce N losses via denitrification and leaching.

Reducing nitrate concentrations from fertilization can be partly completed by the use of non-nitrate containing fertilizers, such as urea. Urea would be an excellent fertilizer source for Virginia producers because it can be used in conventional granular fertilizer applicator equipment and is one of the cheapest N fertilizer sources per pound of actual N. However, urea quickly undergoes hydrolysis and then nitrification by soil born microorganisms. Previous research has shown that urea becomes ammonium within 3 to 4 days after application and significant quantities of ammonium are transformed into nitrate within 7 to 10 days. Incorporation of a nitrification inhibitor, such as dicyandiamide (DCD), can inhibit soil microorganisms that transform ammonium into nitrates. Dicyandiamide's efficacy for reducing nitrification is around 60 days, meaning that most of the N fertilizer would remain in the ammonium form the entire snap bean growing season. Farmers applying their entire N at planting could simply incorporate DCD into their fertilizer formulation and significantly increase their fertilizer use efficiency.

With rising fertilizer prices and increasing pressures being placed on farmers to reduce nutrient loads into the Chesapeake Bay, such as the impending Total Maximum Daily Load "pollution diet", increasing fertilizer use efficiency is imperative. Properly timing their fertilizer applications or using additives in various fertilizer sources are sustainable measures to help farmers' bottom economic line and the Chesapeake Bay.

II. Project Approach

The major objective of this project was to establish a comprehensive N fertilization plan for fresh market snap bean producers in Virginia. The project was repeated for both a Spring and Fall snap bean crop for two years; effectively giving four site years of data. The project was established as a factorial arrangement of three N sources, 3 N rates, and 2 application methods replicated four times, giving a total plot combination of 72 plots. Nitrogen sources used included the industry standard 30% N liquid urea ammonium nitrate, urea - one of the cheapest N sources available, and urea with a nitrification inhibitor additive (UDCD). For N application timing treatments, N fertilizer was applied 100% at-planting (PPI) and at a 50-50% split (Split) between at-planting and side-dressed 3 weeks after emergence. Both combinations of N sources and methods were applied at 40, 80, and 120 pounds of total N per acre. A 0-N control was also included. Yield was calculated by picking the middle two rows of four row plots. Yield was regressed against total fertilizer N applied to derive equations for yield prediction for significant N rate main effects or interactions. All production practices were followed as outlined by the *Commercial Vegetable Production Recommendations – Virginia*. All work was done by faculty and staff of the Eastern Shore AREC.

Total graded yield data indicated a N source main effect in Spring 2010. Urea treatments had higher yields than other fertilizer sources, averaged across N rates and application timing (Table 1). Both UAN and UDCD sources were similar to the untreated 0-N control. In Spring 2010 and Spring 2011, Split N applications yielded higher than PPI treatments, averaged across N sources and N rates (Tables 2 and 3). Nitrogen source was not significantly important in Fall 2010 or Spring 2011.

Size distribution is an important parameter for fresh market snap bean production, with grade size 4 being optimal for the ‘Bronco’ variety. In Spring 2010, a N source \times N application timing interaction indicated that splitting UDCD caused higher size 4 yield than all PPI treatments (Table 4), averaged across N sources; which is interesting as UDCD contains a nitrification inhibitor that should reduce N losses. For size distribution, Spring 2010 data indicated that split applications increased small beans (size 1, 2, and 3) compared to all at-planting treatments (Fig. 1), averaged across N sources, and that urea fertilizers had more size 5 beans than any other source (Table 5), averaged across N rates and N application timing. Fall 2010 treatments had similar results for size 4 as Spring 2010, indicating that UDCD had more yield as size 4 when split applied than PPI and that UDCD yielded higher than split treatments of UAN (Table 6). Nitrogen rates of 120 lbs N/acre had highest yields of size 4 snap beans (Fig. 2), averaged across N sources and N application timing. In Spring 2011, split applications of N fertilizers had more yield grading size 4 than PPI treatments (Table 3), averaged across N source and N rates.

Overall, data generally indicated that proper size distribution and maximum yields will be achieved with split applications of fertilizer treatments. Nitrogen source was not as important as previously thought, as treatments with a nitrification inhibitor did not outperform other fertilizer sources. However, if a nitrification inhibitor is used it seemed increasing important to split fertilizer treatments.

III. Goals and Outcomes Achieved

The primary goal of this project was to decrease N fertilizer consumption by fresh market snap bean producers by 25% without decreasing yields. Considering yield and size distribution data of graded snap beans, we will not change our current overall N rate recommendations for Virginia snap bean producers. Therefore, N “savings” will not be realized. However, we do expect to see a significant yield increase by recommending that producers apply their N fertility in split

applications. Overall, our N fertilizer use efficiency will be increased by 10 to 25%, depending on the combination of N rates, N sources and N applications timings used. An increase in N use efficiency will also be highly variable upon year and weather conditions. Overall, proper N management will bump snap bean yields up to 50% when compared to the 0-N fertilizer controls, even though snap beans are legumes.

Long term measurable outcomes of proper N fertilization used will include reduced N loads in groundwater monitoring wells on the Eastern Shore AREC and in monitoring stations in the Chesapeake Bay and tributaries that are sponsored by USGS and EPA. Snap bean production is just one component of a network of projects that aim to increase N fertilizer use efficiency and reduce overall losses on the Eastern Shore of Virginia. Actual decreases in water quality measurements from groundwater will take many years to realize and are beyond the timeframe of this particular grant.

A short term measurement of program success can be visualized by numbers of interested producers attending field day and conference events. To date, this information has been presented at 2 Virginia Tech Eastern Shore AREC field days with a cumulative attendance of 240 farmers, industry, governmental agency representatives, and other stakeholders. Data was presented at the Eastern Shore Agricultural Conference and Trade Show with 50 producers and other stakeholders in attendance, was presented at the Southern Branch of the American Society of Horticultural Sciences Conference to 45 researchers, was presented at an Extension Agent In-Service training session to 20 agents, was presented at 2 Certified Crop Advisors training sessions with 100 industry representatives in attendance, and data has been incorporated into the *Commercial Vegetable Crop Recommendations – Virginia* Extension publication.

Quantification of long-term success will be measured by taking a survey of Virginia fresh market snap bean producers. Our goal is to have 75% of producers adopt our fertilizer recommendations. It will take time to “switch” producers’ production practices with results being written into Extension publications, presented at grower information meetings, conferences, and so forth and is beyond the timeframe of this grant.

IV. Beneficiaries

Numerous groups will directly benefit from the data collected from this research proposal through the data dissemination. The direct beneficiary is the snap bean producers, as they will be able to produce more snap beans with the same amount of fertilizer they are currently using by switching sources and/or changing their N application timing. This will increase the producers’ fertilizer use efficiency and provide more snap beans for sale. Using Virginia Agricultural statistics as our baseline (yield = 3300 lbs/acre), our yields were 50% to 90% higher, with the exception of the 100 year rainfall event season. At an average price of \$30 per cwt, this translates into a production increase of \$500 to \$900 per acre. If we can bring baseline up to 5000 lbs/acre yield on all 5500 acres in Virginia, snap bean sales would be increased ~\$2.8 million. It is interesting to note that even the 0-fertilizer control often yielded higher than Virginia’s baseline. This suggests that current fertility practices are actually decreasing yields compared to fields that would have no N fertilizer applied at all. Also, the snap beans will grade to the correct size (size 4) more quickly in the growing season, allowing the crop to be in the field for less time. Research data also supports that farmers can use cheaper sources of N fertilizer with comparable yields. Crop consultants will also benefit from this project as they will have new information to provide to producers to ensure maximum fertilizer use efficiency and productivity.

V. Lessons Learned

Numerous project lessons were learned by researchers as we implemented our snap bean fertility project. Primarily, we experienced firsthand the difficulties of growing a 56 day crop on sandy loam soils in Eastern Virginia during summer months. Each year we experienced drought and had to supplement with irrigation to ensure a crop. However, excessive heat often caused plants to lose blooms and caused “split-sets” of snap bean pods. Due to split-sets coupled and inherent differences of pod maturity between treatments, difficulties arose each year when attempting to determine the correct time to harvest crops. Due to the question regarding maturity, we aimed to harvest the crop as close as possible to the “given” 56 day maturity as long as the majority of the treatments were near maturity.

Another production problem that we encountered was inconsistent weather. In Spring 2011, we had a major rain event that approached a 100 year storm. Six inches of rain fell in a two hour period and flooded our fields. Due to this event, we suspect that we had significant leaching of N fertilizer from the first application as well as damage to the root zone of the plants. Interestingly, control plots generally yielded similar to fertilizer plots and some fertilizer treatments actually yielded lower than no-fertilizer control plots as initial N fertilization inhibited early season nodule formation. Following the flood, a drought occurred and we had to continue irrigating. Therefore, yield was ~50% of other years in Spring 2011. We will repeat this study another growing season to garnish more data.

VI. Additional Information

Publications:

Reiter, M.S. 2010. Increasing fertilizer use efficiency for snap beans in Virginia. p. 29-35. *In* D.M. Endale and K.V. Iversen (eds.) Proc. 32nd Southern Conservation Agric. Systems Conf., Jackson, TN. 20-22 July 2010. Available at: <http://www.ag.auburn.edu/auxiliary/nsdl/scasc>.

Wilson, H.P., T.P. Kuhar, S.L. Rideout, J.H. Freeman, **M.S. Reiter**, R.A. Straw, T.E. Hines, C.M. Waldenmaier, H.B. Doughty, U.T. Deitch, and J.D. Aigner, Jr. 2010. Commercial vegetable production recommendations. Publ. 456-420. Virginia Cooperative Ext., Blacksburg.

Reiter, M.S. and J.H. Freeman. 2010. Snap bean nitrogen management in the Mid-Atlantic. *HortScience* 45(4):501.

Pictures:



Picture 1: Snap bean plots.



Picture 2: Harvesting snap bean plots.



Picture 3: Grading snap beans by size.



Picture 4: Flooding that occurred in spring 2011 when 6-inches of rain fell in two hours.

Tables and Figures:

Table 1. Spring 2010 snap bean total graded yield for various nitrogen sources on a Bojac sandy loam in eastern Virginia, averaged across N rates and application timing.

Nitrogen Source	-----lbs/A-----
Control†	4404 b
UAN	5080 b
UDCD	5159 b
Urea	6381 a
LSD _{0.10}	959

†No nitrogen fertilizer applied.

‡Means followed by different letters are significantly different at $p=0.10$ and were separated using Fisher's protected least significant difference tests.

Table 2. Spring 2010 snap bean total graded yield for various nitrogen application timings on a Bojac sandy loam in eastern Virginia, averaged across N rates and sources.

Nitrogen Source	-----lbs/A-----
Control†	4404 b
PPI	5018 b
Split	6062 a
LSD _{0.10}	959

†No nitrogen fertilizer applied.

‡Means followed by different letters are significantly different at $p=0.10$ and were separated using Fisher's protected least significant difference tests.

Table 3. Spring 2011 snap bean total graded yield for various nitrogen application timings on a Bojac sandy loam in eastern Virginia, averaged across N rates and sources.

Nitrogen Source	Size 4	Total Graded Yield
	-----lbs/A-----	
Control†	889 ab	2404 a
PPI	817 b	2144 b
Split	987 a	2369 a
LSD _{0.10}	116	198

†No nitrogen fertilizer applied.

‡Means followed by different letters are significantly different at $p=0.10$ and were separated using Fisher's protected least significant difference tests.

Table 4. Spring 2010 snap bean yield size grade 4 for various nitrogen sources and application timings on a Bojac sandy loam in eastern Virginia, averaged across N rates.

Nitrogen Source	Application Timing	
	PPI	Split
-----lbs/A-----		
Control†	1585 bc‡	
UAN	1682 bc	1892 ab
UDCD	1283 c	2283 a
Urea	1992 ab	1997 ab
LSD _{0.10}	469	

†No nitrogen fertilizer applied.

‡Means followed by different letters are significantly different at $p=0.10$ and were separated using Fisher's protected least significant difference tests.

Table 5. Spring 2010 snap bean yield size grade 5 for various nitrogen sources on a Bojac sandy loam in eastern Virginia, averaged across N rates and application timing.

Nitrogen Source	
	-----lbs/A-----
Control†	1476 b‡
UAN	1660 b
UDCD	1791 b
Urea	2646 a
LSD _{0.10}	550

†No nitrogen fertilizer applied.

‡Means followed by different letters are significantly different at $p=0.10$ and were separated using Fisher's protected least significant difference tests.

Table 6. Fall 2010 snap bean yield size grade 4 for various nitrogen sources and application timings on a Bojac sandy

loam in eastern Virginia, averaged across N rates.

Nitrogen Source	Application Timing	
	PPI	Split
	-----lbs/A-----	
Control†	1912 d‡	
UAN	2595 abc	2336 c
UDCD	2372 bc	2775 a
Urea	2451 abc	2741 ab
LSD _{0.10}	370	

†No nitrogen fertilizer applied.

‡Means followed by different letters are significantly different at $p=0.10$ and were separated using Fisher's protected least significant difference tests.

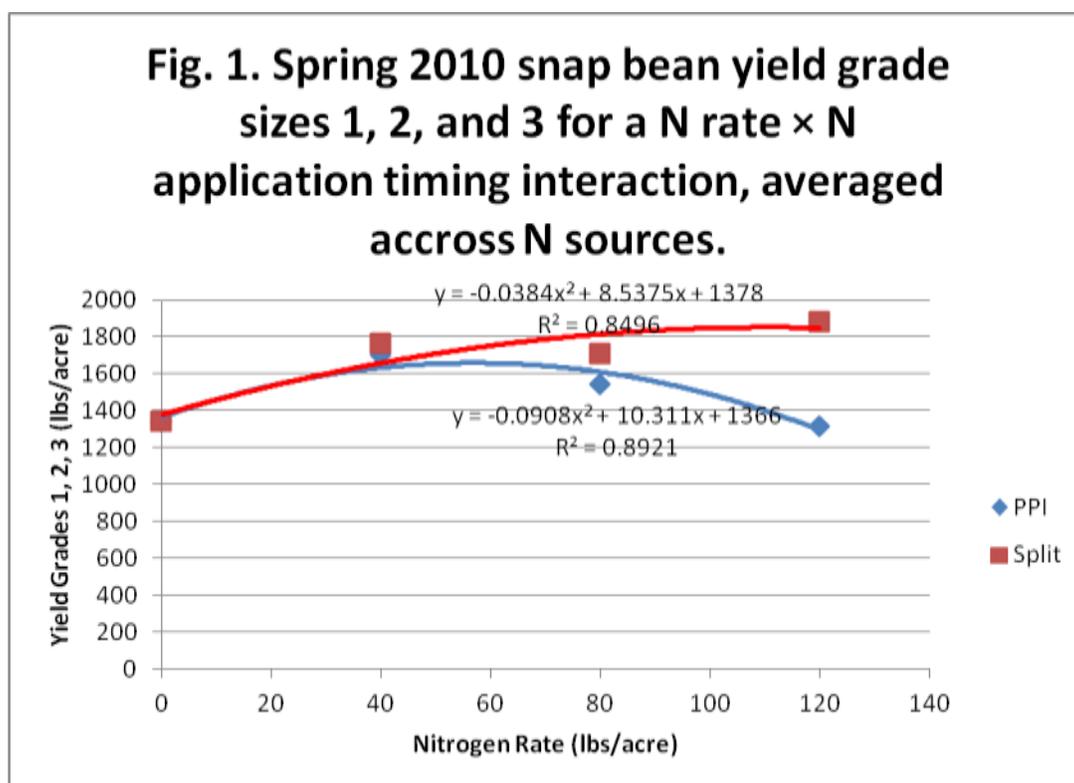
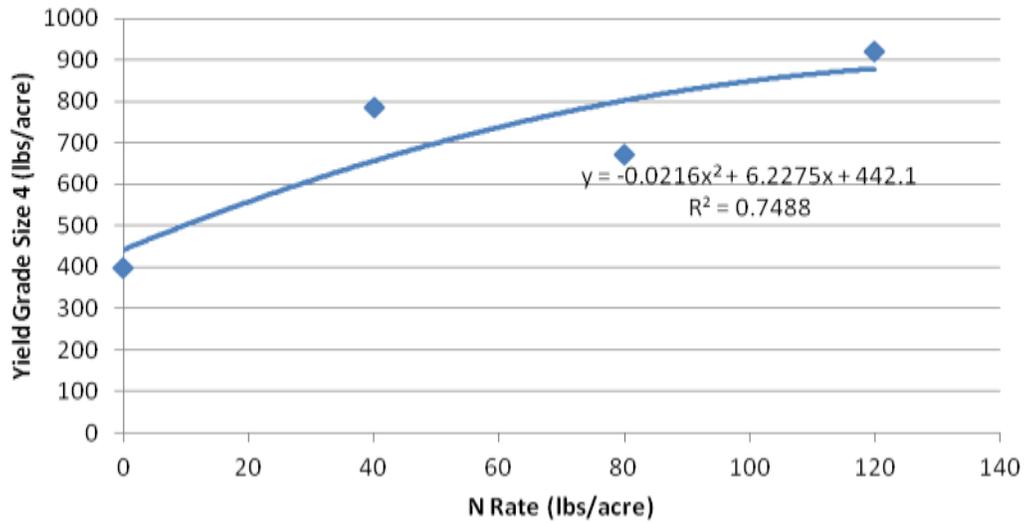


Fig. 2. Fall 2010 snap bean yield grade size 4 for N rate, averaged accross N application timing and N sources.



Project # 3: Producing and Marketing New Specialty Crops for Virginia (Final)

I. Project Summary

Unlike any other time in recent years, farmers are looking for commodities to maintain income and the ability to stay on the farm. Specialty crops continue to be an area that maintains the interest of many growers, especially former tobacco farmers. Actually, during the past 3 years, interest in “new” specialty crops has continued to increase. This increased interest has been on the part of growers, VDACS, farmer’s market management, Extension, and most importantly on the part of buyers. Over this 3 year period broccoli, cauliflower, collard and kale production have went from essentially 0 acres of production to nearly 100 acres. Annual sales of these products in approaching \$1,000,000. This year a buyer approached the Southwest Virginia Farmer’s Market about growing 25 acres of cilantro. They also have interest in other greens like mustard and turnip.

It is great to have these marketing opportunities, and we believe in the old adage that you need to sell it before you plant it. However, we have no research and little production information for commercial production of these new crops. The addition of cole crops like broccoli, cauliflower, collard and kale has created a learning curve for growers. However, many of these producers already grew cabbage. Therefore, they had the basic knowledge needed. It only required them to learn the specifics of the new crops. On the other hand, when growers were approached about growing cilantro, they were excited, but nervous. None of the growers had ever grown cilantro and there is no production information available for cilantro production in Virginia. As an Extension specialist I had to rely on information from other parts of the U.S. and the world. As we conducted the production meeting, we were all learning about cilantro production at the same time.

The growers need support to make these new specialty crops successful. The purpose of this project is to provide that needed support. The goals are to conduct variety evaluations, herbicide evaluations, population and spacing evaluations, fertility evaluations and any other production component that needs attention. Once this production information is obtained, then it must be disseminated to growers in educational / production meetings. Most of this will be conducted in and around the Blue Ridge Plateau region of Southwest Virginia.

Bottom line:

We need research and demonstration projects that will support our producers. With current budget constraints funds within VDACS and VCE are limited and getting tighter. This grant is one of the few avenues we have to secure funds for practical, applied research to assist our specialty crop growers and to disseminate the results to the producers. Hopefully, with hard work on the part of the grower, production information generated from this project and proper education we will make these new ventures (such as mustard, turnip and cilantro production) successful.

II. Project Approach

During January 2010, Kevin Semones, Danny Neel and I visited the buyer interested in purchasing the proposed specialty crops. A later visit was made with approximately 8 interested growers.

A meeting was conducted at the Southwest Virginia Farmer's Market focusing on the production of new specialty crops such as: beets, broccoli, cauliflower, cilantro, collards, kale, mustard, parsley and turnips. Production information on many of these crops was also presented at the Appalachian Regional Horticultural Conference held in Abingdon in February of 2010. Other production meetings were held throughout Virginia, focusing on various specialty crops, including sweet corn, tomato, peppers, small fruit crops and other vegetables. Many of the meetings were held in the Hillsville / Blue Ridge Plateau region of Southwest Virginia, as well as at the Appalachian Regional Horticulture Conference held in Abingdon.

Variety trials evaluating cilantro, collards, kale, mustard and turnips were planted for fall harvest with an interested grower in Lee County. However, the dry weather in the early fall prevented uniform establishment of the various crops and resulted in no useful data for 2010. Variety trials were also conducted with crops such as tomatoes, peppers and sweet corn. Also, four new varieties of broccoli were obtained from seed companies for evaluation. Two of the varieties, 'Imperial' and 'Emerald Crown' showed merit for use during the warmer parts of the production season.

During 2011, production meetings covering sweet corn, cilantro, broccoli, cabbage, collards, kale, mustard, turnips, cucumbers and squash were held in Hillsville. Also, sessions covering most of the aforementioned crops along with pumpkins, strawberries and brambles were presented at the Appalachian Regional Horticulture Conference held in Abingdon in February.

In 2011, broccoli variety trials were also conducted with two more exciting varieties identified. 'BI 10' from Reed Seed Company and 'Green Gold' from Seedway both are very promising varieties for broccoli production in Southwest VA. Various tomato varieties were also evaluated during 2011. '4474R' a new experimental variety from Harris Moran Seed Company is very promising for fresh market, vine ripe production. Also, 'BHN 1050' and 'BHN 1051' are promising new roma tomato varieties. Sweet corn varieties were also evaluated in Wise County during 2011.

III. Goals and Outcomes Achieved

Variety trials were conducted and production information was obtained during 2010 and 2011. The production information was disseminated to growers at various producers meetings throughout the Commonwealth. Many of these meetings and trainings were held in the Blue Ridge Plateau region of Southwest Virginia and at the Appalachian Regional Horticulture Conference. Approximately 55 people attended the Appalachian Regional Horticultural Conference. Additional meetings numbered approximately 20 with about 600 in attendance.

Significant increases in specialty crop production have also been observed over the past 2 years. A 600% increase in cilantro production was observed with an increase in acreage from less than 10 acres to 70+ acres. Collards and kale production increased from just over 60 acres to approximately 75 acres (greater than 10% increase). Sweet corn production increased by 100% in total crates produced, while acres planted exceeded more than a 100% increase. Broccoli production increased by at least 25% over the last 2 years, with more than 100 acres grown in 2011. Pole bean production has increased over 100% in the last 2 years. Cucumber production has also increased by more than 100% in the last year.

IV. Beneficiaries

The beneficiaries of this project include growers / producers in the Commonwealth of Virginia, especially those growers in Southwest Virginia and the Blue Ridge Plateau region. Growers most benefiting from this project have been specialty crop growers and producers wanting to expand into specialty crops.

The local residents of Southwest Virginia have also benefited from the increased sales revenues, as well as a greater abundance of high quality fresh specialty produce.

Increases in production have resulted in greater sales and greater profitability for Virginia producers. Gross sales of specialty crops have increased by at least 25% over the past 2 years. Profitability should also have increased by a least 5% and maybe as much as 10% during this same period of time.

V. Lessons Learned

The unusual heat experienced during the production seasons of 2010 and 2011 made production of some of the specialty crops, especially cilantro, very difficult. The heat even made broccoli production more difficult than normal. This was a reminder that even though much of Virginia is suitable for specialty crop production, weather can be a limiting factor.

The weather also reminded researchers and producers alike of the need of irrigation in specialty crop production. Anyone considering large scale production of these crops must have available water and infrastructure for drip and/or overhead irrigation.

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Project # 4: Production and Marketing of high Tunnel Grown Raspberries in Virginia (Final Report)

I. Project Summary

Virginia growers are looking for profitable farm enterprises to diversify their current production systems. The health benefits associated with many of the berry crops, in particular raspberries, have caused a sharp increase in market demand. Adding to this trend is also the increase in consumer demand for locally grown food thus making crops such as raspberry a prime production candidate for Virginia farmers to produce. This project provided funding for three Virginia growers to initiate high tunnel raspberry production. The second year production data for one grower showed that high tunnel raspberry production can be profitable. One organic grower lost 80% of the production to Brown Marmorated Sink Bugs, which is a new pest in Virginia. The third grower lost the early crop (June-September) due to mismanagement in mistakenly applying herbicide to his raspberry plants and damaging them. This grower is continuing with the late harvest October-November, and is expected to market his raspberry to local farmers markets. Another grower who independently planted and harvested high tunnel grown raspberry was able to sell his products at local farmers markets and a wholesale market with profit.

II. Project Approach

a. Production

Nationally, consumer demand for locally grown fresh fruits and vegetables is on the rise. This trend, in combination with higher gas prices adding to the transportation costs to supply fresh produce over long distances, has forced produce retailers, brokers and wholesalers to look for sources of regional supply. Clearly, this is an opportunity for local growers to capitalize on this trend and concentrate on growing crops with proven market demand. In recent years the health benefits associated with many of the berry crops, in particular raspberries, have caused a sharp increase in their market demand. According to a USDA publication, raspberries are ranked among the top ten food items with the highest level of Oxygen Radical Absorbance Capacity (ORAC), a unit used to measure the antioxidant capacity of foods. The growing demand for raspberries and the recognition of their health benefits in an increasingly health conscious society identify raspberries as a crop with considerable market potential.

A high tunnel structure is an unheated greenhouse covered with clear plastic and is primarily used for season extension both at the beginning and at the end of the production period. This structure is affordable for most farmers. A 48 Ft. long by 20 Ft. wide high tunnel costs less than \$4,000.

In October-November 2009, in collaboration with different County Extension Agents, three growers were selected to participate in growing high tunnel raspberry. The project provided technical and financial support in building a 48 Ft. long by 26 Ft. wide high tunnel on each of the three growers' farms. The high tunnels were built in March 2010. Sufficient raspberry plants of three different varieties; Heritage, Caroline, and Autumn Britten were purchased for planting. All three varieties were planted in each of the high tunnels to evaluate which variety would perform better in each location. Each grower built a 7 Ft. by 12 Ft. cooler, using a 'Cool Bot' system for keeping the fruit at a low temperature in order to maintain quality. The "Cool Bot" provides growers with a low

cost alternative to other cooling systems. This product can be purchased and connected to a standard home air conditioner unit (10,000 BTU). The “Cool Bot” uses the standard 110 outlet as does the standard air conditioner unit, and can provide sufficient cooling to maintain any produce item in the range of 36 F – 50 F. It is essential that all growers working with raspberries consider investing in an appropriate cooling system.

In the first year of this project, growers received educational training on the production, marketing, and food safety management of growing raspberries. Starting in July 2010 the raspberry plants produced small volumes of fruits which were picked for test marketing at the local markets. One grower was able to sell up to \$500.00 which was considerable for the first year of production. Technical assistance and regular visits were made to each farm. Growers followed the technical assistance instruction recommended for pesticide and fertilization programs.

To assure good primocane growth (primocane is the first year shoot that produces fruits in the same year), all raspberry plants were pruned from the soil top in February 2011. The new primocanes emerged, grew and they were tied to a trellis system that was established in each high tunnel in April 2011 to assure good quality fruit production. The second year harvest began in late May or in early June 2011, depending on whether the farm was located in Northern or in Southeast Virginia. The harvests continued until mid December 2011. The three farms selected for this project were located in Loudon, Halifax, and Nelson Counties, Virginia.

The farm located in Nelson County was the one with the most success and produced 495 half pint clamshells from June 6 to September 27, 2011. The harvest will continue until middle of December 2011, and it is estimated another 85 half pint clamshells will be harvested from this high tunnel (this report was prepared and submitted before the end of the second year’s production season). Therefore, the total number of half pint fresh raspberry fruit clamshells harvested from this farm would be 570. The income from the sales of the fresh fruits was \$1710.00 (average sales was \$3.00 per ½ pint clamshell). This grower had an additional income of \$300.00 from the sales of raspberry jam as a value added product. This grower used unmarketable fruit for processing it to jam (50 lbs). See Appendix A for tips on raspberry recipes.

The grower in Loudon County produced his high tunnel raspberry organically, and had severe problem with Brown Marmorated Stink Bugs (see figures 1 and 2), a new pest that has caused severe economic losses to Virginia’s agricultural sector. Unfortunately, this pest severely affected the production, and damaged up to 85% of the total raspberry fruit on the plants. The fruit quality was so poor that it was impossible to market the fruits. The suggested organic insecticide Pyganic was not very effective in controlling this pest. In 2012, several new organic based insecticides will be evaluated for possible control of this pest. As the severity of the pest reduced overtime, the grower in Loudon County was able to continue with the harvest. The harvest result for September-December is not reported as this report was due before the end of the production season (December).

The grower in Halifax County was not able to harvest until September, 2011 due to a different problem. In May 2011, this grower sprayed the raspberry plants with horticultural oil to control the spider mites. Spider mites are serious pests in raspberry production. The backpack sprayer used to spray the horticultural oil had been used

previously for spraying the herbicide Roundup. Growers usually have two different sprayers; one for herbicide and another one for fungicide and insecticide. Using a backpack sprayer that had been used for herbicide application to spray insecticide can severely damage raspberry plants. As a result of this mistake, the raspberry plants suffered severely. The plants untimely recovered, but the harvest was delayed until September, 2011. Therefore, the production information for this grower is also incomplete.

The raspberry production experience from the first two years of this project has been very valuable to all three growers and they plan to continue with their high tunnel raspberry production in 2012.

b. Marketing

The three growers who participated in this project received training in marketing and, as a part of this training, they prepared a marketing plan on how to sell their fresh fruit raspberries. A copy of this marketing plan is attached in Appendix B. with this report. The three growers used the information from the marketing plan and sold fresh raspberries at local farmers markets and fruit stands.

III. Goals and Outcomes Achieved

The proposed goal of this project was:

To provide an alternative crop and a unique production system that can increase the income of family farmers in Virginia through profitable production and marketing of high tunnel grown raspberries.

The proposed measurable outcomes of this project were:

1. A minimum of 25 growers will establish commercial high tunnel (96 Ft. long and 21 Ft. wide) production of raspberry as a new farm enterprise option by 2012.
2. A minimum of 20 of these growers will develop production, post-harvest and marketing skills and knowledge to produce high tunnel raspberry for direct marketing by 2012.
3. A minimum of five (5) of these growers will develop production, post-harvest and marketing skills and knowledge to expand their high tunnel production of raspberry for regional wholesale and produce auction markets.
4. By 2012, an association of Virginia High Tunnel Raspberry Growers will be formed to assist growers to collectively produce larger volumes and expand markets.

Impact of this project: As a result of this project, currently an additional 20 growers are producing and marketing high tunnel grown raspberries (Figure 6). Seven of these growers have constructed a cooling facility, using 'Cool Bot' to extend the shelf-life of their raspberries. One grower in Shenandoah Valley, VA is currently growing and successfully marketing his high tunnel grown raspberries to local farmers markets, restaurants, and to the Shenandoah Auction Market, a wholesale market (Figure 4). This grower shared with us his production and sales information in 2011. This grower produced 1700 half pint clamshells from his 26 Ft. wide by 120 Ft. long high tunnel from June 23 to September 20, 2011. He is estimating another 200 clamshells for the remaining of the season, bringing his total production to 1900 half pint clamshells. The

total income from the sales of fresh raspberry until mid-September were \$4267.80 of which \$2200.00 was sold directly to consumers and the rest was wholesaled to the Shenandoah Auction Market. Converting the above results of 1900 half pint clamshells raspberry produced in a 120 Ft. long by 26 Ft. wide high tunnel to an acre basis results to 9946 lb of fresh raspberry per acre. Clearly high tunnel production of raspberry is superior in terms of quality and yield. Consumers and buyers reception has been very positive to Virginia high tunnel grown raspberry (Figure 5).

The implementation of this project allowed many growers to learn about the ‘Cool Bot’ which provides growers with a low cost alternative to other cooling systems (Figure 3).

In March 2011, the preliminary steps were taken and a letter of initiation and a survey were sent to all current and potential berry growers in Virginia, to determine whether the majority of them support the idea of creating the Virginia Berry Growers Association (VBGA). The result from this survey showed that an overwhelming majority of the growers supported the creation of the VBGA. Consequently, several names were suggested by growers to serve as the Board members of this association (see the Appendix C for a copy of the letter and the survey). The first meeting of all growers and the board members is scheduled for March 2012.

IV. Beneficiaries

Groups and other operations that gained benefits from this high tunnel raspberry production and marketing project were:

- Virginia consumers shopping at their local farmers markets now are able to have access to locally grown raspberries earlier and later than normal growing season, May-November.
- Several high school agriculture programs in the state have learned about high tunnel raspberry production. Students assisted in building high tunnel, planting, harvesting and marketing the raspberry fruits.
- Members of the Virginia Association for Biological Farming.
- Virginia Farm Bureau
- Students from elementary, middle and high schools in Richmond and Petersburg areas
- Members of several local Farmers Market Associations
- Over 20 local chapters of Virginia Master Gardeners
- Shenandoah Valley Produce Auction market buyers and customers
- Virginia Cooperative Extension – Agriculture Extension Agents
- Growers throughout Virginia

V. Lessons Learned

- It is always possible for an invasive pest to negatively affect the outcome of a project as was the case with the Brown Marmorated Stink Bugs that caused severe reduction in yield and quality of the fresh raspberry fruits. How to quickly respond in finding a solution for an unexpected pest or disease is a challenge. In 2012, several organic pesticides will be evaluated as possible controls for Brown Marmorated Stink Bugs on raspberry.

- Promoting raspberry needs the active participation of the farmers in promoting raspberry among consumers that are not familiar with this crop.
- In the months of July and August, the high temperature reduces raspberry quality. A 30% shade cloth was added to all high tunnels roof tops to reduce the light intensity, and, therefore, the temperature. This was very effective in protecting the fruits during the summer months.
- The experience of Hurricane Irene in August 27, 2011 showed that high tunnel structures have the ability of withstanding a 70-75 miles per hour wind. This is very important in terms of long term investment.
- Newer high yielding and better quality raspberry varieties are now on the market. As raspberry plants are long term plants (5-10 years), to replace the older varieties with the new ones is challenging and expensive. Growers should be careful and consider newer varieties when expanding their production.
- Selling fresh raspberry to the market is profitable; however, marketing both fresh and adding value to the fruit in making jam and jelly can increase growers bottom-line.
- Careful planning and implementation is needed to make the production of high tunnel raspberry a success.



Figure 1. A Brown Marmorated Stink Bug feeding on raspberry fruit.



Figure 2. Damaged raspberry fruit by Stink Bug.



Figure 3. A Cool Bot connected to an air conditioner unit in a 7Ft. by 12 Ft. Cooler.



Figur4. One of the growers collaborating with this raspberry. Project.



Figure 5. Virginia high tunnel grown



Fig 6. High tunnel production of raspberry in Northern Virginia.

Appendix A

Raspberry Pancakes

*A classic buttermilk pancake jazzed up with sweet raspberries makes this a favorite for all ages.
Add Raspberries to your favorite pancake mix for an easy morning meal!*

Total Time: 15 minutes

Serves: 4

Cost per serving: \$1.50 or 0.27 cents for boxed version

Ingredients

- 1 egg
- 1 Cup buttermilk
- 2 Tbsp olive oil
- 1 Cup flour, all purpose
- 1 Tbsp sugar, granulated
- 1 tsp baking powder
- ½ tsp baking soda
- ½ tsp salt
- 1 Cup raspberries
- Cooking spray, olive oil

Directions

- Beat egg in a medium bowl and add remaining ingredients in order listed and beat until smooth.
- Heat frying pan and spray with cooking spray. Pour batter onto pan using ¼ cup of batter for each pancake.
- Flip pancakes once bubbles start to form on the top, or until golden brown. Remove from pan once golden brown on both sides.

Suggestions

- *Use boxed pancake mix to lower the cost of ingredients.*
- *Add additional flour or pancake mix to the batter if it is too watery.*
- *Use low fat buttermilk for a lower calorie option!*
- *Don't have buttermilk? Use 1 Cup milk + 1 Tbs vinegar instead!*
- *Serve with sugar free raspberry jam for an even sweeter morning treat!*
- *Try using half whole wheat flour for a higher fiber pancake that will help keep you full for your morning.*

Raspberry Vinaigrette

Use this sweet and flavorful dressing on top of your favorite salad!

Total Time: 5 minutes

Serves: 24

Cost per serving: \$0.11

Ingredients

- 1 1/3 cups fresh raspberries or thawed frozen unsweetened raspberries
- 1/3 cup chicken broth
- 2 tablespoons sugar
- 1 tablespoon cider vinegar
- 2 1/2 teaspoons olive oil
- 2 teaspoons mustard

Directions

- Add all ingredients to a blender. Blend for 30 seconds or until smooth.

Suggestions

- *Use as a dressing for a salad or for your favorite veggie dip.*
- *For a less sweet dressing add more cider vinegar.*
- *To lower the sodium use reduced sodium chicken broth.*

Raspberry Smoothie

Try this sweet treat as your breakfast, afternoon snack, or dessert.

Total Time: 5 minutes

Serves: 2

Cost per serving: 1.01

Ingredients

1/4 Cup raspberry yogurt

3/4 Cup milk

1/3 Cup frozen raspberries

Ice

Directions

In a blender add all ingredients. Blend until smooth.

Suggestions

- *Use sugar free, non-fat yogurt and skim milk for a healthier, guilt free treat!*
- *Try using soy milk or almond milk for a nutty alternative to this smoothie!*
- *Fresh raspberries can be used instead of frozen, add 1/2C ice to keep the drink frozen!*

Appendix B

Name of Farm

Marketing Plan

Version 0.0
Date

Presented by:
Owner Name

Farm Name-Farm Marketing Plan

Executive Summary

Use this space to describe your products to be marketed and your sales goals and strategic goals. Write 3-4 sentences here, this is usually done last after filling in the information below.

Objective

Use this space to describe your marketing goals for your products, sales goals and strategic goals. Write 3-4 sentences here

Target Market

In this section, you need to define your current customers and the potential customers you want to target.

Product Demographics

Describe who might buy your products

Target Contact Demographics

Describe where you think you can find your customers

Competition

Write down the names of your competition and why you consider them competition

Partners

Write down the names and contacts of partners you work with and how you work with them

Marketing Environment

Write down the legal, economic, social, cultural and technological issues that affect your marketing

Marketing Strategy

Write down information for each section below: product, price, place, and promotion

Product

What are the advantages of buying your products?

Why would a customer want to buy your products?

Price

For each product fill in the following:

Retail Price

Discounts Available

Bundling Options

Payment Terms

Financing available (Credit)

Places of Distribution

Write down where you will be selling products

Promotion

Write down how you will advertise and promote your products to customers

Project Plan

Necessary Resources for Marketing Products (Fill in the table below)

Resource (packaging, truck, brochure,etc)	Reason why you need Resource	Estimated Work Hours	Estimated Cost

Marketing Plan Sign-off

The undersigned accept this Marketing Plan as described herein.

Signature/Date		Signature/Date	
Signature:		Signature:	
Print first and last name:		Print first and last name:	
Title:	Date:	Title:	Date:

This plan is subject to change over time and provides a guideline only

Appendix C

Virginia Cooperative Extension

A partnership of Virginia Tech and Virginia State University

 **VirginiaTech**
College of Agriculture
and Life Sciences



School of Agriculture
Virginia State University

Loudoun County Extension Office

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Leesburg, VA 20175-3617
(703)-777-0373 Fax: (703)-771-1107
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February 24th, 2011
RE: Virginia Berry Growers Association

Dear Berry Grower:

Berry production in Virginia is a growing industry! Counties across the state continue to gain new acreage of berries to meet the increasing demand for healthy, local food. One of the key components to ensuring the success of a burgeoning industry is to work together to promote berries and support growers.

Virginia Cooperative Extension recognizes the need for a statewide organization of berry producers who would provide networking opportunities for growers to learn from each other and cooperatively market their products. Working together as an industry could aid in infrastructure development, increase the volume of berry production to target new markets, and assist growers in voicing the positive impacts of the berry industry to local and state agencies and representatives. Growers would also have the opportunity to provide direct input for the development of additional educational programs.

Your support and participation in establishing a Berry Growers Association in the Commonwealth is important for the organization to succeed. We would like to invite you to join us in launching the Virginia Berry Growers Association (VBGA) to support our producers in the State of Virginia in achieving their collective goals.

Attached is a simple survey to collect information from growers that would help us initiate steps toward establishing the VBGA and identifying the Board Members that are willing to serve in a leadership role.

Sincerely,



Leslie Blischak
Commercial Horticulturist
Loudoun County Cooperative Extension

Reza Rafie, Ph.D.
Horticulture Extension Specialist
Virginia State University

www.ext.vt.edu

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Survey:

Please answer the following questions.

Name _____
Address _____
Email _____
Tel. _____

Do you grow any of the berry crops?
_Yes _No

If yes, which one? Please mark all that apply.
_Raspberry _Blackberry _Blueberry _Strawberry

Do you support the creation of the Virginia Berry Grower Association?
_Yes _No

If yes, are you willing to become a member and/or serve on the Board of Directors Committee?
_Yes _No

If you do not have time to serve on the Board of Directors Committee, please nominate other interested grower(s).

1. _____
2. _____
3. _____

Project # 5: Biofumigation and Herbicides for Use in Pumpkin Production (Final)

I. Project Summary

The Blue Ridge Plateau of Southwest Virginia is becoming one of the, if not the, premier pumpkin production regions in the United States. Growers in this region, as well as other parts of Virginia, are producing some of the highest yields and highest quality pumpkins of any part of the country. Producers in the Blue Ridge Plateau region probably grow 2,500 to 3,000 acres of pumpkins, annually. Statewide pumpkin acreage is estimated at between 4,000 and 5,000 acres. This acreage easily accounts for at least \$15 million in annual agricultural sales.

With the acreage, yield and quality of pumpkins produced in Virginia, there is no reason that Virginia should not be the “Pumpkin Capitol of the World”. This title is not just about bragging rights. It is about the rest of the country looking at Virginia as the number one source of high quality pumpkins. Even though the pumpkin producers of Virginia are among the best in the nation, they still need updated recommendations on soil pathogen and weed control.

Two serious soil pathogens affect pumpkins grown in Virginia. The most prevalent is Fusarium. There are at least 11 different species of Fusarium that attack pumpkin fruit. The Fusarium organisms can cause a root and crown rot that kills the plant, but often just expresses itself on the mature fruit at or near harvest. Fusarium is often considered a weak pathogen and will not express itself if the fruit is healthy. However, if the fruit is exposed to stress conditions (too wet, too dry, too hot) Fusarium can attack the fruit, making them unmarketable. The fruit lesions are observed from somewhere in the Commonwealth every year. At present there are no effective chemical controls for Fusarium.

Phytophthora capsici is not as prevalent a pest, but can be very serious if it is present. Phytophthora can live in the soil for several years. In wet years, entire fields can be lost this organism. As a matter of fact there are locations in Southwest Virginia where growers would like to grow pumpkins, but due to disease pressure are unable to.

A private research institute in Italy found that various mustard species contain high levels of glucosinolates. When these glucosinolates come in contact with an enzyme called myrosinase in the presence of water, they form thiocyanates. The thiocyanate then gasses off in the soil acting as a fumigant, killing soil pathogens. Two seed companies in the U.S. sell a blend of these mustards know as Caliente 199. This blend of mustard actually produces allyl thiocyanate that is effective in controlling many soil pathogens especially Phytophthora species. The allyl thiocyanate has also been found to be less harsh on beneficial organisms. There is also some evidence that thiocyanates can provide some control of weed seed.

Trials will be established to determine the effectiveness of the Caliente 199 in controlling soil pathogens like Fusarium and Phytophthora, as well as weeds.

New herbicide options may become available in the not so distant future. Evaluation of these products for crop safety and weed control (efficacy) will enable specialists to make better recommendations to clientele. New experimental products like Reflex and Spartan will be evaluated.

II. Project Approach

In 2009, a preliminary trial with Caliente 199, Nemat and the combination of the two products was conducted. Results were very positive. The producer had the best pumpkin crop in almost 10 years.

A trial was planted in the late spring/early summer of 2010 in the Clinch River Valley in a field that has a history of severe Phytophthora pressure. However, due to the seeding procedures and dry weather, a very poor stand of the Caliente 199 and Nemat was obtained. There was not enough material produced to conduct biofumigation.

A pumpkin herbicide trial evaluating the efficacy and crop safety of Dual Magnum herbicide was conducted in Washington County. Dual Magnum, which was labeled for use in pumpkins in 2009 was very effective in control of redroot pigweed and grass species. It was also very safe to the crop.

Other observational pots were treated with various combinations of Dual Magnum, Reflex (which will be labeled in the next couple of years), Sandea and Command. All of the treatments provided superior weed control to the standard treatments of Strategy or Command and Curbit.

In 2011, more trials were conducted. Due to challenges in stand establishment and lack of overhead irrigation for most growers, the emphasis of the biofumigation trial was changed from seeding Caliente 199 and Nemat to using Biofence, a granulated product of Caliente 199. Biofence has been used in greenhouses as a fertilizer amendment with very positive results. In 2009, a greenhouse tomato operation used Biofence at 2,000 lb/A as compared to an untreated area and found that only 1 plant (<0.1%) died in the house treated with Biofence while more than 100 plants (>10%) in the untreated area died. The primary disease appeared to be Fusarium Crown and Root Rot.

Two large scale observational trials with Biofence were conducted with plasticulture strawberries and a replicated trial was conducted with tomatoes. The strawberry trials are showing good promise with obvious differences in growth between the 1,000 lb/A rate of biofence and the untreated area. Obviously, it will be spring of 2011 before the yield data are collected. Final assessment will be made then.

In the replicated tomato trial; 500 lb/A, 750 lb/A and 1,000 lb/A rates of Biofence were compared to an untreated check and standard fumigation with Pic Chlor 60 at 170 lb/A. The final harvest was just completed, but preliminary analysis of the trial shows that tomatoes treated with the standard fumigation treatment of Pic Chlor 60 out produced all other treatments. Little difference in growth or yield was observed among the Biofence treatments and the untreated check.

The Caliente 199, Nemat and Biofence appear to have merit, but optimizing the use of the products still needs to be refined. Also, at a little over \$1.00 per pound for the Biofence, use in crops like pumpkins may not be economically feasible.

Herbicide trials were repeated and expanded in 2010. Products like Dual Magnum appear to have a great fit in pumpkin production. With Reflex registration coming in the next year or two, continued work with that product showed excellent weed control with little injury. Three way combinations of Dual Magnum, Command 3ME and Reflex showed promising results for controlling the most troublesome weeds.

III. Goals and Outcomes Achieved

In 2009, a preliminary trial with Caliente 199, Nemat and the combination of the two products was conducted. Also, a greenhouse tomato Biofence trial was conducted.

In 2010, a trial with Caliente 199, Nemat and the combination of the two products was conducted in the Clinch River Valley. A pumpkin herbicide trial evaluating the efficacy and crop safety of Dual Magnum herbicide was conducted in Washington County. Other observational pots were treated with various combinations of Dual Magnum, Reflex, Sandea and Command.

In 2011, two observational Biofence trials in strawberries and a replicated Biofence tomato trial were conducted. Four replicated pumpkin herbicide trials were conducted.

The use of Biofence, Caliente 199 and Nemat has shown merit in plant disease control. However, the overall benefit and economic feasibility is still not exactly known. Further trials need to be conducted to determine the overall effectiveness and economic feasibilities in pumpkin production.

Dual Magnum and Reflex both offer good weed control options. Lack of weed control was found to reduce yield and fruit size. Fruit harvested from plants grown in weeds also had a lighter color and weaker stems. Control of weeds in pumpkins increased yields in number of fruit and weight of fruit by at least 5%. The quality difference between pumpkins grown with and without acceptable weed control would have amounted in another 5 to 10% increase in price paid for the higher quality pumpkin.

Information collected from growers in Southwest Virginia shows that pumpkin acreage has increased by at least 5% over the last 2 years. This is a combination of a few first time pumpkin growers, along with increased acreage by existing growers. Overall pumpkin production within 50 miles of the Southwest Virginia Farmers Market has increased by at least 30% in the past 2 years.

IV. Beneficiaries

Pumpkin producers, vegetable producers and other growers looking for alternative crops are beneficiaries of this project.

The use of biofumigation via green crops or Biofence in pumpkin production is uncertain. Further trials need to be conducted to determine the overall effectiveness and economic feasibilities in pumpkin production. Acceptable weed control will increase pumpkin production for the beneficiaries by at least 5%. The increased quality from acceptable pumpkin weed control would increase price paid to the grower by at least 5 to 10%.

V. Lessons Learned

The biggest obstacle was getting an adequate stand of Caliente 199 and Nemat to conduct the biofumigation work. Proper seed bed preparation is essential. However, timely rainfall or overhead irrigation is essential for acceptable germination of the small seed.

VI. Additional Information

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Project # 6: Increasing Awareness/Consumption of Local Strawberries (Final)

Project Objective

The Specialty Crop Grant, “Increasing Awareness/Consumption of Local Strawberries” was written to design and develop promotional tools for increasing nutritional knowledge of strawberries and to develop regional community awareness of locally grown strawberries by increasing on-farm sales and consumption of berries. **Strawberries are an expensive crop to grow with a narrow marketing window. Consumers often forget when local berries are in season and the economy has negatively impacted sales. Area advertising is more effective than small individual ads placed by a farm. For these reasons it is important to tap advertising methods to let consumers know when local berries are ready and to target the market share that has income to buy local fresh berries and those that want to make berry picking a family destination. Advertising efforts need to take place during the peak weeks to move ripe berries and increase sales when the crop is bountiful, thus increasing on farm sale profits.**

Project Approach, Goals and Outcomes

The 2010 strawberry season in SE Virginia was a short season due to unusual weather resulting in fewer berries. Due to the shortness of the season, the Specialty Crop Grant greatly helped growers sell more berries in a short time frame by tapping into new promotional resources. Without promotional money to enhance marketing tools to promote on-farm berry sales, growers would not have sold as many berries. This emphasizes the need for growers to incorporate good marketing practices into their farm operation.

Prior to the season a brochure entitled, “*Virginia Grown Strawberries*” was developed and printed for strawberry consumers which included nutritional information, picking hints, recommended storage, availability information, as well as a conversion chart including how many berries are needed for a pie, how many equals a cup, etc. This colorful brochure was available at the farm stands. The brochure was so popular that we reprinted and shipped again to the targeted farms as needed. Over 50,000 copies were taken by the farm customers on picking days during the season.

A “*Strawberry Time*” Booklet was purchased to use with children coming to the strawberry farms. The booklet is an overview of how strawberries are planted and grown, complete with easy recipes that children love, and some fun strawberry games. The use of this publication was to enhance the child’s strawberry farm picking experience. It also let the growers understand why marketing tools are important for all ages. A set amount of booklets were given to each farm in the target area and many growers asked for additional booklets as they were a great promotional item. This booklet was indeed well received by the farmers, the children, and their parents.

Rolls of “*I Love Local Strawberries*” stickers were also purchased with grant money and available to children visiting the strawberry farms. Some of the smaller stands “allowed” adults to have a sticker. As customers left the stands they wore the stickers. Anyone that saw them the rest of the day was reminded that local strawberries were in season. Often the person wearing the sticker was asked where they picked that day thus another great advertising venue.

Print media newspaper ads were used in urban areas to increase consumer/public awareness of the local strawberry season. Some ads listed the local berry farms while other ads referred

readers to visit the Virginia Grown website for a listing of local berry farms. One ad was a 3 x 3 peel off post-it ad that graced the front page of a major Friday paper on one of the peak picking weekends. Growers commented positively on the number of pickers that referenced the ads. **Business increased on the days immediately following ads by up to 30% at some of the farms. All farms reported increased business and most farms reported at least a 20% increase in business the weekend after the ads ran.** Radio ads were considered but due to the high cost it was more feasible to use print ads with the main large newspapers.

An interactive marketing avenue was tapped and a 24 hour internet post-it in full color ad ran on PilotOnline prior to the peak strawberry weekend. The average daily impressions on this site are over 75,000. Farms sales increased after the run of the Friday interactive ad to a new market of clients. This segment of clients represented the 30 to 40 age group that arrived at the farm with their children to experience strawberry picking. Hopefully the strawberry picking experience for the families that visited the farms was positive and they will look forward to revisiting next year. The internet post-it ad received an impressive amount of impressions on the run date, one of the highest ever received on the site partly due to the ads appealing colors.

In teaming up with the food editor of the largest newspaper, with a readership of over 375,000, in the Tidewater Virginia we offered a four week strawberry recipe contest. Each week a recipe was selected and featured in the paper with a photo of the winning recipe. Winners received a gallon of fresh picked berries from the farm of their choice. This marketing approach reached many new consumers and helped them remember local strawberries were ready and available at area farms. In another promo effort readers could also nominate their favor restaurant's strawberry dessert and winners were selected for a full page feature story. Repetition helps consumers remember and the media stories were great in reminding consumers that local strawberries were in season. Free print media space promoting local strawberries totaled over \$155,000.

Beneficiaries

Thirty five strawberry farms participated in the grant funding. Each farm was visited at least twice, once prior to the season and at least once during the season. The growers were very appreciative of promotional materials that were delivered to their farms for use during the strawberry season and the media blitz. Data was collected from each farm prior to the season to use in news releases, to ask what marketing tools were currently used on the farm, what marketing tools were needed, etc. A follow-up was also done with each farm and all marketing efforts received high marks. These 35 farms represented 85 acres of strawberries with a pick-your-own value of 1.9 million dollars. Most of the farms have only one or two acres of berries. Advertising is very expensive and they cannot afford to advertise as needed to get their crop sold. This grant aided in helping potential customers know about the strawberry farms and learn more about strawberries thus increasing on-farm income for the targeted Virginia strawberry farms.

Grant Funding Balance

The grant was funded at \$25,000. At the close of this grant the balance remains at \$93.85.

Additional Information

Thank you for the opportunity to increase strawberry sales, awareness, and consumption of local strawberries in the targeted project area!

Grant contact:

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Project # 7: Off Season and Ready to Prepare Product Blends (Final)

I. Project Summary

The purpose of this project was to broaden market opportunities for farmers in the Appalachian region through season extension and the testing and development of new off-season products and product mixes. The project involved organic growers who work with the *Appalachian Harvest* (AH) grower's network in the far southwest Virginia counties of Lee, Scott, Russell, Washington and neighboring counties.

Specialty crop (primarily vegetable) farmers often suffer from cash flow challenges due to the seasonal nature of what they grow. The AH business likewise suffers from cash flow challenges because of its focus on produce. The purpose of this project was to create an income stream for both farmers and AH so that both could become more sustainable.

Since it becomes harder to recruit farmers every year, it is critical that we find a way to make farming, an already difficult endeavor, more enticing, particularly to younger people.

Lengthening the growing season is one excellent way of improving farmer profitability and therefore would become a benefit that would draw more people to farming.

During this grant period ASD underwent significant transition at the executive level. Anthony Flaccavento, the Executive Director and founder of ASD departed at the end of 2009 after providing a one year notice. After a lengthy search, a successor to Anthony was identified. Denise Barrett served as ASD's Executive Director from late 2009 through early 2011, providing much needed guidance through a difficult transition period. When Denise left in February 2011, Kathlyn Terry (formerly Business Operations Manager for ASD) took over as the Interim Executive Director. She was made the permanent Executive Director in September 2011. In short, 2009 – 2011 (almost the exact period of this grant) were difficult years for ASD. However, we are a much stronger organization having gone through that transition period.

In early 2010 ASD was forced to close its Sustainable Woods social enterprise. The significant losses the enterprise sustained and the poor state of the economy made it impossible to continue to operate. This difficult decision caused ASD to look at its work and commitments more closely, engaging in more analysis and thoughtful consideration to ensure that any commitments made could be fulfilled without risk to grantors or ASD. Therefore ASD spent considerable time re-analyzing the commitments made in this grant. Our concern was that committing to multiple costly greenhouses required a much more thoughtful and considered approach before we could be convinced that the expense would prove to be a good use of funds and a good use of ASD labor. Our analysis led us to the following conclusions.

II. Project Approach

The project described above went through more radical changes than any ASD has proposed to date. Through the course of the two years of this grant, ASD modified its hoophouse production strategy, and eventually elected to pass the U-Blend project on to a partner capable of greater scale and therefore a product that will result in a reasonable profit margin – something ASD was unable to accomplish.

Project Activities

Hoop houses

- Ground Preparation: The ground upon which the hoop house was erected was prepared. Due to the slope and high water, ground preparation took longer than expected. Fortunately, there was dirt available at a different location on site and we were able to build up the site sufficiently.
- The hoop house was erected, prepared for planting and maintained using a combination of staff time and contract labor.
- Five rows of plastic and drip tape were laid in raised beds and green zucchini planted.
- There were very little disease and pest issues in the high tunnel so sprays were not required. We anticipate that the next crop planted will require more diligence and pest management given that it will be the second crop in the same space.
- Water was set on a timer and the plants watered every day for one hour.
- Picking was done by the laborers and staff at the packinghouse. We did not plan to plant at the time of year we did and had some challenges with balancing the labor needs of the packinghouse with the labor needs of the high tunnel. In the future we will schedule planting schedules accordingly.
- We are currently planning the next crop which is likely to be another planting of zucchini followed by a variety of lettuces.
- The high tunnel produced 620 pounds of marketable produce.

U-Blend

- ASD worked with Chef Jassen Campbell on a couple of recipe options, until his schedule prohibited him from seeing the project through. ASD used a variety of combinations of these trial recipes to find one that had both the right taste and the right combination of colors to make the presentation attractive in the marketplace.
- Farmers and staff were employed to sample the varieties of salsa that resulted and all approved!
- Packaging was researched – extensively – with the result that we were unable to locate appropriate packaging at a price point (given our volumes) that would be reasonable for any sort of long term, viable product.
- Ingles Markets agreed to support the project as long as ASD could enter the marketplace at a competitive price point allowing both buyer and ASD to generate profit from the product.
- Since Roma tomatoes were one of the key ingredients for this project, ASD followed Roma tomato pricing from June 2010 until July 2011. It was established that sourcing Roma tomatoes within our necessary price range would only be possible during our regular growing season. Off season pricing ranges encompassed tremendous and abrupt increases which would be difficult for ASD to adjust for on their price point level and in turn allow the buyer to adjust on price point level while maintaining the delivery of a fresh perishable product. This was a disappointing setback given our hopes that the U-Blend project could provide AH with off season income.
- Fresh herbs required for both taste and presentation of the salsa could be sourced from local farmers during both the regular growing season and off season. However, packaging and shipping fresh herbs at the same temperature as required by the Roma tomatoes resulted in poor quality/unattractive herbs after 4-5 days in the same packaging.
- ASD has solid markets on both its south and north distribution routes:
 - South: Ingles, Food City, Earth Fare, Whole Foods South

- North: Produce Source Partners, Whole Foods Mid Atlantic, Lancaster Foods and Giant/Martins
- ASD established with these partners that this product could be marketed if we could engage a partner who had better access to volume discount for packaging purchases, volume produce discounts, and year round labor.
- Initial discussions have begun with Horton Fruit Company, a repacker that has purchased produce from Appalachian Harvest for the last two seasons. Horton Fruit's trucks return to their base in Louisville, KY via a route that passes right by the ASD packinghouse 4-5 times per week which would allow logistical soundness for the partnership.

III. Goals and Outcomes Achieved

Goal 1: Construct at least two large hoophouses and utilize them to train farmers and to raise high value organic crops during the off season.

Progress and Activities on Goal 1:

When this grant proposal was submitted to VDACS, ASD planned to erect as many hoop houses as possible on the .91 acre tract located adjacent to the AH packinghouse in Duffield, VA. Our intent was to use the VDACS money to erect the first of these hoop houses on this site. The plan was to extend the AH season which would benefit farmers by improving cash flow for AH, thus contributing to the sustainability of the enterprise. It would also be used to train AH and non-AH farmers in the region. A third anticipated benefit was that AH could extend employment for 1 or 2 of its best packinghouse workers.

In an effort to ensure that this plan was a sound one, ASD staff took a step back to reanalyze the assumptions that were used to plan this project initially. Our new approach was to use funds provided to ASD by VDACS to prove these financial assumptions and projections before proceeding with the rest of the project which would include an additional 6 to 8 hoop houses on the site. ASD ordered one large hoop house kit that was erected in late spring of 2011. We have had the opportunity to plant only one crop so far but have plans to plant fall and spring crops now that we have our processes refined. This spring/summer green zucchini was planted in the high tunnel and maintained and harvested by packinghouse labor. The plants were transplanted far too late in the season which resulted in a relatively low yield. (see Lessons Learned for some of the challenges)

Goal 2: Develop and test market a new organic product line, Appalachian Harvest U-Blend, which creates healthy, ready-to-prepare assortments accompanied by a chef-tested recipe and nutritional information.

Progress and Activities on Goal 1:

We have learned a lot of lessons about this particular aspect of the project – outlined below - but one lesson that we learned and that we believe will be of benefit to a larger audience than we had originally hoped, is Horton Fruit considering adopting this project for its own use. As mentioned previously, Horton Fruit is a repacker and therefore they already have processes and efficiencies in place to ensure that this project has a greater chance of success. They also have greater volumes that would allow the proposed product(s) to be priced at a viable level.

Part of ASD's new way of operating is to facilitate others to do work that we are not equipped (or poorly equipped) to do. It is our goal to establish value chains that are appropriate to the

partner(s) involved. It is not our goal to own and operate the entire value chain. In fact, we believe that this is not the most efficient way to operate if there are any other alternatives. We believe that if we can facilitate Horton Fruit's entry into this sector by providing farmers with a place to sell their products and facilitating the sales of the resulting product through our marketing channels, we are working in the value chain in the areas where we are most efficient.

Outcome 1: New markets are created within at least two supermarket chains for healthy, ready to prepare organic foods that both increase farmers' revenues and improve consumer's healthy eating habits.

- Appalachian Harvest (AH) staff worked with buyers, growers and a local chef to create the first product that would be labeled "Appalachian Harvest U-Blend". The idea was to market specialty crops from local farmers in a large clamshell that included an attractive colorful label complete with suggested recipes. The contents of the clamshell would be blended together by the consumer (along with other ingredients of the consumer's choosing) to create a healthy, delicious product. AH identified produce items that we felt could be sourced for much of the year. We then worked with a local chef to develop a recipe based on those items. When a decision had been made on the correct combination of produce items to include, an appropriately sized container (a plastic clamshell of an interesting shape) was identified. AH staff focused primarily on using a container that would make the product visually appealing and attractive to our buyers and potential customers.
- AH staff then took the product to buyers at Ingles Markets and Whole Foods. Both agreed that the product concept had merit and liked the appearance of the packaging. At that point we began to talk about price points. This was difficult to do before reaching this point, as the buyers required a sample in order to proceed.
- AH staff then looked for a source for the clamshell that had been selected. Unfortunately, that clamshell could no longer be sourced.
- AH went back to the drawing board to find a different clamshell that would fit our needs and that could be sourced in small quantities. We were provided with a price point of \$1.50/unit. We were concerned about the price point but were unable to find a more cost effective solution that was still large enough for this product.
- The recipe we had created had to be revised to include a reduced amount of produce, in keeping with the now smaller clamshell.
- The new recipe and clamshell were re-presented to Ingles and Whole Foods. Both buyers still liked the product and we began to talk price and volumes. Unfortunately, the retail price for the product was far too low to justify the cost. Our assessment was that the cost of the clamshell itself was the first hurdle to overcome. The second was to identify an affordable way to preserve the fresh herbs to be included in the clamshell – which we eventually determined would require an additional packaging material. And finally, the cost of off-season products to be included in the recipe proved to be far higher than anticipated. Farmers who had tomatoes, onions and peppers in the off season could command a premium for those products and selling them to AH for inclusion in this product at a much reduced rate was not a reasonable course of action for them to take.
- When we realized that the primary hurdle – that of the costly packaging material – was due to our inability to purchase the extremely high volumes necessary to reduce the per unit cost, we went in search of an alternative strategy. In 2011 AH's relationship with a buyer, Horton Fruit Company, grew exponentially. We developed an excellent relationship with this buyer, to the point that we pitched the U-Blend idea to them and they were very interested. They like the idea of using our farmer's product (when financially viable), using their packaging

material sources and their labor to package the materials, and then selling it through AH to our buyers.

- The plan for working with Horton Fruit that is outlined above is indicative of ASD's new way of operating since the executive director transition and the closure of ASD's Sustainable Woods enterprise. Previously, ASD would embark upon a project and assume the bulk of the responsibility for making it work, doing its best to overcome hurdles and pushing forward. This dogged commitment resulted in some amazing work – the creation of Appalachian Harvest and Sustainable Woods to name just two. However, in this new economy and environment, ASD is seeking new ways to operate. Ways that involve multiple partners, distributed risk, and (probably most importantly) the engagement of the private sector in the work of supporting our farmers in a variety of ways. While on the surface, the results of this project are disappointing since we have not managed to get a product into our retailers' stores, we feel that there is an incredible opportunity to make this idea work on a much larger scale with Horton Fruit, Ingles and Whole Foods as partners.
- The two year time span for this project would likely have been sufficient had ASD not been distracted by multiple executive director transitions during this exact time period. However, we will continue to work to make this project a success, focusing on Horton Fruit. We anticipate a meeting with buyers to discuss demand for organic and conventional produce and the U-Blend product in late January, 2012.

Lesson Learned:

We spent too much time at the front end of this aspect of the project focusing on the visual appeal of the product and not enough time focusing on the cost of the end product.

Outcome 2: Overall income increases and early season cash flow improves for 20-25 farmers.

- Several AH farmers increased their income by using high tunnels to extend their season.
- AH struggles to make ends meet in the 5 months when no income comes in from local produce. And farmers struggle to make ends meet with the ups and downs of the season. What we have learned about the hoop houses our farmers have built and the one that AH erected on the packinghouse site is that farmers can obtain a much higher price point for their off season products than they can get through the wholesale market.
- ASD's focus over the last two years has been to build wholesale markets and improve the efficiency of its distribution system. The objectives have been to reduce AH's dependency on grant funding and reduce the costs to farmers, increasing their profitability. We have not focused on developing a direct market distribution system.
- As we have analyzed our work in the wholesale market arena, we have learned that it is critical to guide farmers to those markets that are the most profitable for them. In short, the wholesale market is not the right market for everyone. We believe that the best plan for many farmers is to combine wholesale and direct markets, selling products to the markets that make the most sense for the volume and price points available. In the case of off season produce, high tunnel production can produce significant income for farmers. In our region the supply of off season produce does not come close to meeting demand. Therefore farmers can command a very high price point for their products from direct markets such as restaurants and direct sales to customers.
- To provide an idea of the difference between the price a grower can receive for products, please look at the following brief chart:

	Retail	Wholesale
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24-Count Lettuce	\$3.00 – 4.50/head or \$30-38/box	\$22 – 26/box
Broccoli	\$25+/box	\$14.50/box

- Our work in other geographic regions makes it clear that it is difficult to change this paradigm until there is more supply. Supply will need to outstrip the local demand for off season products. ASD’s immediate region has a considerable way to go before this paradigm shifts.
- ASD assisted 9 farmers with obtaining cost shares through the NRCS Organic Initiative to purchase and erect high tunnels. All 9 farmers are still in production, growing crops such as collards, lettuce, peas, turnips, beans, broccoli, kale, and a small number of tomatoes. None of these farmers use supplemental heat and all sell to direct markets. We believe that this was the most appropriate use for high tunnel production at this point. These farmers are required to report on production figures for the high tunnels. Those figures can be made available to VDACS if desired but the report will not be available until after March.

Lesson Learned: The price points obtained from off season production in our region are best obtained from direct, not wholesale, markets.

Outcome 3: Financial feasibility of off season crop production is assessed for four to six vegetable crops, and the assessment enables farmers to better plan their own farm enterprise diversification.

- This grant proposal called for erecting two “greenhouses”. (Alternately this proposal refers to the structures as greenhouses and high tunnels.) ASD undertook an analysis to determine the best approach given the budget and projected goals for the project. Staff wanted to ensure that the project would make financial sense for all involved. Following are the findings of the analysis:
 - Greenhouses and high tunnels both exceeded the cost included in the budget for this proposal. High tunnels have grown to be in excess of \$5K. (The grant preparer had estimated \$4500/ high tunnel for this particular item.) Thus, in order to make the budget work within the guidelines of the grant, a higher portion of funds were used towards personal services and internal budgets were adjusted to account for this change.
 - The cost of propane to heat the greenhouses would be exorbitant. ASD staff worked with three AH greenhouse producers to assess alternatives to propane including wood heat. Our analysis concluded that wood heat would be the most cost effective means of heating a greenhouse or high tunnel if a farmer had the labor on site to stoke the boilers and access to cheap or free wood. Unfortunately, given AH’s position in a business park and limited labor in the off season, wood-fired boilers were not an option. (Additionally, they cost in excess of \$7500.)
 - We revisited the use of propane, by far the most attractive option from a heat and labor management standpoint. Our target was to keep the high tunnel/greenhouse between 55 and 60 degrees. Following were the figures we obtained from our farmers for heating costs from September to December for 2009 and 2011:

2009	2011
\$6750	\$11,025

- Given these figures, a decision was made to grow cold season produce only through December and let the ground rest between January and March.
- ASD had spent the first year of the grant period researching the best option and deciding how to proceed. A decision was made in late 2010 to proceed with an unheated high tunnel. Because we had decided that it would not be cost effective (or successful) to grow produce in the unheated high tunnel from January through March, we used the time to prepare the ground and collect supplies, including ordering an appropriate high tunnel. Due to excessive rain in early 2011, the high tunnel was not erected until later in 2011 which was later than we had anticipated.
- Therefore, once the high tunnel was erected AH chose a “quick” 45 day crop, green zucchini that could fit into any existing market or distribution path. Due to the rising Food Safety concerns with leafy greens such as lettuces, spinaches, etc, AH opted to have GAP certification for the packinghouse and site USDA GAP trained and on the path to certification before actually producing leafy green crops. Using the data and experiences of farmers operating greenhouses and/or high tunnels for off season production of tomatoes, AH learned that production volumes were substantially lower, and disease and loss numbers were high mostly due to the change in the red/blue sun spectrum, as the sun moves away from us in the later months of the year.
- The high tunnel produced low volumes of zucchini. We attribute that to an acute nutrient deficiency which required supplemental soil and amendments in order to prepare the site for high tunnel installation. Also, poor pollination due to the fact that our donated bee hive, quickly suffered from what is assumed as colony collapse. At that time, AH decided to use composted materials from the packinghouse facility, and organic inputs such as Nature Safe 8-5-5 and 13-0-0 to feed the soil for several months prior to re-entry with another plant population of any variety. AH, has sourced two additional bee hives for the site from one of its local farmers and both the bee keeper and AH are hopeful that pollination will prove to be more successful.

Outcome 4: Consumer awareness of and support for local, organic foods increase as both the diversity of products and length of season increases. This will be measured through consumer surveys.

Consumer awareness of and support for local foods has increased during this grant period. This is due in part to ASD’s work with farmers markets and the Appalachian Farm to Family Coop which provides consumers access to local, pasture-finished meats and value added products. AH staff has also worked with retailers to promote local foods in supermarkets. Whole Foods in particular is extremely committed to using farmer profiles in their produce departments to promote local foods and the farmers themselves. In a meeting with Whole Foods in December, the produce manager shared that this type of promotion doubles the sales for local produce. Most retailers have strict in-store policies regarding direct contact with consumers. Therefore, AH utilized buyer feedback to represent retail consumer feedback. All feedback was positive and several new crops desired by consumers were discovered through this process.

IV. Beneficiaries

The expected beneficiaries of this project were Appalachian Harvest farmers and the Appalachian Harvest business. Though the benefits to both AH farmers and the AH business have yet to be realized, we believe that this project has laid the groundwork for both parts of the project to have a great impacts on farmers.

The expected beneficiaries of this project were Appalachian Harvest farmers and the Appalachian Harvest business. Though the benefits to both AH farmers and the AH business have yet to be realized, we believe that this project has laid the groundwork for both parts of the project to have a great impacts on farmers. However we can say that farmers have great potential to receive better pricing for marketable seconds with the U-Blend project. The high tunnel project has identified both direct and indirect beneficiaries. It has facilitated farmers to provide more variety, earlier, to their farmers market consumers and direct market buyers. With limited direct markets in our region the high tunnel project has created greater product diversity and availability for consumers and local buyers. Farmers that did not have high tunnels and those who did, have avoided gluts in these small markets because high tunnels created season extension, and early crop diversification.

Nine farmers received cost shares through ASD's work (through a collaboration with a DCR board member) and 32 farmers received benefits from the high tunnel erected at the Appalachian Harvest facility, as all revenues generated from high tunnel were rolled back into the business to support the AH farmers.

V. Lessons Learned

High Tunnel

- One difficult lesson that ASD learned is that farming in a high tunnel is no easy task if you lack the appropriate equipment. We had assumed that it would not be difficult to borrow a small walk-behind tractor for use in plowing and laying plastic in the high tunnel, allowing for more rows and making establishing and maintaining the high tunnels far easier. Unfortunately, this did not prove to be the case.
- The high tunnel was challenging to erect due to the slope of the land. It required reworking to even up the corners of the high tunnel.
- The delays in planting resulted in plants being transplanted in a very hot spring. In the original plan the plants would have actually been completing their growing cycle when we were just able to plant.
- ASD borrowed a beehive from one of the AH growers to aid in pollination. Unfortunately, not long after being set, the bees died.

U-Blend

This project had staff very excited initially. We felt it was an excellent way to create a new product and potentially produce better cash flow (and high margins) for growers and AH alike. Though the reality was somewhat disappointing, we are still hopeful that a combination of our partners and ASD's vision can make it happen.

- ASD often encounters challenges with scale when doing our work. One of the more significant examples of this was in our attempts to procure containers for this project at a reasonable cost. AH has been fortunate to work with supportive partners over the last several years. One such partner brokered an arrangement that allowed us to procure 1 pint clamshells at a fraction of the rate we would have paid due to our low volume usage. Unfortunately, we were unable to find such a deal for these larger, non-standard packages.
- Ingles was (and is) quite interested in the product. They have been an incredibly supportive partner and we believe that they will eventually commit to purchasing this

product. However, the individual buyer who had committed to make this purchase left the company. We still have very strong ties at very high levels but the timing is still being assessed.

- Sourcing ingredients that are organic and local and also small enough to fit reasonably in a clamshell or other attractive package proved to be very challenging. For instance, we tried to avoid the use of onions in the salsa recipe because we have been unable to locate a local organic source.
- Purchasing low volumes of organic (or even conventional) produce was also problematic. This is likely to have been something that ASD could have surmounted over the long term, but in the interim it was very difficult to source the ingredients we do not produce. Contrary to our original assumption, it has proven to be far easier to procure 200 cases of a product than merely 10.
- AH does not currently process any products so it is necessary to avoid cutting anything that is put into clamshell or other package. This makes both the recipe development and the packaging more complex.

ASD can provide VDACS and the USDA with findings from this project as it continues. We expect to be able to provide figures on both the AH high tunnel cold season crop and individual farmer product sales in March, 2012. If possible, ASD would like to share the information that is gained from those two reports with VDACS. We will also be happy to share the quantitative results of our work with Horton Fruit on the U-Blend project.

VI. Additional Information

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Project # 8: VA Wine Quality Assurance program (Final)

Project Summary:

The Virginia Wineries Association began exploring how it could increase Virginia wine quality and consumer perception, while differentiating Virginia wines from competing wines. The goal of program was to deliver better wines to the consumer on a more regular basis with a proven distinction or designation. An additional intent was helping the promotion of Virginia wines, wineries and vineyards while increasing agritourism.

Project Approach:

The Virginia Wineries Association created a steering committee composed of the Technical Committee and interested wineries. First, they sorted out the parameters of the program and then prepared for implementation. They researched other programs; surveyed wineries and vineyards; and consulted labs, wine makers, public relations firms and other professionals. VWA went to industry partners garnering endorsements and support. Through this process the program was altered and expanded. A great working document was created through the process which, when combined with the data collection being done, can lead to potential educational opportunities in the future.

The labs to run the tests were key components. We found a single contractor to perform both the sensory and lab analysis. We were able to get included two day shipping and keep the cost at a competitive level.

We protected the program name through trademarking and securing URL's naming the program the "Commonwealth Quality Alliance®" with an abbreviation of "CQA".

Once market research was completed for the name and logo, a logo, talking points, brochure, website and eventually bottle stickers were created. CQA has received multiple press hits and the wine bloggers, a niche group important to the industry, have also written about the program. The VWA regularly markets to the membership about participating in the program through mailings, emails and online newsletters. Additionally, staff attended the Wineries Unlimited conference with materials in hand to market and promote the program.

The program was launched in November 2011, suspended due to the issues with contractors in late December, and relaunched in May 2012. During that time, 19 wineries became members of the program. In 6 months, 55 wines have been entered and 27 approved, more wines have passed the program but did not complete the approval process by not paying their 5 cents per bottle fee. Through an arrangement with the VWA and the Virginia Wine Board, CQA approved wines were allowed to enter the Governor's Cup® competition for no fee, an \$80 savings per wine. This has been approved to occur again for 2013 competition.

Goals:

- a. *Increase Virginia Wines in the market place within Virginia by 25%. The market share when we started was 5.2%. Awareness of Virginia wines quality has increased as has been outlined by the Virginia Wine Marketing Office, however market share has fallen. Current market share is 4.6%. Part of this is attributed to the closing and sale of some large wineries. The program could only contribute slightly to these results due to the delays. We were able to get the endorsement of the Virginia Wine Distribution Company and they placed the CQA as a*

sort element for their distribution site. We did consult a Public Relations firm which helped in developing our logo, brochure talking points, website and some press pieces.

- b. *Increase number of website hits to www.virginiawines.org by 10% and increase number of website hits to participating wineries by 20%. Hits to the www.Virginiawines.org site increased from 408,839 hits from August 2008 through August 2009 (when the grant was entered) to 1550 hits a day or 565,750 year or over a 38% increase. Since the launch began late this significant amount of increase cannot be attributed solely to this program. Additionally, the CQA website links to the individual wineries increasing their traffic and the logo itself includes the web address. Logoed stickers were purchased and provided for all approved wines, furthering the awareness.*
- c. *Increase the Virginia grown grapes content in wines produced in Virginia by 5% by volume. With the program being launched in late 2011 this should begin to be seen in the 2012 vintage, but more likely the 2013 vintage.*
- d. *Increase the average sales price per bottle of Virginia wine 5%. Since this program was launched in late 2011 with already bottled wine then suspended we have not measured increases yet as new Vintages are not out yet. We do expect a measured increase.*
- e. *Gain large scale national coverage through major media sources involved in the wine industry. We have received media coverage and interest. We expect this will gain momentum now with the re-launch of the program and entry of wines.*

Beneficiaries:

The wineries have benefitted from this additional marketing outlet. The increased market share, awareness and quality perception are also benefits partially attributed to the program, which ultimately create more agritourism and sell more Virginia wines. They also have an accessible testing program with parameters developed for young wineries. Additionally, this gives an opportunity for professionals to provide a sensory analysis of the wine and provide results again for an overall competitive price from a trusted source.

Virginia vineyards will begin to benefit from this program as attributed by the Virginia Vineyards Association's endorsement given the 100% Virginia grown grape requirement. We believe demand will increase for Virginia grown grapes as a result.

Consumers will also benefit when faced with the wall of wine at stores being able to distinguish a quality Virginia wine seeing the designated seal and discovering they are made from 100% Virginia grown grapes.

Lessons Learned:

Delays happen. This project was delayed when coordinating industry endorsements that we believed are important to the program's success took longer than expected. We found many of our original objectives were too ambitious, especially without staff, therefore rollout of the program was delayed. Staff was retained and brought it together.

The contractors not abiding by the contracts caused the program to be suspended. Thankfully, we had contracts. However, ultimately we are pleased with the new contractor although they are not Virginia based.

Cost was another deterrent for participation. Value had to be shown through major marketing results yet mass marketing could not begin without participation and additional funding. For the program to succeed long term, more participation is needed; therefore marketing to wineries for participation and consumers to show value to the wineries and create the desired goal. These will be key as we enter the next stage of the program.

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Project # 9: Grafting Tomatoes to Control Soil-Borne Diseases in Open Field Production (Final)

Project Summary:

Bacterial wilt caused by *Ralstonia solanacearum* is a devastating disease of tomato which can cause yield losses of over 50% in commercial plantings. This disease is endemic to the south east U.S. and can remain in the soil for many years. There are currently no commercially available tomato varieties with resistance to bacterial wilt that possess the agronomic characteristics required by growers. The few varieties that are available have small fruit that become overly soft near maturation. For many years growers have relied on methyl bromide to provide some management of bacterial wilt. Even high fumigation rates cannot provide complete control of this disease. As the phase out of methyl bromide has progressed, less has been available and growers have reduced use rates. This appears to have aggravated the problem of bacterial wilt in Virginia tomatoes as the incidence has increased in recent years. The best management tool growers have for bacterial wilt is crop rotation where land is taken out of production and a non-susceptible crop is planted. Unfortunately many tomato growers have significant amounts of capital invested in land rent and irrigation equipment on these farms. When they are not planted in a high value crop like tomatoes, growers cannot recoup their investment.

The purpose of this project was to evaluate grafting as a strategy that may be employed to manage bacterial wilt in Virginia tomatoes. This involved grafting commercially acceptable tomato scions onto bacterial wilt resistant rootstocks.

Project Approach:

Field experiments were conducted during 2010 and 2011 to test the efficacy of grafting to control bacterial wilt in tomatoes on the eastern shore of Virginia. Six rootstocks (RST 106, BHN 998, BHN 1053, BHN 1054, Cheong Gang, and Jjak Kkung) were selected for the experiment in 2010 and two were selected (Cheong Gang and Shin Cheong Gang) for 2011. Only two rootstocks were used in 2011 because good resistance had been defined in Cheong Gang but Shin Cheong Gang was a new rootstock. In 2010, all grafted plants utilized the commercial variety BHN 602 as a scion. An untreated control (ungrafted BHN 602) and a self-grafted control (BHN 602 grafted onto BHN 602) was included in the experiment for comparison. In 2011 FL 47 was used as a scion to determine the efficacy with another scion variety. Un-grafted FL 47 controls were used in the 2011 trial; self grafted controls were eliminated in 2011. The performance goals were exceeded both experiments due to extremely high bacterial wilt incidence at the experimental site and excellent bacterial wilt resistance provided by the grafted tomatoes.

In 2010, disease incidence and total marketable tomato yield were significantly different between grafted treatments. Disease incidence was lowest in the plants grafted onto BHN 1054 (5% mortality), Cheong Gang (6.5% mortality), BHN 998 (10.5% mortality), and RST 106 (13% mortality). These rootstocks significantly lowered bacterial wilt incidence compared to the self-grafted control (97% mortality), the un-grafted control (85.5% mortality), and plants grafted on Jjak Kkung (56% mortality), and BHN 1053 (43.5% mortality). All grafted plants (5 to 43.5 % mortality), except Jjak Kkung (56% mortality), lowered bacterial wilt incidence compared to the self-grafted control (97% mortality). All grafted tomatoes had higher total marketable fruit yield (50,126 to 80,450 kg/ha) compared to the ungrafted (16,370 kg/ha) and self-grafted controls (0 kg/ha). Plants grafted onto RST 106 (80,450 kg/ha), BHN 1054 (79,951 kg/ha), and Cheong

Gang (78,926 kg/ha) had higher total marketable tomato yields than those grafted on Jjak Kkung (50,126 kg/ha).

Results from 2011, followed a similar trend to 2010. Both grafted treatments had significantly less plant mortality compared to the un-grafted treatment. Overall, the un-grafted treatment exhibited 63% mortality while plants grafted to Cheong Gang and Shin Cheong Gang only exhibited 17% and 4% mortality, respectively. Plants grafted to either Cheong Gang or Shin Cheong Gang also produced significantly more marketable tomatoes than un-grafted plants.

Goals and Outcomes Achieved:

The goals set for this project are primarily long term goals but strides have been made toward these goals. The primary goal is to increase average tomato yield and decrease the impact bacterial wilt on local tomato producers. In 2008, there were no grafted tomatoes grown on the Eastern Shore of Virginia and likely none grown in the state. In 2009, research trials began in conjunction with two major seed companies and one Eastern Shore tomato producer. In 2010, multiple trials were placed at several locations in Virginia and in 2011 nearly two acres of grafted tomatoes were produced on the Eastern Shore with more projected for 2012. Seed producers are now working with large scale commercial propagators in order to develop a supply chain for grafted tomato seedlings. The economics of using grafted tomatoes appear to be favorable for tomato producers and should increase their overall profit.

The utility of this technology has been demonstrated to producers across the state and several have stated that they will adopt the use of grafted plants when they become available. In many cases growers affected by bacterial wilt lose 30 to 40% of their crop prior to harvest. The use of grafted plants can eliminate 90% or more of that loss. If adopted, grafted plants will easily surpass the goal of 10% yield increase over five years. The limitation in technology adoption now becomes plant suppliers.

Beneficiaries:

The beneficiaries of this project are tomato producers in the state of Virginia and around the region. Virginia has approximately 5,500 acres of tomatoes in the state with probably 75-100 producers of varying scales. Nearly all of these growers face problems with soil borne pests and could benefit from the use of grafting. The initial implementation is small, less than 10 producers, but is expected to increase with the availability of commercially grafted seedlings. The primary cooperator on this project was East Coast Brokers and Packers, the largest tomato producer in the state. Most of the trial work was performed on their farm and they have provided tremendous support in this endeavor. Knowledge gained from this project has been disseminated throughout the state through extension and outreach activities. Though most of the on farm experimentation has been accomplished with a large tomato producer, at its current stage grafting is more applicable to small producers who have the ability to produce their own grafted transplants. Without soil fumigation growers face substantial losses from bacterial wilt and other soil-borne diseases which can result in 30% or greater yield loss. The use of grafting can mitigate these losses and increase tomato yield and overall economic output.

Lessons Learned:

This project illustrated that grafting can be of tremendous benefit for producers of tomatoes in open field production. This technology has primarily been thought of as a technique for greenhouse production but it produced excellent results in our experiments. Preliminary economic analysis indicates that even with increased plant costs, the use of grafted plants can

contribute positively to farm income. This technology also gives growers a suitable alternative to soil fumigation for soil-borne disease management.

Additional Information:

The following images are of experimental trials illustrating the management of bacterial wilt provided by grafted tomato plants.



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Project # 10: Profitable Greenhouse Production of Local Produce (FINAL)

I. Project Summary

- Provide a background for the initial purpose of the project, which includes the specific issue, problem, or need that was addressed by this project.
- Establish the motivation for this project by presenting the importance and timeliness of the project.
- If the project built on a previously funded project with the SCBGP or SCBGP-FB describe how this project complimented and enhanced previously completed work.

Consumer interest in buying locally grown foods and produce is providing new opportunities for small-farmers located near the larger population centers in Virginia. In addition, an increased number of grocery stores are interested in purchasing locally grown produce. Farmers and other entrepreneurs with small but suitable acreages are contacting VDACS and VCE regarding support for business development and production and marketing details.

Numerous organizations throughout the United States, including Virginia, are encouraging communities to buy locally grown produce to strengthen local economies, as well as promoting the health benefits of eating produce grown locally. This movement is providing opportunities for new small farm and diversified farm operations to enhance their profitability through production of more or new fresh market produce. Producing local crops out of season will increase marketability and if properly managed increased profitability of the operation.

The purpose of the proposed project was to increase the production, marketing and profitability of locally grown greenhouse vegetable and berry crops in Virginia. Our approach was to develop educational materials to assist new and existing producers to establish or expand greenhouse vegetable or berry operations that are economically sound business ventures.

II. Project Approach

- Briefly summarize activities performed and tasks performed during the grant period. Whenever possible, describe the work accomplished in both quantitative and qualitative terms. Include the significant results, accomplishments, conclusions and recommendations. Include favorable or unusual developments.
- Present the significant contributions and role of project partners in the project.

Our approach was to develop educational materials to assist new and existing producers to establish or expand greenhouse vegetable or berry operations that are economically sound business ventures. The materials were developed and compiled into an extensive notebook by the cooperators, along with VCE Specialists Chris Mullins and Theresa Nartea of Virginia State University.

This team of Specialists conducted five workshops around the Commonwealth with approximately 162 participants. The audience included 30 VCE agents along with 132 other citizens, primarily ones considering greenhouse production as a new enterprise along with about 20 established producers. The program evaluations were completed by 117 participants (72% of the total participants). Ninety-one percent of these respondents rated the handout materials as “excellent.” Therefore, we met our primary goal. Additional evaluation comments are described in the next section.

In addition to the workshop notebook, VCE agents received access to the actual Powerpoint presentations to permit them to conduct small group or one-on-one trainings to assist future producers.

All of these resources were posted on a new website developed by Sarah Gugercin of the Virginia Tech Horticulture Department. That site is <http://www.hort.vt.edu/ghvegetables/>. Although it is outside the plans and scope of the grant funding, Sarah is continuing to work with the team of specialists to develop an ebook summary of the workshop.

III. Goals and Outcomes Achieved

- Supply the activities that were completed in order to achieve the performance goals and measurable outcomes for the project.
- If outcome measures were long term, summarize the progress that has been made towards achievement.
- Provide a comparison of actual accomplishments with the goals established for the reporting period.
- Clearly convey completion of achieving outcomes by illustrating baseline data that has been gathered to date and showing the progress toward achieving set targets.

Our approach was to develop educational materials to assist new, or prospective, and existing producers to establish or expand greenhouse vegetable or berry operations that are economically sound business ventures. The materials were developed and compiled into an extensive notebook by the cooperators, along with VCE Specialists Chris Mullins and Theresa Nartea of Virginia State University. A copy of this notebook and resource cds will be mailed to Melissa Ball, VDACS. In addition to production information, the materials included topics on profitability: a focus on marketing information and resources as well as how to develop and implement a marketing plan; and resources on business planning and assessing costs, income and profitability.

This team of Specialists conducted five workshops around the Commonwealth with approximately 162 participants. Locations for the workshops included Virginia Beach, Manassas, Harrisonburg, Blackstone, and Wytheville. At each location, the local VCE agent(s) facilitated the program by locating facilities, caterers and presentation equipment as well as handling local promotion and registration. The overall audience included 30 VCE agents along with 132 other citizens, primarily participants considering greenhouse production as a new enterprise, along with about 20 established producers. Program evaluations were completed by 117 participants (72% of the total). Ninety-one percent of the respondents rated the handout materials as “excellent.” Other topics included in the evaluation along with some representative responses are listed below.

What was the highlight of the day for you?

- The Notebook
- The take home resources are great for future use and reference info.
- Excellent information and good presenters-Practical information for starting a business.
- The knowledge that the speakers had in their fields and the way they present there topics.
- Seeing ways to utilize enterprises budgeting for various crops. Enjoyed walking through the business plan. It gives an indication of what one should do before starting a new venture and how detailed it should be.

- Well organized all speakers staying on target and time. I really get a lot out of this workshop. Could go through another day of info and not be bored. Lots of material for reference which I appreciate.
- Everything, Great pictures on slides, great book.
- Receiving templates for producing business plans and the information on construction for greenhouses-types- helped me think on pathways to what I really want to produce and how.
- Realizing how important and often overlooked marketing plans can be. Even through the speaker wasn't present her presentation was recorded and had a wealth of info.
- This program is an eye opener. It answered so many of my questions about where to get information. I know what to do and how, and have even better resources.
- Makes me think more long range plans, more than just the 5 yr. plan.

Comments included requests for additional training:

- Would like to see more classes on greenhouse operations.
- More information on alternative growing strategies (Organic/chemical free).
- Would like to see a session on SMALL GH Basics; a way for beginners to get their feet wet without spending a lot.
- Can we get more specific programs for specific crops in another program? This was an excellent day for expanding on specific crop programs. You could cover tomatoes/potatoes/peppers one day. You could group squash/cucs/melons another or in the AM and others in the PM.
- I would like to see a second workshop geared specifically to organic & bio-dynamic operations.
- IPM-Not enough information on control methods.
- Program on herbs!

Since our primary audience was new or prospective producers, we wanted to assess if the information presented in the workshop was useful in the decision-making process. Fewer respondents (67%) answered this question, but the comments indicated that we had influenced the decision-making process. In particular, the attendees appreciated the need to develop both business and marketing plans for their operation.

Has this program helped you to decide about getting into the greenhouse vegetable business (percent of total respondents)?

17 (14.5%)	No, I am already growing local produce
20 (17.1%)	Yes, I am planning to start construction this year
25 (21.4%)	Yes, I am starting to plan the business this year
5 (4.3%)	Yes, I have decided this is NOT the right business for me
11 (9.4%)	No, I am still undecided

Comments under this question:

- I plan to develop a business plan to get a better idea about whether or not to start the business.
- Not ready to make the investment of money and time required to both produce and market the products. Unsure if the local demand will offer the desired premium price.
- I have a few ideas and niche items to grow in a greenhouse or high tunnel. These workshops will help boost my confidence.

- Very educational. I was not expecting this in depth information. I found that I have many decisions to make before embarking on this business. It was really exciting.
- Made me realize it was more labor intense than I had considered.
- This program was an eye opener for some of the difficulties that one would face with greenhouse operations and marketing.
- It helped me realize aspects of growing that I had not previously considered. Very useful.
- I am a novice, so all information was very helpful. There were many things I had not considered.

In addition to the workshop notebook, VCE agents received access to the actual Powerpoint presentations to permit them to conduct small group or one-on-one trainings to assist future producers.

IV. Beneficiaries

- Provide a description of the groups and other operations that benefited from the completion of this project's accomplishments.
- Clearly state the quantitative data that concerns the beneficiaries affected by the project's accomplishments and/or the potential economic impact of the project.

The success of the training program was first evaluated by the number of attendees at producer workshops presented. With the spring workshop timeframe, we were pleased with 162 attendees. These attendees were surveyed to determine their current involvement in specialty crop or greenhouse production. Only 17 participants (14% of the 117 evaluation respondents) were currently growing greenhouse produce. These producers reported various workshop topics that benefitted them in their current production. Only one commented that he would not have attended if he had known that the focus was on new producers.

We also wanted to provide the educational resources and training for VCE agents to help their clientele with local production of greenhouse produce. Thirty VCE agents and employees attended the workshops. The agents were very complimentary regarding the resources and the workshop presentations. Other agents not in attendance expressed interest in obtaining the resource materials for their clientele. All resource material including the actual PowerPoint presentations are available to all VCE agents through the website developed as part of this program.

The VCE agents who organized the individual workshops have been charged with maintaining contact with their local producers to assess expansion or startup of greenhouse vegetable operations. The number of new operations or percent expansion of existing operations will be assessed through the local VCE office in early Summer 2014 (estimating one year for planning and operations in production the second year). These records will be collected and assembled by Dr. Latimer and she will make follow-up contact by phone, email or mail to assess the operation's profitability at 5 years after the trainings.

V. Lessons Learned

- Offer insights into the lessons learned by the project staff as a result of completing this project. This section is meant to illustrate the positive and negative results and conclusions for the project.
- Provide unexpected outcomes or results that were a effect of implementing this project.

- If goals or outcome measures were not achieved, identify and share the lessons learned to help others expedite problem-solving.

Once we actually started the program, there were no problems completing the tasks. The delay was in this program rising to the top of the pile. All short-term goals, development of the educational materials and conducting the workshops which included training the agents, were achieved. We will evaluate the impact of the program at 2 and 5 years from now.

One note regarding programming, we rely heavily on electronic resources and assume that most clients have computer access. However, our workshop in Harrisonburg included old-order Mennonite attendees. Since the agents in that area are accustomed to working with these clients, they guided us in providing additional printed resource material for those clients. Furthermore, the agents offered their office resources to the clients as they needed additional information.

VI. Additional Information

<http://www.hort.vt.edu/ghvegetables/>

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Project # 11: Fresh Produce Audit Verification Program (GAP/GHP) for Virginia's Shipping Point Farmers Markets (Final)

Project Summary

The approved State plan for Specialty Crop Block Grant # 12-25-B-0956 included a project entitled "Fresh Produce Audit Verification Program (GAP/GHP) for Virginia's Shipping Point Farmers Markets."

The purpose of this project was to create and implement comprehensive management plans for the Virginia Farmers Market System, which encompasses four shipping point farmers' markets, to focus on a Fresh Produce Audit Verification Program, Good Agricultural Practices and Good Handling Practices (GAP/GHP) for the markets and growers that utilize those markets. The project will offer and promote GAP/GHP compliance and certification for the four Virginia shipping point farmers' facilities, enhancing food safety and traceability for fruit and vegetable specialty crops being handled and processed through the state's wholesale farmers market system.

Project Approach

Initially, a team of VDACS staff developed a Request For Proposals in search of a consultant with the expertise and experience to carry out the project. All proposals were received March 16, 2010. Upon careful review, it was determined that the selected approach was not the optimal way to execute this project. Following notification to the 3 applicants, the team from VDACS composed a letter to the managers of the four Wholesale Farmers Markets and attempted to pursue a close working relationship with the Market Managers to identify producers and work towards certification. Because of the lack of resources and dedicated staff time to a project of this size, VDACS determined that the optimal solution was to revise the scope of the entire project. Thus, a significant balance of funds allocated to this grant were re-directed with prior approval from USDA through a scope amendment request that created five smaller projects that will be able to be completed within the timeframe.

The first project focused on variety evaluation and crop adaptability of carrots and tomatoes. The remainder of the funds will focus on Food Safety initiatives within Virginia. In order to effectively reach across the state, we propose four additional projects, each one narrowing in on the specific needs of producers in that area. These four projects absorbed the remaining balance of the unexpended funds.

Goals and Outcomes Achieved

With respect to the original project "Fresh Produce Audit Verification Program (GAP/GHP) for Virginia's Shipping Point Farmers Markets," the work plan ceased. Neither of the expected measurable outcomes was accomplished within the bounds of this project. However, through this scope amendment and the development of smaller projects, we received better results within the given time.

Beneficiaries

Beneficiaries of the initial grant were to include Virginia's four shipping point farmers markets and their regional specialty crop producers. Ultimately, through the scope revision, the beneficiaries remained the same.

Lessons Learned

Lessons learned from this particular project were heavily weighted on the grant administration side. It is critical to have a specific work plan with appropriate and designated staff for each element of the project. While we were able to make appropriate and useful changes to the scope, the issues that we encountered initially should have been avoided.

Additional Information

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Project 11a
Carrot and Processing Tomato Adaptability Evaluations
VA Tech

I. Project Summary

Faculty at the Eastern Shore Agricultural Research and Extension Center (ESAREC) were informed that private industry was interested in developing two new vegetable production enterprises on the Eastern Shore of Virginia. Both of these enterprises (carrot production and ground production of processing type tomatoes) have not been present in Virginia for decades. Hillside Gardens Ltd. and Sabra Dipping Co LLC. are interested in expanding their market and are interested in sourcing product from eastern Virginia. Before investing resources into unproven systems, both partners desired to perform experiments to investigate the potential productivity of these systems on the Eastern Shore. Horticulture faculty at the ESAREC developed experimental protocols in collaboration with industry partners to perform these experiments.

II. Project Approach

A carrot planting date study was initiated during the late winter of 2012 with six different carrot varieties. Four planting dates were established beginning in the middle of February and ending at the end of March. Commercial carrot acreage was also established on the Eastern Shore during the same time period. The experiments conducted at the ESAREC also investigated tillage programs for carrot. Carrot research at the ESAREC was initiated to provide guidelines and direction for the potential commercial carrot industry. The program was conducted in collaboration with Hillside Gardens Ltd., a grower and packer of fresh market carrots that has begun production with Eastern Shore producers. Initially three producers were involved but if successful acreage will increase and more producers will become involved. The primary goal was to determine when to begin carrot planting and which varieties were most adapted to the area.

Another aspect of this project was to investigate the potential of producing processing type tomatoes on the Eastern Shore utilizing bare ground production for a producer of fresh salsa. This project involved three planting dates of five different tomato varieties throughout the summer. The purpose of this project was to determine if yield goals and quality standards necessary for this type of production could be met. If successfully implemented, this production would be a natural fit for one of the large Eastern Shore tomato producers. This project was conducted in cooperation with Sabra Dipping Co LLC. The primary goal was to determine the most productive time frame of production as well as the most adapted varieties.

III. Goals and Outcomes Achieved

The overarching goal of both segments of this project was to determine if successful carrot and processing type tomato production could be carried out on the Eastern Shore, when this production was most successful, and which varieties were most adapted to the area. Significant differences in varietal performance were observed in both carrot and tomato. Three of the six carrot varieties and two of the five tomato varieties outperformed the other entries. In the carrot project the two earliest planting dates were the most productive with respect to yield and percentage of marketable carrots produced. Two of the three tomato planting dates appeared to be acceptable with respect to yield. The last planting date, which is acceptable for plasticulture

production of tomatoes appeared to be too late for bare ground tomatoes and did not result in sufficient yields. Both of these projects were visited by cooperating partners during the growing season to discuss the progress and future potential. After the growing season was finished, carrot project results were evaluated with representatives from Hillside Gardens. Commercial acreage in 2012 was a disappointment and did not indicate that carrots could be produced on the Eastern Shore but results from trials at the ESAREC indicated the opposite. Hillside Gardens indicated that they may not pursue further production based on the commercial results but because of the research conducted at the ESAREC and the positive results they would attempt production in 2013 with practices similar to the ones used at the ESAREC in 2012. Commercial production is planned to continue in 2013 on the Eastern Shore. If the 2013 growing season is successful commercial acreage will likely grow in 2014. Yields and quality parameters obtained in the tomato trials were at acceptable levels for Sabra who conducted independent sensory evaluation in California. The results of the sensory evaluation have not been received. Though the outcomes of the project were successful in 2012, the projects will be replicated again in 2013 in cooperation with the industry partners to further validate experimental findings. Based on 2012 results there is definite potential for these two cropping systems to be successful on the Eastern Shore of Virginia. Results from these two projects have been discussed with the two cooperating industry partners. Results will be provided to vegetable producers during winter meetings that are held around the state from December through March.

IV. Beneficiaries

Hillside Gardens Ltd. indicated to ESAREC faculty and Virginia Department of Agriculture and Consumer Services that they were developing a market that would necessitate increased production in the mid-Atlantic states. They indicated that this could be as much as 350 acres of carrots. This would likely require 10-20 producers to reach this acreage. Carrots represent an economic benefit for most producers which would increase overall farm profitability. Due to increases in shipping costs and an expanding market Sabra Dipping Co. has indicated interest in sourcing tomatoes from the eastern United States. There is potential that their production facility located in Colonial Heights, Virginia may expand to produce fresh cut salsa and sourcing tomatoes from Virginia would be a likely result. It is unclear the extent of the potential acreage but this could likely be produced by one of the tomato producers on the Eastern Shore of Virginia. Tomatoes are Virginia's most valuable vegetable commodity which has a tremendous economic impact in Accomack and Northampton Counties. Expansion of existing tomato acreage would have a ripple effect on the economy due to an increased need for labor, crop protection chemicals, and transportation.

V. Lessons Learned

With respect to the carrot portion of the grant, one of the major impediments to successful production will be the weather during February and March. This is often a rainy time of the year in eastern Virginia which can lead to wet soil conditions. The commercial acreage that was planted in 2012 was planted when soil conditions were wetter than ideal. This led to compaction and crusting issues which had a major negative impact on the percentage of unmarketable carrots. So much so that these

farms were not harvested. This was an important lesson learned for moving commercial production forward. The experiments located at the ESAREC were planted when soil conditions were acceptable and the results were very good and high quality carrots were produced. One problem that was observed at the ESAREC was stand establishment. Plant population was much lower than desired and germination was very uneven. This was likely due to inadequate irrigation being provided immediately after seeding.

The tomato portion of the project presented less difficulty in implementation and fewer unexpected problems. The primary problem with this project was the uneven growth rate of the different tomato varieties used. Several of the varieties emerged and grew much faster in the greenhouse facility than the others. These varieties also reach an ideal size for transplanting 7-10 days earlier than most tomato varieties. This is a very easy problem to address with improved scheduling and better knowledge of these varieties.

VI. Additional Information

Results from the carrot portion of this project were presented at the annual ESAREC field day in July to over 100 people. Samples of the carrots were on display to participants and pictures of the various carrot varieties were posted on the ESAREC Horticulture facebook page. The best performing varieties were also added as recommended varieties in the vegetable production guide for Virginia.

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Project 11b

Project: Transitioning Farmers From USDA GAP to Harmonized GAP Appalachian Sustainable Development

I. Project Summary

Background: The purpose of this project is to ensure that family farmers in Virginia are not forced out of their markets by an inability to obtain the Good Agricultural Practices (GAP) certification necessary to access the large grocery store chain wholesale markets. ASD and VA Cooperative Extension's work over the last two years has been focused on making the complicated requirements of GAP and Good Handling Practices (GHP) certification more understandable and accessible to farmers in the region, including guiding them through the process and conducting on-farm training, technical assistance, and mock audits of their written farm plans and practices. The urgency of the food safety work with family farmers became significantly elevated when several large scale wholesale buyers began to mandate food safety certification schemes that had a disproportional impact on local Virginia family farms. These mandates were meted out without regard to farm size and did not acknowledge or address the need to provide support services or on the farm assistance.

Motivation The original purpose of the Harmonized Audit was to allow farmers to obtain one audit that would be good for all buyers. ASD and Extension partnered to create a transition plan for moving from USDA GAP audits to the Harmonized Audit in hopes that large volume wholesale buyers will accept this food safety program, since its original purpose was one audit fits all.

There are a multitude of food safety audits - GFSI, Global GAP, Primus, USDA, Davis Fresh, etc. - and some farmers were having to pay for as many as 3 different audits to meet the requirements of their farm's specific buyers. The Harmonized Audit was created by comparing all of the food safety audits, side-by-side. The findings noted that collectively the audits were 90% alike with only a 10% difference. The Harmonized Audit's intent is to prevent farmers from having to undergo numerous third party audits to maintain markets, therefore, the USDA, Davis Fresh, Primus, etc. could conduct the Harmonized Audit and it would be accepted across the industry. However, at this time there is still debate within the industry whether buyers will accept the Harmonized Audit from the USDA. ASD supports the USDA GAP and the USDA Harmonized Audit and is currently in ongoing debates with industry leaders regarding the opposing position.

Unfortunately, in November 2011, WalMart announced that all of their produce items would require GFSI certification (not the Harmonized Audit). By February 2012, three additional major wholesale buyers decided to follow WalMart's lead. The announcement of this requirement came without support services, guidance, or ample preparation time; just disproportional demands that local family farmers could not meet prior to the 2012 harvest.

The ultimate motivation for this project is to leverage additional resources to reduce the time it takes farmers to become USDA GAP certified and then Harmonized Audit-ready by beginning training on the obvious areas of need during the growing season.

II. Project Approach

Summary of Activities and Tasks Performed During Grant Period

The following steps were taken to create a transition plan for moving from USDA GAP audits to the Harmonized Audit.

1. ASD and Extension created a training curriculum
2. ASD conducted one train-the-trainer session with 10 attendees to ensure that TA providers across the state delivered and are still delivering a consistent message and training material.
3. 42 VA family farmers received on-the-farm consulting and/or consulting and training, with 8 requiring 2 on-the-farm visits.
4. After classroom training of consultants, ongoing scheduling was completed to ensure that a farmer friendly approach to visiting the projected 50 farmers would be accomplished during production season.
5. Using these grant funds, ASD purchased the following to be checked out to farmers:
 - a. 300 Reusable Plastic Containers (RPCs) boxes
 - b. 25 RPC bins
 - c. 11 PPM Chlorine Free Meters
 - d. 3 Food Grade Pallet Mobilizers, 2 available to be checked out and 1 maintained on site to demonstrate the “model facility”
 - e. 5 Cooler alarms – 3 of which are available to farmers for check out and 2 maintained on site to demonstrate the model facility.
6. After input from several industry leaders and 5 packinghouse/packing shed managers, ASD did not purchase the Dosatron, EMD Refractor Meter, and EMD Strips, as originally planned in the grant proposal. The farmer’s/packing facility’s costs of sodium hypochlorite (chlorine based) solutions is much cheaper than compared to Sanidate (peroxide based) solution. We deemed it a better use of funds to obtain implements and supplies that farmers would use long term with the least amount of additional costs.
7. During the on-farm visits farm/farmer assessments enabled the following to occur:
 - a. 5 farmers were able to check out 150 bushel and 1/9 RPCs
 - b. 3 farmers were able to check out PPM Chlorine Free Meter
 - c. 3 farmers we able to check out 20 RPC bins
 - d. SOPs were reviewed and necessary modifications to processes and documentation were identified and made with all farmers involved.

Farmers made arrangements with AH staff to receive training and sign out necessary food safety supplies and equipment in order to be in compliance. Due to the length of time it took to purchase and receive the RPCs, and farmers not being prepared to take advantage of this opportunity, the number of farmers taking advantage of these items was low. However, we fully expect these numbers to increase significantly when main season volumes return.

Role and Significant Contributions of Project Partners

ASD assumed the leadership role in this project, but accomplishments and assistance to farmers could not have been completed without the solid partnership of Virginia Cooperative Extension. Appalachian Harvest buyers also partnered with ASD to help identify Virginia family farmers in need of assistance, and helped to classify farmers so that ASD could prioritize this work (high level need without GAP training, medium level-GAP trained and certification ready, lower level need-GAP certified needing Harmonization TA only).

III. Goals and Outcomes Achieved

Activities completed in order to achieve the performance goals and measurable outcomes

Goal: Pre-transition 50+ farmers VA family farmers to the Harmonized Audit prior to full Harmonized Audit training in October 2012.

Activities completed: ASD held a consultant training (with 10 attendees) to ensure that TA providers across the state delivered a consistent message and training material. Telephone calls were made to farmers who had previously attended GAP training and to Virginia buyers and aggregators to arrive at a list of farmers willing to participate and/or needing assistance. With farmers, buyers, and trained staff being in peak production, scheduling a sequence of TA visits required numerous follow up calls, revisions to project plans, and ongoing calendar adjustments. Once TA providers arrived on the farms, an assessment of the farmer's current food safety status was made: GAP status, paperwork, on the farm processes, and on the farm supplies. The Harmonization Audit was then explained to farmers and revisions, additions and/or deletions that would be necessary for their farm to become Harmonized Audit ready. Pre-harmonization consulting was accomplished with a 12 point checklist and bulleted discussion points that included the significant differences between USDA GAP Audits and USDA Harmonized Audits. 42 farmers were visited with 8 farmers requiring additional follow-up.

Comparison of actual accomplishments with goals established for reporting period

ASD, in partnership with Virginia Cooperative Extension and trained consultants, accomplished the goals established for this grant reporting period. Several farmers required more than one TA consulting visit. However, the changes in the complexion of the food safety debates continues to require the attention of ASD, Virginia Cooperative Extension, and partners in order to keep farmers well informed, trained, and prepared for their market's requirements.

IV. Beneficiaries

Groups and other operations benefiting from the completion of this project's accomplishments

ASD in partnership with Virginia Cooperative Extension and trained consultants benefited partners such as the Hillsville Farmers Market, Produce Source Partners, 3 local and 4 regional packing facilities, and 42 Virginia Family Farmers.

Quantitative Data concerning beneficiaries or the potential economic impact of the project.

If Appalachian Harvest farmers had not been trained, the buyers available to them would have shrunk from 11 to 2 with the only buyers still an option for non-GAP certified farmers being two Whole Food Distribution Centers: Whole Foods South and Whole Foods Mid-Atlantic. This would have represented a reduction of 87% in sales. (To put this in perspective, sales year to date through Appalachian Harvest are \$815,567, with \$571,167 going to farmers in the region.)

V. Lessons Learned

Insights from project staff into positive and negative lessons learned.

ASD learned many valuable lessons from the execution of this project. Many Virginia farmers have made great strides in the area of food safety training and on-the-farm processes. Several family farmers had every intention of obtaining their USDA GAP certification; however, they were struggling with their paperwork and framing the implementation of their practices into "words" and a living document. The on-the-farm assistance helped many farmers finalize their USDA GAP documents and processes and then become GAP audited during this grant period. That being said, a follow up visit within such a short window discussing additional paperwork and additional processes became almost overwhelming to some farmers. ASD and trained consultants learned that farmers who utilized our previous trainings and were proactive about

their USDA GAP, we more welcoming and open to pre-transition to Harmonization discussions than those who had struggled with and/or procrastinated about their USDA GAP. While we recognize that family farmers are suffering from training and audit fatigue, we also recognize the need for ongoing food safety supports in order for Virginia family farmers to maintain their markets and continue to produce fresh fruits and vegetable for the wholesale to retail markets.

An unexpected learning came from ASD's logistical work and executing backhauls from various farms to various processing facilities. One example demonstrates some of the challenges faced in this work. During one delivery Appalachian Harvest was told that the truck would not be loaded for the processing facility destination for 2 reasons. First, thermal blankets were mistakenly assumed to be furniture blankets. Thermal blankets are utilized to protect cold temperature sensitive products when shipping multiple crops that have different temperature requirements. These thermal blankets could be removed from the back of the truck and relocated to the cab of the truck which satisfied the loader for this issue. The second reason for not initially loading the truck was because Appalachian Harvest had a pallet jack on board that was painted. Appalachian Harvest could not place the pallet jack in the cab of the truck. With this realization, ASD moved toward the purchase of food grade pallet jacks/pallet mobilizers for farmers to sign out and utilize if delivering product to hyper-sensitive food safety processors for this specific activity.

ASD also learned that there are many extremes in the realm of food safety, and our work to continually stay abreast and well aware of food safety changes is a significant need in order to keep our farmers prepared and in their markets.

Unexpected outcomes or results

During this grant cycle, ASD, Virginia Cooperative Extension, trained consultants, supportive buyers and other partners learned that one of the buyers driving this year's food safety "wave of change" had to downsize their own food safety requirements in order to source the needed products for their produce sections. Initially, this specific buyer required GFSI certification; however, when GFSI certified watermelons were not available, they were willing to accept USDA GAP certified watermelons. When USDA GAP watermelons were not available they were willing to buy watermelons that we not food safety certified to any degree.

ASD has been in ongoing discussions with retail buyers, wholesale distributors, local food supporters, and agriculture industry leaders sharing the potential impacts of food safety radicalism and how this would negatively impact Virginia's agriculture landscapes, the Commonwealth's overall economy and moreover, the economic sustainability of Virginia's family farmers. Through these insightful discussions, great strides have been made with many retail buyers to accept the USDA GAP, and a 2 year training plan toward USDA Harmonized. With curriculums being presented, farmer's burden of costs explained in great detail with science based risk factors being addressed, many buyers are becoming more realistic for their "local" produce programs, which is great news for Virginia's family farmers.

VI. Additional Information

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Project 11c
Transition from USDA GAP/GMP Audit to Harmonization
Southwest VA Farmers Market

I. Project Summary

The purpose of this project was to further enhance the Food Safety program at the Southwest Virginia Farmers' Market (SWVFM) while setting a positive example for regional growers to benefit Virginia's agricultural producers. The upgrades received through USDA grant funding will enable the SWVFM to get closer to achieving GFSI Certification which will enhance grower net profits and marketability considerably.

The addition of "clean room" contact surfaces in the processing areas, implementation of a new product traceability system, and use of all other food safety items provided by this funding assists the SWVFM in ensuring less of a financial burden passed on to Virginia farmers.

II. Project Approach

We assessed the needs for GAP/GMP improvements to the SWVFM by comparing FDA and GFSI requirements which could not be currently met as well as verbal input from regional growers on ways to reduce costs to them while still ensuring compliance.

While there is always room for further improvements to Food Safety at the SWVFM, potential customers and consumers of our regional produce see the dedication we and our growers have toward providing safe and healthy, fresh fruits and vegetables.

The groups involved in this project include VDACS, Carroll County, and the SWVFM. VDACS' role is that of grant management. Carroll County serves as Market Operator. The market staff examined needs, purchased supplies, and implemented Food Safety program policies for incorporation.

III. Goals and Outcomes Achieved

The goals/outcomes of this project being two-fold has achieved both of its objectives which allowed Virginia farmers to survive another growing season with reduced costs and additional time in complying with GAP Certification requirements.

There are now 18 Carroll County GAP Certified growers compared to 11 in 2011. This exceeds our 20% expectation. Virginia Cooperative Extension confirms that there are 10 additional GAP Certified regional growers in 2012. This number exceeded the 50% expectation mark because there were only 4 of our regional growers certified in 2011.

The SWVFM received GAP Certification for its third straight year while adding new components of the facility under the new certification which included an additional processing area. We are continually striving to meet GAP/GMP and GFSI requirements in the hopes of becoming a global distribution point for Virginia agricultural products.

The project involving clean room sanitation has been delayed due to the processing areas still being in use at this point, but the products are here awaiting installation. As soon as there is a delay in produce supply with adequate time to ensure proper installation, the contact surface liners will be applied to the walls. The anti-microbial nature of these materials will increase the ease of sanitation and decrease the risk of possible contamination in the processing areas.

The purchase of a new laptop, label producing equipment, and a label supply has been instrumental in implementing the new product traceability system. The system which was purchased is simple to use and was easy to incorporate into our warehouse environment. More pertinent information about the product, such as the grower, the harvest date, the pack date, and distribution date can be placed on the container supplied directly to a vendor or consumer.

The purchase and implementation of the portable cleansing station has become a vital new part of our food safety program at the SWVFM. It allows market staff to monitor the cleanliness of the employees and visitors to the market. The mobility of the station makes it a great addition to the facility due to the ever-changing nature of what is needed here. Market staff has used it in the broccoli processing areas as well as in the grading room, the greens bay, and even out on the dock. Hand-washing practices have increased by at least fifty percent.

The purchase and installation of new vinyl curtain material at the entrances to all of the bays, processing areas, and coolers have had a major impact on reducing cross-contamination risks. With the hustle and bustle of the farmers' market, sometimes it is not always easy to see the contamination or deterioration of these materials especially if they are not replaced annually. Being able to visibly see if a risk is present immediately can reduce further contamination when corrected promptly.

The additional purchase of other food safety supplies such as foot baths, new knives and a knife sterilizer, applicable product chemical solutions and testing devices, and gloves and aprons have been a tremendous aid to daily operations at the market. Each of these supplies has had a direct impact on the food safety program at the SWVFM as well as being instrumental in our attempt to reach GAP Harmonization and GFSI levels. Thanks to USDA, use of these products has begun; and we are already being recognized for our increased commitment to food safety not only by the growers we serve but also our customers.

Costs associated with the SWVFM Food Safety program were absorbed by USDA funding. It allowed the market to implement necessary upgrades to the food processing areas without having to charge farmers a fee to cover these additional expenses. To put the savings into perspective, these supplies would have cost the grower an additional 56 cents per box of commodity which would have been a 50% increase over the current rate.

Also, the new product traceability system supplied by USDA grant funding saved growers time and money by allowing the market staff to label the products being supplied with all required farmer/harvest information which met all GAP requirements for both parties. The projected savings from this portion of the project can range from a few hundred dollars into the thousands depending on the grower, container size, and/or commodity.

IV. Beneficiaries

The monetary benefit of this project goes directly to the Virginia agricultural producers. The producers did not have an increase in costs to meet GAP/GMP requirements. This project strengthened regional growers' attitudes toward compliance with Food Safety and encouraged forward movement in southwest Virginia. Compliance with Food Safety regulations is a major marketing tool which will keep increasing net profits for our farmers. It is the mission of the SWM to enable every farmer to keep growing and selling their safe, healthy products to America's tables.

Indirectly, the market will benefit due to the increase in marketability of GAP Certified products. We strive to grow and serve the farmers of Virginia in whatever capacity is needed.

Indirectly, the end consumer benefits from a safe and healthy product offered at a reasonable price.

V. Lessons Learned

By setting a positive example and supporting Virginia farmers in projects such as this, we allow them time and assistance in obtaining the required certifications to remain marketable and profitable.

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Project 11d

Food Safety for Eastern Shore Producers

Project Summary

Background: Food safety has become a huge issue for growers throughout the United States. Both retailers and wholesalers are demanding more comprehensive food safety plans from suppliers. made a unilateral decision The purpose of this project was to assist family farmers in the Central and Eastern Parts of Virginia to either upgrade their food safety plans from USDA GAP to GFSI or obtain GAP certification for the first time.

Motivation Our purpose was to motivate growers to enroll in a GAP program or upgrade to a GFSI program by offering financial assistance to help pay for an upgraded food safety plan. VDACS staff served on the United Fresh Harmonized Audit Technical Working Group and was in contact with numerous growers in the Eastern part of the Commonwealth during that project. Since there are a numerous plans, we decided to let the grower choose the scheme that works best for them and work with a consultant/plan of their choice to implement the upgrade and purchase supplies.. Although we targeted growers who had expressed an interest in upgrading from GAP to GFSI plans we left it open for growers to grant funding for a GAP program.

Project Approach

Summary of Activities and Tasks Performed During Grant Period

The following steps were taken to create a transition plan for moving from USDA GAP audits to the Harmonized Audit.

8. Met with interested farmers to assess the need for a food safety upgrade and made them aware of the options. Met with 15 growers who had expressed an interest in upgrading/implementing a food safety program.
9. Mailed or emailed a one page application to interested growers and followed up with phone calls or visits. In addition, we emailed a notice and application to fellow three VDACS marketing specialists in the eastern part of the state so that they could forward them to anyone in their areas to make the growers aware of the program. Based on the length of time it takes to write and implement a full blown food safety program and the time constraints of the grant, we targeted those growers who had already begun the process. It was unlikely that someone who had not begun the process could hire a consultant and complete it within the specified time limit of the grant, although we did not specifically exclude anyone who expressed an interest.
10. Received applications from farmers, VDACS personnel reviewed applications and made awards.

Role and Significant Contributions of Project Partners

Based on the fact that personnel in the Marketing division of VDACS had been a member of the technical working group of the United Fresh Harmonized Audit committee, VDACS took the lead in this project. United Fresh and members of their technical working group made themselves available as a resource as we moved forward.

Goals and Outcomes Achieved

Activities completed in order to achieve the performance goals and measurable outcomes

Goal: Up to 10 farm organizations certified for either GAP or GFSI food safety program.

Activities completed: Since we worked on a very short timeline we stayed in constant contact with farmers to make sure applications were received in time to be eligible for funding. We made initial calls and emails, followed up with visits, more calls and emails. When we received the applications

we reviewed and forwarded them within two days. We received 9 applications, two of which we could not fund.

Comparison of actual accomplishments with goals established for reporting period

We were able to fund 7 grower applications, 5 GAP to GFSI, 2 GAP food safety grants. It appears that the short timeline was the main reason we did not have more applications.

Beneficiaries

Groups and other operations benefiting from the completion of this project's accomplishments

Virginia growers, retailers, and wholesalers were the main beneficiaries of the program.

Quantitative Data concerning beneficiaries or the potential economic impact of the project.

We do not have any hard data to convey at this time, but it is safe to say that the economic benefits accruing to Virginia growers who participated in the program would be in the millions of dollars. This is based on the fact that without an enhanced food safety program, the growers options in terms of sales to major retailers would have been greatly reduced. Based on the fact that major retailers are refusing to deal with growers who don't have a robust food safety program, this project will have a very significant impact on every operation that participated.

Lessons Learned

Insights from project staff into positive and negative lessons learned.

The major insight from the project was that we need to stay engaged with food safety issues in order to stay ahead of the curve and let growers know what to expect in the future. Stringent food safety is here to stay and we need to be proactive to keep Virginia farmers informed.

Unexpected outcomes or results

We experienced no unexpected outcomes.

Additional Information

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Project 11e

Northern Neck Vegetable Growers Association Upgrading Growers to GAP and GFSI Programs Final Report

I. Project Summary

The Northern Neck Vegetable Growers Association is an organization serving vegetable producers primarily located in the northeastern portion of Virginia. These fifty some operations are family held farms and most have to depend on a few key individuals to do many things from production to marketing to compliance with the increasingly complex legal requirements that impact this production system. Adding food safety to the mix has been expected and producers have participated in learning opportunities for several years prior. But none of them have had the resources to allocate toward this effort until now, when the impetus is obvious. In order to retain market share, they must comply. Different produce buyers require different levels of certification. On buyer, Produce Source, seems to be satisfied for this year to get Good Ag. Practices (GAPs) implemented as was Cisco while Wal-Mart has insisted on Global Food Safety Initiative (GFSI) in order to sell to their distribution centers. Markets are not developed overnight. These relationships take years to develop and evolve and those markets are not replaced quickly. This group of producers while taking the lead is also part of the traditional early adopters of many things and their example has been informally noted by others.

II. Project Approach

Producers have participated in training programs and received individual assistance from Extension Agents, Specialists and private consultants to help them not only understand the various program requirements but to develop a plan, implement the resulting plan and then successfully complete the audit requirements for the particular program that they were looking to fulfill.

Initial program interest was gathered by local Extension Agent staff during production meetings and from farm visits as well as assurances from marketing staff and VDACS marketing personnel that this was “really going to happen”. The time frame was from January to March, as outlined.

Before we could proceed with the project, we had to gather support. When that was showing a positive response and after hearing the chords of despair amongst growers who were fearful of losing markets, we proceeded with all due hast. Local Extension staff realized that the GFSI protocol would take too long for us to learn so the services of the consultant were secured for that portion of the project. A one on one method of implementation would follow a group session taught by Extension specialists.

The group session was attended by a large group of growers from the region hosted by a produce buyer primarily for their producers and taught by Extension specialist staff. Four operations from this Association were in attendance which enabled them to receive training specific to using the tools developed by VPI Extension staff for meeting the criteria of the plan. It was obvious that individual follow-up would be required if implementation was to take place. This was only geared toward GAP program compliance.

The services of the consultant were actually researched by a member of the vegetable growers association. References were checked and Kelly Williams of Palmetto Ag. Services was selected. Ms. Williams took the implementation of that portion of the project plan over and worked directly with growers to develop the GFSI plan and implement it in a timely fashion during May-June 2012.

Local Extension staff as well as specialists worked with 4 individual growers to develop plans and 2 implemented their GAPS programs on their farms starting in March and getting finished by the end of May. Time was spent reviewing teaching materials and templates received in earlier training sessions provided by Extension specialists, explaining specific portions of the plan and finding answers to

technical questions to implement effective and certifiable programs. Some assistance was also provided in developing how to properly and accurately record intended responses to questions in the plan.

The resulting certifications (4; 2 GAP and 2 GFSI) were achieved in time for the growing season with none of the plan completing growers reporting being shut out from any markets for not being certified. Those who did not finish their projects were looking for alternative marketing channels. Certification was completed by the various agencies/firms in May and June.

Project success was evaluated in September by Extension Agent staff conducting farm visits to measure success and implementation/compliance with the program components as well as trouble shooting some wildlife issues.

III. Goals and Outcomes Achieved

As of September 2012, ten (10) producers have participated in at least one group educational program (some of the programs were not in this setting but the growers reported having sought them out) to help them develop their food safety plans and four (4) farms and the packing shed successfully completed the plans and passed the audits for the respective program requirements. The remaining producer group is informally self-reported, based upon on-the-farm interviews, to be at various stages of implementation. Various meaning in this case, ranges from thinking about it, to building construction, to waiting to see if their buyers will not take their product.

IV. Beneficiaries

The producers who have completed the program and moved into the certified marketing portion of the handlers business were impacted this year by the drought just like everyone else. But even though that was the case, marketing this year, thus far is in excess of \$1million that would have been minimized significantly if these market channels were not available and the loading dock doors open to it because it was certified by the respective food safety organizations.

V. Lessons Learned

Farmers need their hands held a bit to overcome some of the requirements. These are folks who have grown produce for a long time and these requirements have flown in their face as being a lack of trust in them by their purveyors. It wasn't until they were told that product was certified or not on the dock that this change of operation was accomplished. Farmers tend to be more implementers than planners and if they have deficiencies they will fix them but have trouble writing things down. Coming up with methods for them to record things and technology uses are challenges and will no doubt continue to evolve.

This project wasn't the only place in town to get the basic information and some growers utilized other venues for program delivery but ended up coming back using local Extension staff for individual assistance to get the final product in the hands of certifiers. Word of mouth is a very effective tool in this setting, and many of the referrals for assistance came from that means of recruiting.

We also have done some special recruiting in the Latino community to establish a rapport with that clientele and introduce them to the concept as direct marketers. We used bi-lingual members of the community to help make in-roads and discussed the program with producers as they attended a scale certification and marketing event specifically for the direct marketing clientele.

VI. Additional Information

Extension staff plans to continue the education and implementation phase of this project to include small group work sessions and on farm assistance with special emphasis being given to the Latino and direct marketing sectors of the producers group.

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Project # 12: Promotion of Native Plant Production and Sales in VA (Final)

I. Project Summary

Native plants are those that evolved naturally in a particular area and were growing naturally in this area before humans introduced plants from distant places. With the ever growing urbanization there is a trend for transition of certain percent of the land from utilitarian use (agriculture crops for consumption) to use for increase of quality of life (crops for beautification of private and public properties). This trend causes an increased competition between the nurseries which in order to achieve competitive edge introduce more and more exotic plants with striking ornamental characteristics. The introductions are often done with little or no testing for their invasive potential, as well for their potential impact to the local flora and fauna. Such approach poses significant risk to the environment. It could also alter the quality of life of the communities across the state and nationally, and as a consequence – to jeopardize the reputation of the nursery industry and ultimately shrink its revenue.

With the growing awareness of the citizens of the Commonwealth of Virginia regarding the role of the natural components for a balanced environment, an increasing number of homeowners, professional landscapers, and conservation specialists are interested in promotion of the role of the native plants for restoring the balance in the ecosystems, and for creating mini-natural areas in the yards, parks and arboreta.

Our goal was to make available to the buying public a dependable source for native plants under an established, quality, name brand that would provide expanded and profitable production opportunities for existing and new Virginia ornamental plants producers.

II. Project Approach

Participating Beautiful Gardens® growers and garden centers will be contacted about their current inventories of native plants, if any, and their suggestions and observations for plants to be included in the program.

A separate web page within the Beautiful Gardens® web site is to be created and dedicated to native plants. This site will be updated when necessary. Links are to be established to VNLA and Virginia Tech sites and to web pages of participating nurseries and retailers.

Contact will be made with related plant groups such as The Virginia Native Plant Society and with nurserymen and naturalists across the state. Native plants will be purchased that are suggested for their high potential for commercialization and ornamental value. These plants are to be evaluated at the Beautiful Gardens® test sites during and beyond the grant period.

Beautiful Gardens® Plant Selection Committee will identify several native plants for finishing and retail sales under their Plants of Distinction. Through their marketing efforts, the value of natives in gardens and landscapes will be presented to retail garden center employees, commercial and residential landscape companies and wholesale growing operations within the VNLA network.

Significant contributions of time and resources have been made by project partners. Rick Baker of The Virginia Department of Agriculture and Consumer Services (VDACS) spoke with growers and owners of retail garden centers across the state about their current inclusion and significance of natives in their operations. He has worked on marketing materials that include the promotion of natives through the Beautiful Gardens® Plants of Distinction. Jeff Miller of The Virginia Nursery and Landscape Association (VNLA) created the initial web page within the Beautiful Gardens® web site devoted specifically to native plants. Sarah Gugercin, Research Associate in the Department of Horticulture, Virginia Tech, updated the web site making it more user friendly in 2011. Lisa Lipsey, Beautiful Gardens® Program Coordinator, and Velva Groover, Research Specialist Senior, both with the Department of Horticulture, Virginia Tech, acquired, planted, maintained, and evaluated the native plants that were chosen during the grant period. The Urban Horticultural Center at Virginia Tech, Claytor Nature Study Center at Lynchburg College and Norfolk Botanical Gardens contributed staff time and resources to the maintenance of Beautiful Gardens® test sites.

III. Goals and Outcomes Achieved

Goal: Survey Beautiful Gardens® (BG) participating growers and garden centers about current inventories of natives and suggestions for plants to be introduced

Rick Baker and Lisa Lipsey formulated a 'Native Plant Questionnaire' to 1) better understand the Virginia nursery industry's involvement with native plants, 2) determine the native species that are currently being produced and sold by Virginia growers, and 3) determine what, if any, native species the industry might recommend for promotion in the BG program. The questionnaire was distributed from the Virginia Nursery and Landscape Association (VNLA) informational booth at MANTS 2010 and was published in the VNLA's quarterly newsletter, Jan/Feb 2010. The newsletter was distributed to all members of VNLA whose current membership is 566.

We received no response from the questionnaire. However, by reviewing VNLA's *2010 Guide to Virginia Growers*, we found that many nurseries offer native species, or cultivars of native species, with cultivars being listed in much greater quantities than species. As an example, six member nurseries offer *Juniperus virginiana* with an additional six nurseries offering one or more of six listed cultivars.

Another example of a popular native landscape plant common in the nursery trade is *Amelanchier sp.* (serviceberry). According to The Digital Atlas of the Virginia Flora (http://www.biol.vt.edu/digital_atlas/) there are seven species native to Virginia. Currently, the most popular *Amelanchier* in the nursery industry is the cultivar 'Autumn Brilliance', a clonal selection from a natural cross between *A. arborea* and *A. laevis*.

Many growers in Virginia produce and sell native plants. Lists of nurseries where natives comprise most of their inventory can be found at the following websites:

<http://www.plantnative.org/index.htm>

<http://www.vnps.org/>

<http://www.fws.gov/chesapeakebay/BayScapes/bsresources/bs-nurseries.htm>

The Virginia Department of Conservation and Recreation website lists Virginia native plant species recommended for use in horticulture, land management, conservation and restoration.

http://www.dcr.virginia.gov/natural_heritage/nativeplants.shtml

Goal: Contact related plant organizations and local naturalists for suggestions of natives to be included in BG program

Lisa Lipsey contacted Ruth Douglas, Director of Invasive Plant Education and Board Member of the Virginia Native Plant Society (VNPS), for Virginia native plant suggestions to include in our trials. She contacted several VNPS state board members and a suggested plant list was created. Further information and plant suggestions were received from Susie Leslie, a native plant enthusiast and gardener, member of the New River Valley chapter of the VNPS, Kim Strader, Assistant Curator, Nancy Larrick Crosby Native Plant Trail, State Arboretum of Virginia, and Nancy Lee Adams, VT Graduate Student in Entomology.

Goal: Purchase plants with high commercialization and install at BG test sites

Using the plant list provided by Ruth Douglas, all other suggestions from interested parties, and Lisa Lipsey's own knowledge of native plants, a number of plants were chosen for trials based on 1) ornamental value, 2) the feasibility and suitability for container production, 3) scarcity in the current ornamental plant market, and 4) the availability of plants for purchase, collection or donation. Plants chosen for trials during 2010 were:

Eryngium yuccifolium (Rattlesnake Master)
Solidago flexicaulis (Zig Zag Goldenrod)
Sorghastrum nutans 'Blue Steel' (Indian Grass)
Gillenia trifoliata (Bowman's Root)
*Porteranthus trifoliatu*s 'Pink Profusion' (Pink Bowman's Root)
Spiranthes cernua v. *odorata* (Fragrant Lady's Tresses)
Clematis viorna (American Bells Clematis)
Scutellaria ovata (Heart-leaved Skullcap)
Rhexia virginica (Meadow Beauty)
Piptochaetium avenaceum (syn. *Stipa avenacea*) (Blackseed Needle Grass)

The above species were planted at three Beautiful Gardens®' test sites – The Urban Horticulture Center, Virginia Tech, Blacksburg, VA, The Claytor Nature Study Center, Lynchburg College, Bedford, VA, and Norfolk Botanical Garden, Norfolk, VA – during the summer of 2010. Performance evaluations have begun with observations being made on adaptability, disease and insect pressure, phenology, growth rate and aesthetic value.

During 2011, we added additional native plants to the Beautiful Gardens®' test sites. Plants were chosen from suggestions made by owners of native plant nurseries and horticulturists from across the state.

Meehania cordata (Meehan's Mint)
Viola walteri 'Silver Gem' (Violet)
Scutellaria incana (Hoary Skullcap)
Hibiscus coccineus (Scarlet Hibiscus)
Actaea pachypoda 'Misty Blue' (Baneberry)
Asclepias incarnate 'Ice Ballet' (Milkweed)
Scutellaria serrata (Showy Skullcap)
Cymophyllus fraserianus (Fraser's Sedge)
Polygala paucifolia (Gaywings)
Caulophyllum thalictroides (Blue Cohosh)
Lysimachia lanceolata selection (Lanceleaf Loosestrife)
Stipa avenacea (Black Oat Grass)

Andropogon gerardii ‘Red Bull’
Nyssa sylvatica ‘Wildfire’

All plants are still under evaluation at the test sites; however, some of the plants installed the first year show undesirable characteristics or were universally disliked by Master Gardeners who are in charge of evaluation data collection. *Eryngium yuccifolium* was found very unattractive by all Master Gardeners who said they would not purchase this plant from a nursery. It also proved difficult to produce an attractive, sellable container plant. *Solidago flexicaulis* has the potential to spread aggressively by seed in a garden situation. Both these plants will be eliminated from the trials.

Even at this early stage of evaluation, *Andropogon gerardii* ‘Red Bull’ and *Viola walteri* ‘Silver Gem’ appear to be very promising for introduction through the Beautiful Gardens® program. Lisa Lipsey will make a recommendation to the BG Plant Selection Committee to include them with the 2013 plants of distinction.

Goal: Web page created on BG web site

During 2010, Mr. Jeff Miller (VNLA) created a separate section on the Beautiful Gardens® website dedicated exclusively to our work with native plants. The goal and importance of the project are described along with potential impacts to the nursery industry and to the public.

In 2011, Beautiful Gardens’ website was updated with a highly visible link to our native plant project on the home page. The website will be updated in subsequent years to include new activities and conclusions of our stated goals.

Goal: Inclusion of natives in Beautiful Gardens’ promotions

Beautiful Gardens® has begun to actively promote and evaluate native plants in our program. We do include cultivars of local species that are selected for superior characteristics. An example would be ‘Spring Fleecing’, a cultivar of the native fringetree, *Chionanthus virginicus*. Unlike the species, the cultivar blooms prolifically at a very young age and propagation by cuttings has a much higher success rate compared to the species.

We currently have a number of natives included in our plant promotions. In 2010, *Schizachyrium scoparium* ‘The Blues’, a naturally occurring selection of Little Bluestem, was one of our promotion plants. Among our 2011 Plants of Distinction are included two natives – *Sporobolus heterolepis* and *Iris cristata* ‘Tennessee White’. Promotion plants in 2012 include two native species, *Nyssa sylvatica* ‘Red Bull’ and *Panicum virgatum* ‘Northwind’. Both were suggested by two of the larger wholesale growers in Virginia.

Goal: Continued contacts and open line of communication with sources of promising native plant selections

In February 2011, Lisa Lipsey attended the Landscape Management Seminar in Charlottesville, VA, which was sponsored by The Piedmont Landscape Association. The keynote speaker was Dr. Douglas Tallamy, Professor and Chair of the Department of Entomology and Wildlife Ecology at the University of Delaware, who has written extensively on natives. His recent book, *Bringing Nature Home*, speaks of the import role our suburban landscapes play in sustaining native plants and the animals that depend on them. He maintains that when choosing native plants we make a contribution to biodiversity. His website, <http://bringingnaturehome.net/>, has extensive lists of recommended natives as they related to the number of butterfly and moth

species they support. Speaking with conference attendees, that included landscape contractors, landscape designers, retail garden center owners and employees, and wholesale nursery growers, there was a firm belief in the importance of native plants in our planned landscapes. Many designers said they always include some natives in their home landscape designs.

In June 2011, Dr. Alex Niemiera attended the Annual Meeting of the Southern Extension and Research Activities/Information Group 27 (SERA-IEG-27) for Nursery and Landscape Systems. The purpose of this meeting is to share and evaluate potential landscape species for use in the southern U.S. Native plant species are a subset of the plants that are evaluated.

Goal: Increase native plant production by Virginia growers by 25% or more at the end of 2 years

Our goal to educate and encourage Virginia growers to include or expand their production of native plants has been challenged by current economic conditions. Participating garden center sales have been down 10% to 30% over the last two years, and grower sales have been down 15% to 40%. This later figure also reflects the significant decrease in the commercial sale of ornamental plants.

Virginia growers are aware of, and have become more aware of, the value and demand of natives from the gardening public. The Beautiful Gardens® “*Plants of Distinction*” program has included several natives in each of the last three years of promotion through 25 independent retail garden centers across Virginia. In support of this retail presence, we worked with numerous garden writers, Master Gardeners, botanic gardens, and landscape designers.

At present, we can identify a limited increase of 5% in the number of growers who produce native plants as well as a steady increase in the level of production.

Goal: Increase native plant sales by participating garden centers by 15% within the grant period, and by 35% within a five year period

As has been previously stated, the economy has impeded our efforts to make any significant impact on increasing the sale of native plants through Beautiful Gardens® participating garden centers. End of year surveys at the 25 garden centers indicate a yearly total dollar sales of all Beautiful Gardens® promotion plants to be approximately \$200,000 for 2010 and 2011. Included in this figure are sale of natives. The garden centers have indicated that our promotional activities have positively impacted their sales. Improvement in the economy and the willingness of the public to consider more than impatiens and geraniums should help us move forward over the next several years.

IV. Beneficiaries

Approximately 25 Virginia nurseries and retail centers benefited from this project by increasing opportunities for production and profit by the inclusion of native plants for sale through Beautiful Gardens®. Homeowners and landscapers throughout the state were provided with information on the value, both environmental and ornamental, of native plants in achieving a balanced and beautiful environment.

We have contacted or have been contacted by several organizations regarding our efforts to promote and expand the use of native plants. These include The Virginia Native Plant Society, The Virginia Department of Environmental quality, The Virginia Society of Landscape

Designers, the City of Richmond, the Governor's Mansion, the Virginia State Fair Grounds, Lewis Ginter Botanical Gardens and The Virginia Department of Conservation and Recreation.

We have been contacted by a Virginia county for native plant suggestions for a landfill reclamation project. We are in discussions with The Virginia Department of Conservation and Recreation about collaborating with them through their "Plant More Plants" program which encourages the use of natives. Beautiful Gardens® has recently been contacted by Virginia Witmer, Outreach Coordinator for the Virginia Department of Environmental Quality's coastal management program. Our goal is to support increased efforts to market natives through their "Virginia Native Plant Marketing Project" and our "Plants of Distinction" program.

V. Lessons Learned

During the project, it became obvious that both Virginia growers and retail garden centers do not know and do not quantify the economic impact of native plants among their total inventory of plants. Typically, natives are considered together with other perennials, shrubs and trees when determining the sale of plants by growers and retailers. In general, from discussions with growers, over the last ten years there has been an increase in native plant production but cultivars of native plants, rather than native species, dominates.

This project did allow an additional marketing outlet for native plants by inclusion in the Beautiful Gardens® plant introduction program.

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Project # 13: Building Capacity of Commonwealth Community Food System (Final)

I. Project Summary

This project has three components: building programs that Lynchburg Grows (“LG”) offers producers engaged in the direct marketing of specialty crops to consumers; expanding regional capacity of Virginia’s farmer-to-consumer food system; and presenting a series of targeted regional workshops for new direct farm marketers on the benefits, challenges, and logistics of agricultural direct marketing of specialty crops.

The overall goal is improving the network utilized by producers engaged in the direct marketing of specialty crops to consumers and the resources available to producers. To accomplish this LG will: expand the growing season for producers by providing heated space and/or starter stock to individuals; expand marketing opportunities available to individual producers by providing cold storage and sales space in a “food hub” that links producers to consumers; and expand the educational opportunities available to producers.

The motivation for this project was to help area producers engage in direct marketing of specialty crops to consumers and to expand the regional capacity of Virginia’s farm-to-consumer food system. Here in central Virginia, over the past decade there has been increased interest and demand for locally grown food but the supply has not kept up with demand. In addition, many farmers do not have the time to rent a weekly stall at the farmer’s market selling to individual customers. We were approached by Appalachian Harvest and local farmers in central Virginia about a need to help farmers who do not want to direct market their crops but instead want to participate in a grower’s network where they have a dedicated buyer for their product at wholesale prices without having to sell it piecemeal to individual customers at farmer’s markets and on-site farm stands.

II. Project Approach

A. Activities Performed

Work Plan – Stage 1: Enhanced Cold Storage Capacity

Funding of this project has allowed Lynchburg Grows (LG) to expand its cold storage capacity from 300 to 900 square feet, by allowing for the restoration of LG’s circa 1920 root cellar. This will allow LG to not only store food for its CSA and other customers throughout the winter but also for the four school districts that we are currently providing local food to in terms of mixed greens, salad mixes, and upcoming orders for apples and potatoes. In 2010 we were able to put over 300 pounds of local food into Lynchburg City schools and this year we have added Campbell, Amherst and Nelson County school systems to our list of institutional buyers.

Work Plan – Stage 2: Regional Workshops

During the course of this grant period LG was able to offer a series of targeted regional workshops for new and existing direct farm marketers of the benefits, challenges, and logistics of agricultural direct marketing. These workshops were the 1 ½ day Will Allen/Growing Power workshop (62 attendees), Appalachian Harvest (AH) Grower’s Network recruitment and training workshops (5 held during first year of grant period with over 30 attendees) and four workshops (two each year) on composting and organic vegetable production which attracted an additional 64 attendees. Sessions covered in the workshops included: 1) project planning; 2) raised bed organic vegetable production; 3) composting and vermin-composting; 4) aquaponics; 5) organic certification; 6) GAP and quality control; 7) irrigation installation, and; 8) controlling pests and diseases in fields.

Through these targeted workshops we were able to reach our target number of participants from throughout the region. Many participants were from Southside VA and the Shenandoah Valley. In 2010, a total of four farmers (including LG) participated in the AH Grower's Network. In addition, 40 farmers decided to grow for LG's CSA program during 2010-2011 helping us expand the program to 120 families and expanding it year round as opposed to just a 20-week period.

Work Plan – Stage 3: Extending the Growing Season for Producers

A secondary component of stage 1 was to try and find additional funding for season extension to help local growers by heating the hoopouses. Unfortunately we were not able to secure additional funding for this component through two USDA grants and a Virginia foundation.

We have two proposals in currently to two Virginia Foundations, which if accepted, will allow us to start a \$500,000 campaign. The campaign will have three components: 1) restoring greenhouses 4-6 (half an acre of 100 year old glass greenhouses which almost collapsed in the winter of 2009-2010); 2) installation of hybrid biomass/solar heating system which allows for zone heating of soil in all greenhouses and targeted heating when the need arises to melt snow on the roofs before the weight collapses roof beams and breaks glass as has been happening, and; 3) a rainwater harvesting system that will allow us store 45,000 gallons of water that falls on the greenhouse complex (1 inch rain equals 50,000 gallons draining off the rain gutters) so that we can save over \$1,000 a month in water utilities and keep the precious rain from becoming sediment laden as it goes into storm water drains and into the James River.

B. Significant contributions of project partners in project:

It is hard to imagine that this project would have been as successful as it was without the assistance of our project partners.

Will Allen and some of his Growing Power staff came in the first year of the project for a 1 ½ day workshop attended by 62 individuals. We were not able to have a second workshop during the grant period due to Will's busy schedule and the fact that their workshop fees have doubled in the past few years making it unaffordable to the moderate and low-income individuals that we are targeting through this project (we would have had to charge \$350 per person to have a workshop the second year).

Anthony Flaccovento and Appalachian Harvest (AH) were similarly invaluable in the first year of the project. With their assistance we were able to hold a series of 5 recruitment and training workshops in the first year that attracted over 30 attendees. Even though only 4 farmer's participated in becoming organic certified and participating in the AH grower's network that first year, the trainings helped us develop a non-certified grower's network in central Virginia with Lynchburg Grows as the food hub and distribution center. Now in its second year we have 40 farmers participating as shown below. The trainings by Anthony and AH along with mentorship from Growing Power/Will Allen have allowed Lynchburg Grows to develop its professional and training capacity so that we can now carry the load on our own with the assistance of two Virginia Cooperative Extension agents from Lynchburg and Nelson county who are helping us now.

III. Goals and Outcomes Achieved

Goal 1: Offering a series of targeted regional workshops for new direct farm marketers

The workshops offered under this project were targeted for new direct farm marketers on the benefits, challenges and logistics of agricultural marketing. The results of these 8 training sessions and the 1 ½ day intensive workshop was the increased education of partnering farmers and organizations through hands-on, practical workshops teaching them skills that they can implement on their farm or community garden.

We were able to exceed our target number of 100 participants attending the training sessions and workshops. A total of 124 individuals participated in the workshops during the project period. Feedback and evaluations from participants were solicited in order to refine workshop offerings and curriculum. Lessons learned were that many potential attendees could not afford the \$250 fee for the Will Allen workshop (to offset his contract costs) and therefore could not attend. We did not have a workshop the second year because Will's contract costs have gone up to where we would have had to charge \$350 attendance fee and we feared that we would not be able to attract new direct farm marketers at that high cost. In addition we learned that there was a lot of interest in attendees in participating in a local grower's network and not just AH's organic grower's network. Using that knowledge we have created a viable grower's network for central Virginia using Lynchburg Grows as the hub and distribution point. To illustrate this viability, in 2010 our network put over \$15,000 in the pockets of partnering farmers and in the first 9 months of 2011 we have been able to put over \$29,700 dollars in their pockets.

Goal 2: Build Educational programs offered to producers engaged in direct marketing
Under this goal LG aimed to increase the number of farmers selling direct to consumers at Lynchburg Community Market and participating in LG's CSA program as a grower. This goal met with mixed results. It was hoped that 3 additional vendors would be at the Community Market by the end of the grant program and that 6 additional growers would participate in our CSA program.

We were not able to increase vendors at the Lynchburg Community Market but 3 growers helped in the second year in the creation and participation in the Appomattox community market which did well in 2011 season. In addition 40 local growers decided to participate in our CSA program which vastly exceeded our goals. The interest from farmers who simply want to sell their produce to a large customer who pays wholesale prices was immense. We will continue expanding this program and as noted in the grant the additional growers have helped us expand our CSA program into year-round production.

Through our evaluations we found that there is quite a bit of interest in us adding hoop house construction to a future workshop. In addition a lot of participants want to attend a Will Allen workshop but the price is prohibitive so we will have to find ways to offset the workshop fees so more interested folks can attend it who otherwise could not afford it.

The second year of the project did allow us to develop a growing relationship with Virginia Cooperative Extension and we have been developing educational programs with them. We have already had two composting workshops and a vegetable production workshop which has brought in an additional 43 attendees in the second year of educational programs. We will continue to expand these programs which are offered to interested farmers for free.

Goal 3: Expand regional capacity of Virginia's farmer-to-consumer food system
This goal had two components: 1) to increase cold storage capacity to 900 sq. ft., and; 2) adding the capability to heat two greenhouses thus offering season extension opportunities. This goal

also met with mixed results. We were able to expand our cold storage in the summer of 2010 and we will be using the expanded space not only for our grower's network/CSA program but also storing extra food for sale to local school districts (we are currently selling to 4 school districts in 2011). The cold storage has helped with our developing a winter CSA and we have local producers supplying apples, potatoes, sweet potatoes, winter squash, cabbages and other winter crops.

We were not able to secure funding for the biomass boiler system in the first two years of the project. We currently have two grant applications submitted to two Virginia foundations and are hopeful that we will receive funding for this component.

Goal 4: Training and mentoring programs created for low-income community stakeholders

This goal is to help low-income community stakeholders and urban and rural agricultural producers to grow vegetables and fruits using sustainable and chemical free production methods. Our expected results were an increase in number of farmers selling direct to consumers at the community market and participating in LG's CSA program as a grower. We had a goal of 3 additional vendors at the Lynchburg Community Market by the end of the grant and an increase of 50 people in community participating in training and mentoring programs among targeted participants, thereby increasing their knowledge and use of new techniques. As mentioned above, we did not increase vendors at LCM but 3 of our growers were instrumental in the new Appomattox farmer's market. In sheer dollar value of the 40 growers participating in LG's CSA program, in the two years of this program we were able to put almost \$45,000 in the pockets of local farmers which we are confident will only grow in coming years. In addition 4 farmers participated in AH's organic grower's network the first year of the project (this was not continued the second year due to transportation costs incurred by AH).

We were also fortunate that 2 VCE extension agents participated in the workshops the first year. This has allowed us to develop a partnership with agents in our region and the creation of educational programs targeted for local producers. As mentioned previously, LG's executive director has been appointed to the VCE state leadership council which will hopefully help us grow this partnership over coming years. Future workshops include grape, and berry production along with workshops requested in areas of hoop house construction, season extension and sustainable vegetable crop production (as opposed to NOP standards).

IV. Beneficiaries

A. Groups and operations benefiting from completion of project:

Participating Farmers in LG's Growers Network

- | | | |
|---------------------------------|-----------------------------|---------------------------------|
| 1. Auburnlea Farm | 8. Crown Orchard | 16. Island Creek Farm |
| 2. Barry Wood | 9. Delectable Hills Farm | 17. Jolly Pond Farms |
| 3. Black Eagle Farm | 10. Dickie Brothers Orchard | 18. Johnson's Orchard |
| 4. Blue Ridge Natural Resources | 11. Fairview Farms | 19. Morris Orchard |
| 5. Carter Mountain Orchard | 12. Fox Family Farms | 20. Mountain View Farm Products |
| 6. Chiles Peach Orchard | 13. Goldman Farm | 21. Our Father's Farm |
| 7. Clifford Van Derveer | 14. Henry Fitzgerald | 22. P.W. Morgan |
| | 15. Iron Gate Farm | 23. Paradox Farm |

24. Ratliff Berry Farm and Greenhouse
25. Rocky Top Farm
26. Shenandoah Food
27. Silver Creek Orchards
28. Spring Mill Farm
29. Three Creeks Farm
30. Three Rivers Farm
31. Three Spring Farm
32. Valley Farming LLC
33. Walnut Winds Farm
34. Winston Horst
35. Yoder's Hydroponic Tomatoes
36. Crews Family Farm
37. Concrete World
38. Hix, Diana
39. The Family Affair
40. Archlynn Far

Additional partnerships developed through the project:

During the second year of the project we were able to develop partnerships with Virginia Cooperative Extension through Lynchburg's new agent, Kevin Camm, and his immediate superior Dan Goerlich. Through these partnerships we have been able to offer VCE sponsored workshop on organic vegetable production and composting with many others in the works for the upcoming year including such topics as grape production, berry production, rain barrel workshops, etc. In fact, the executive director of Lynchburg Grows is now serving on the VCE State Leadership Council which will allow LG to continue to grow our relationships with producers throughout central and southside Virginia.

B. Economic impact of the project (actual and potential):

We are proud to highlight that our CSA has been able to grow to 120 families during summer and up to 75 in the winter due to partnering with the 40 local producers. In addition we are able to offer a year-round CSA now with local produce further expanding revenues for LG and for local producers. Below is a table that shows our revenues from produce sales since 2008 through September 30th, 2011 with a break down as to net revenues for LG and the grower's network respectively.

Table 1: Net Revenues from Produce Sales to LG and Producers 2008- Sept. 30, 2011

Year	LG Revenues	Grower's Network Revenues
2008	\$18,100	\$0
2009	\$24,700	\$1,075
2010	\$33,200	\$15,600
2011 (thru 9/30/11)	\$46,100	\$29,722

Lessons Learned

A. Insights into lessons learned by staff (positive and negative results and conclusion):

The dramatic increase in the cost of Growing Power/Will Allen training sessions were not anticipated during this grant project. The reason for this is due to the intense demand and offered amounts for his presentations after he was recognized as a MacArthur Genius Awardee at the end of 2008.

The lack of farmers interested in attaining organic certification was not anticipated. In addition the high cost of fuel made it to where AH had a shortened season with the 4 growers participating in their network. In fact we had to truck produce over the mountains and meet AH's tractor trailer in Rockbridge County which increased the overall cost to LG preventing us from participating in the second year of the project.

B. Unexpected outcomes or results that were an effect of implementing the project:

We did not anticipate the strong demand from the outset of this project from current and local growers who do not want to become certified organic, and therefore ineligible to participate in ASD's Appalachian Harvest grower's network. The growers have expressed their commitment over the past two years to growing sustainably and chemical free as much as possible and also want their food sold locally – this is something that AH cannot do. In fact, the reason the four grower's did not participate in a second year with AH is that they were not happy with the fact that their food was being trucked to AH's

headquarters for sorting and aggregation. Afterwards it was shipped and sold in NC and Georgia – none of it being sold in VA as was initially anticipated.

A positive result was that 40 farmers wanted to participate in a local farmer's network where all of the food was sold in the region where it was produced. Currently all of our producers in the network live within 45 miles of Lynchburg, the sales hub for the network. In addition, it is a positive benefit to families in central Virginia that they are able to enjoy locally produced, highly nutritious food at an affordable price.

C. Identify and share lessons learned to help others expedite problem solving:

When we learned quickly that the more than 124 individuals participating in workshops and over 30 producers attending follow up training and educational session were not interested in becoming certified organic, despite their commitment to sustainable and low-spray/chemical free production we did not give up on them. We worked with the 4 producers wanting to participate in AH's grower's network and then realized that with our CSA and dedicated buyers that we could form our own regional grower's network where the food would in fact stay in the region instead of being shipped hundreds of miles.

Similarly when we were notified by Will Allen that despite being one of their seven national training centers that the fees were going to be such that a second year would be impossible to have him in a row we did not give up. We have kept our partnership with him and anticipate having a statewide workshop in 2012-2013 depending on schedule and funding so that we can offer significant scholarships to lower income individuals who would like to attend the workshop.

After eight workshops with Growing Power since 2005 and the workshops and training from Anthony Flaccovento and AH, our organization feels - on the eve of our eight year anniversary - that we can truly stand on our feet and continue building the grower's network over the coming year. This will not only help LG during our striving to self-sufficiency and local farmers by paying them wholesale prices for their crops, but it will also bolster local food security.

We have also found a good economic model in that we pay our producers the wholesale rate that they request and then only add 30% to it to cover the cost of processing, labor, cold storage, loss, etc. That way our consumers are purchasing produce much cheaper than from a supermarket making it affordable to a larger cross section of socio-economic groups throughout Lynchburg and the surrounding counties.

Another opportunity that we developed to help grow the network and, in particular, LG's fall and winter revenues is that we have expanded our master partnership in education with Lynchburg City Schools in the first year to also providing city elementary schools with mixed greens, salad mixes, arugula and spinach for a salad bar. Now in its second year we have sold in the first two months of 2011 fall school year over \$4,800 worth of produce to not only Lynchburg City Schools but also Campbell, Amherst and Nelson County schools. We are working with them and will utilize our extra cold storage space to store apples, potatoes and squash for fall and winter months from producers in our

grower's network. Our staff has spent time during farm to school month working with the kitchens at Campbell and Lynchburg schools learning more about how they function and all of their processes so that we can better assist our network in gaining a foothold in institutional food purchases. In addition we are in discussions with Lynchburg College and Centra Health to start offering food to their facilities as well.

V. Additional Information (including publications, websites, photographs)

Lynchburg Grows web-site
www.LynchburgGrows.org

12 segments on Living in the Heart of Virginia TV show sponsored by AREVA 2010-2011
http://www.lynchburggrows.org/?page_id=758

Lynchburg Grows: Growing Produce in the Heart of the Community
<http://www.lynchburgbusinessmag.com/mag/lynchburg-grows-growing-produce-and-community-in-the-heart-of-lynchburg/>

Lynchburg News & Advance: Urban Farmer Breaks New Ground at Lynchburg Grows
http://www2.newsadvance.com/news/2010/mar/06/urban_farmer_breaks_new_ground_at_lynchburg_grows-ar-209778/

Lynchburg News & Advance: Lynchburg Grows Plants Ideas for Richmond's Urban Garden
<http://www2.newsadvance.com/news/2011/jun/29/lynchburg-grows-plants-ideas-richmonds-urban-garde-ar-1142334/>

Conclusion:

Thanks to the initial seed funding provided by VDACS Specialty Crop Grant Program it has been possible for Lynchburg Grows to expand our CSA from a 1 grower program to helping 40 additional farmers. This grant has allowed us to expand our CSA from 60 individuals to 120 during the summer in addition to offering a winter CSA program with 80 participating members as of this date. The CSA program has helped Lynchburg Grows become over the last two years more than 33% self-sufficient in terms of generating our own revenues to cover the operation of our farm and non-profit organization. This is important as we strive to become truly sustainable as an organization. We feel that with continued growth and our upcoming capital campaign that we can be self-sufficient by the end of 2015.

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Project # 14: Virginia Specialty Crop (Fruit and Vegetable) Promotional and Sales Video (Final)

I. Project Summary

The purpose of the project was to shoot, edit, produce and disseminate a promotional video, highlighting the variety, abundance and competitive advantages of Virginia's fruit and vegetable crops. A video highlighting fresh produce that is grown across Virginia is an effective tool for educating buyers regarding the abundance, availability, and cost competitiveness of Virginia's fruit and vegetable products. The video also showcased and reinforced food safety, Good Agricultural Practices and Good Handling practices, all topics that are promoted by the Virginia Department of Agriculture and Consumer Services (VDACS).

Vegetable production and marketing continue to change at a rapid pace. As the world becomes much more connected through technological advances, there is a strong emphasis on marketing via social media and distance learning through the use of video, sound and images. Social media is an important concept for today's agricultural community.

A fruit and vegetable video project allowed VDACS to promote Virginia grown fruits and vegetables through the powerful use of DVD, Web-based video channels, and online exchanges. The video was used at trade shows, educational conferences, association meetings and during sales calls when agency staff and private companies call on produce buyers. When using the video as a marketing tool, the target audience is produce and grocery buyers. When using the video as a networking and educational tool, the target audience is current and future farmers and friends of the agricultural industry.

A video highlighting Virginia's fruit and vegetable specialty crops can construct an accurate and clear picture of the evolving and modern vegetable production across the Commonwealth. The video allows Virginia to highlight produce items grown in different regions of Virginia including (but not limited to) tomatoes, potatoes, apples, peaches, snap beans, cucumbers, cabbage, broccoli, leafy greens, lima beans, brambles, and watermelon. The video can also serve as a recruiting tool to help us combat the decline in active Virginia farmers.

Virginia is located within a day's drive of 50 percent of the nation's population, yet many of the same types of fruits and vegetables that are grown in Virginia are shipped into these major urban markets on the East Coast from across the country or overseas.

There remain opportunities for increased sales of Virginia produce items and there are also opportunities for additional acreage to be planted in fruits and vegetables, given increased wholesale buyer and processor awareness and acceptance of Virginia's high-quality, price competitive produce items.

While Virginia boasts a variety and abundance of fruits and vegetables available for sale to regional wholesale and grocery buyers and further processors, many of these buyers have not recognized the availability, transportation savings, and other competitive advantages of sourcing fresh produce from Virginia. Similarly, individual Virginia growers have not always individually invested in marketing tools to effectively reach the wholesale markets across the east Coast region.

The proximity of Virginia's fruit and vegetable production areas to major urban population centers on the East Coast represents an opportunity for Virginia specialty crop growers to access new markets for their products, among wholesale buyers, grocery buyers, and processors who may not be familiar with the quality, quantity, and other competitive advantages of purchasing Virginia grown fruits and vegetables.

A video project, inclusive of a variety of Virginia grown fruits and vegetables, is an effective way to educate and influence buyers by promoting the benefits of Virginia modern produce production systems, including product variety, availability, affordability, and food safety. A video provides a way to reach buyers and the general public via social media, as the video can be incorporated into presentations and utilized on the Internet.

II. Project Approach

Project partners generated a list of target specialty fruits/vegetables, farms, packing facilities between September and November 2009, as outlined by the project's Work Plan. The project partners worked with VDACS Regional Market Development managers headquartered around the Commonwealth to identify a diverse range of farms and operations to film and document. The project partners consulted with trade groups and growers' associations as well.

Between September 2009 and April 2010, the project partners met with the Office of Procurement within the Virginia Department of Agriculture and Consumer Services (VDACS) to determine the best route to solicit estimates for filming, editing and producing a Virginia Grown video. While talks with Procurement were underway, the project partners initiated a discussion with the Office of Public Affairs within the Virginia Department of Transportation (VDOT), a state agency that has partnered with VDACS on video projects in recent years. After consulting with the Office of Procurement, the project partners opted to develop a Memorandum of Understanding (MOU) with VDOT to film, edit and produce the Virginia Grown Video. The MOU was signed by both parties in late April 2010.

Project partners shot fresh footage of Virginia specialty crops, and edited and revised the Virginia Grown video from July 2010 - November 2011. Initially, shooting of video footage was scheduled for completion by in the fall of 2010. Due to the drought and excessive heat that occurred in 2010, project partners scheduled additional filming of specialty crops throughout 2011. In early 2011, project partners edited the video and tailored it for specific buyers that they would meet at two of the world's leading fruit and vegetable industry events: the Canadian Produce Marketing Association (CPMA) show and the Southeast Produce Expo. Project partners envisioned and created the Virginia Grown video in such a way that allowed them to continually edit and revise the video to fit specific buyer needs.

The Virginia Grown video was officially unveiled during the Southeast Produce Expo (Southern Exposure 2011) in Orlando, Florida in early March 2011. As one attendee reports, "Southern Exposure provides a concentrated amount of information and available contacts in a smaller and more comfortable setting than other events. It is a great networking opportunity that still keeps the time commitment reasonable." In the fall of 2010, a rough draft of the Virginia Grown video was "test" marketed at the 2010 Fresh Summit (PMA) in Orlando, Florida. A large wholesale buyer who saw the video at the 2010 PMA requested a production area tour and has subsequently purchased Virginia Grown products.

The second “official” airing of the Virginia Grown video occurred during the 86th annual Canadian Produce Marketing Association (CPMA) show in Montreal, Canada in April 2011. More than 3,200 produce professionals participated in the 2011 CPMA, therefore we can speculate that at least half of the attendees, or 1600 individuals, saw a portion of the video during this trade show. The CPMA trade show regularly attracts key decision-makers and customers from the fresh produce sector as participants include business people, members of the industry, as well as government representatives who are directly or indirectly involved in the Canadian fresh fruit and vegetable sector. There is tremendous global opportunity in the Canadian marketplace, where three out of every four dollars spent at retail on produce is spent on imported products. The Virginia Grown video allowed project partners to properly showcase the variety, abundance and competitive advantages of Virginia’s fruit and vegetable crops. As a result of the CPMA, someone saw the Virginia Grown video and a large operation in Canada was scheduled to work with researchers and growers to initiate a new crop in Virginia. Additionally, project partners have sent the Virginia Grown video to Loblaw, the largest food retailer in Canada, representing 52% of the business in Canada, to showcase donut peaches from Central Virginia.

Supported Documentation:

2011 CPMA End of Show Report

http://www.convention.cpma.ca/pdf/2012/2011_CPMA_End_Show_Report.pdf

In July 2011, project partners aired the video during a special farm bus tour involving Military Produce Group (MPG). MPG partners with produce growers and suppliers to provide fresh fruits and vegetables to military commissaries, operated by the Defense Commissary Agency (DeCA). DeCA is headquartered at Fort Lee, Virginia. MPG promotes Virginia Grown products and is committed to buying local and supporting Virginia farmers. Along with several MPG members, 23 DeCA administrators and employees watched the Virginia Grown video during the July farm bus tour. New produce sales or additional produce sales can be documented as part of the VDACS Marketing Division’s annual report of accomplishments that records the results of agency managed promotional activities and marketing programs.

Supported Documentation:

MPG Website showing the Virginia Grown logo

<http://www.militaryproduce.com/about-us>

In the summer and fall of 2011, project partners and the film crew shot fresh footage of Virginia watermelons and green beans. Project partners also edited the Virginia Grown video so that it would include Hanover tomatoes for use at 2011 Fresh Summit (PMA) held in Atlanta, Georgia, October 14-17, 2011. Over 800 exhibitors and more than 18,500 attendees from 50 countries attend the annual PMA. According to show reports, 65% of Fresh Summit buyers represent firms with sales greater than 10-million dollars.

In 2012, the Virginia Grown video was used at the following trade shows:

March 4-6, 2012: Southeast Produce Show, Orlando, Florida; estimated 1599 attendees (mostly buyers).

April 13-16, 2012: Canadian Produce Marketing Association (CPMA) Show, over 3000 attendees representing all major Canadian chain stores, many wholesalers.

August 13-16, 2012: Midwest Produce Conference, estimated 1200 attendees
 October 14-16, 2012: 2012 Fresh Summit (PMA), Anaheim, California, estimated 1200 attendees.

Project partners estimate over 12,000 views of the video at major produce trade shows from 2011-2012.

Due to the fact that we were able to develop a Memorandum of Understanding (MOU) with personnel at a fellow state agency (Virginia Department of Transportation) to film and edit the Virginia Grown video, project partners were able to complete the project at a much lower cost than our original estimate. Project partners requested and were granted amendments from USDA to conduct two other projects in conjunction with the video, including:

1. Promotion for Virginia Grown Donut peaches in the Toronto Area using a Canadian public relations firm who had previously worked with USDA and was familiar with the peach grower and his operation. The video was sent to the PR firm in the preliminary stage of the project.
2. Underwrite the cost of attending 2012 CPMA in Calgary, Canada. VDACS had not participated in a CPMA west of Ontario in many years, and used the funds to pay a portion of the expenses for the trade show. Project partners showcased the Virginia Grown video, and met with and developed numerous leads. With attendance of over 3000, we calculated 1,500 views during this show.

The Virginia Grown video prominently features the Virginia Grown logo on the bottom corner of the screen, similar to how television news stations promote their logos. While work has continued on the Virginia Grown video, project partners also worked to generate more publicity and awareness of the Virginia Grown brand by applying for a federal trademark. The federal trademark for the Virginia Grown produce design was approved in October 2011.

Project partners including Butch Nottingham, the Eastern Shore Regional Market Development Manager, and Olivia Wilson, Promotions Coordinator for VDACS Division of Marketing, contributed greatly and cooperated to implement this project. Melissa Ball, Grant Administrator, worked with and guided Nottingham and Wilson to ensure that SCBGP rules and regulations are followed closely.

III. Goals and Outcomes Achieved

The goal of utilizing the Virginia Grown fruit and vegetable promotional video was to increase sales of Virginia's fruits and vegetables to buyers making a new product purchase decision, or purchasing additional produce items from Virginia, after having been targeted by the promotional video.

Project partners estimate over 12,000 views of the video at major produce trade shows from 2011-2012. Those views ultimately lead to increased knowledge and sales of Virginia produce.

Two of the more noteworthy achieved goals derived from this project include the following:

In the fall of 2010, a rough draft of the Virginia Grown video was "test" marketed at the 2010 Fresh Summit (PMA) in Orlando, Florida. A large wholesale buyer who saw the video at the

2010 PMA requested a production area tour and has subsequently purchased Virginia Grown products.

As a result of the 2011 CPMA, someone saw the Virginia Grown video and a large operation in Canada was scheduled to work with researchers and growers to initiate a new crop in Virginia. Additionally, project partners have sent the Virginia Grown video to Loblaw, the largest food retailer in Canada, representing 52% of the business in Canada, to showcase donut peaches from Central Virginia.

IV. Beneficiaries

According to the USDA NASS, there are more than 2,800 (over 1,600 vegetable producers and over 1,200 fruit producers) that commercially harvest and sell fruits and vegetables. These farms, along with Virginia produce packers and related businesses would most benefit from increased sales of Virginia grown fruits and vegetables to wholesale buyers, grocery buyers, and processors who may not be familiar with the quality, quantity, and other competitive advantages of purchasing Virginia grown fruits and vegetables.

Virginia's commercial fruit and vegetable growers are geographically spread across the Commonwealth. The Eastern Shore of Virginia is known for tomato, snap bean, lima bean, and potato production; the Shenandoah Valley region is known for apple and peach production, The Northern Neck area produces a wide range of vegetables, and growers in Southwestern Virginia are known for producing broccoli, collards, and other cooler season vegetables

A video highlighting fresh produce that is grown across Virginia can serve as an effective tool for educating wholesale and grocery buyers regarding the abundance, availability, and cost competitiveness of Virginia's fruit and vegetable products. At present, fruit and vegetable production accounts for over \$130 million of cash receipts and gross farm income in Virginia.

With over 150 million consumers within a day's drive of Virginia, getting additional Virginia grown produce items into the supermarkets and retail outlets where the majority of consumers shop can be an effective way to significantly boost cash receipts and farm income for the more than 2,800 Virginia commercial fruit and vegetable growers. A promotional sales video targeting wholesale buyers, responsible for the supply chain of produce items into major East Coast retail outlets, is a tool for increasing the sale of Virginia grown specialty crops.

Project partners shared copies of the Virginia Grown video with agricultural groups and associations in Virginia. The video can serve as a recruiting tool to help Virginia combat the decline in active Virginia farmers. A specific example of this outreach with agricultural groups and associations was in January 2011 when VDACS received a request from an Extension Agent working with the Northern Neck Vegetable Growers Association requesting copies of the video.

V. Lessons Learned

The drought during the summer of 2010 delayed a significant portion of the filming of the Virginia Grown video.

In an effort to launch this project at a fiscally responsible level, the Department contracted with a fellow Virginia state agency to provide video shooting and editing services in April 2010. Due to financial efficiencies related to the video contractual agreement that saved money while

maintaining the continuity of this project, the Department requested and was approved by USDA to redirect these unused contractual funds for use at the 2012 Canadian Produce Marketing Association (CPMA) Trade Show, scheduled April 11-13, 2012 in Calgary, Alberta, Canada and for publicity purposes.

One of the project partners was out on maternity leave during a portion of the reporting period. Therefore, there was a delay in adding the Virginia Grown video to the Virginia Grown website. Project partners must work with agency IT staff in an effort to add the video to the Virginia Grown website.

One of the goals of the project was to increase sales of Virginia's fruit and produce, tracking the increase/decrease by using National Agricultural Statistical Service (NASS) data. We estimated 130 Million in 2008; NASS data released after the proposal gave us an official 133.5M. Data below summarizes the sales data and the percentage increase or decrease from the 2008 benchmark. All figures are from NASS:

2008-133.5M Benchmark
 2010-121,157-Decrease of 9.0%
 2011-126.6M-Decrease of 5.0%

Based on these figures, it appears that our goal of a 10% increase in sales was optimistic. Using sales figures alone may have been a mistake. There are many factors that influence that sales figure, the major one being drought during both of the two out years.

A major drought in the Commonwealth severely impacted the 2010 crops. At the Eastern Shore VA Tech. Research facility measured rainfall was 29 inches in 2010 as opposed to 43.8 70 in. average "normal rainfall" Other areas in the state were similarly impacted. We also had drought conditions in 2011 and while not as severe, the impact on crop yields and sales was significant. We failed to appreciate the significance that weather would have on sales.

VI. Additional Information

One of the benefits to growers in Virginia was that VDACS marketing staff who worked on this project gained a better understanding of the scope and diversity of specialty crops in Virginia. That enables the marketing specialists' to better represent Virginia Farmers with buyers and at trade shows. The phrase "a picture is worth a thousand words" certainly applies to this project. Based on positive comments by buyers and number of views at trade shows, we feel confident that we have made a positive impact on sales of Virginia Grown fruits and vegetables. This project remains a work in progress; our recommendation is that it be continued.

VI. Additional Information

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Project # 15: Mt. Rogers Christmas Tree Growers Assoc. Seed Orchard (Final)

Project Summary

The Mount Rogers Area Christmas Tree Growers Association (MRACTGA) has been actively involved in the management of and production of Fraser fir seed from a seed orchard on the property of the Grayson Highlands State Park for 31 years. This activity has involved the maintenance of the orchard and the supply of seed to growers of Fraser fir in Grayson County, Virginia and surrounding areas. This activity has helped preserve the unique strain of Mount Rogers Fraser fir as the native stands have been decimated by the balsam woolly adelgid insect.

The Grayson Highland Seed Orchard has begun to decline as the trees have grown older. A new orchard needs to be established to preserve and improve the unique genetic characteristics of the Mount Rogers strain of Fraser fir. This grant has been used to prepare a site on Mount Rogers controlled by the Virginia Department of Forestry. Root stock has been planted and part of the cost of surveying the area was paid for from these funds. In addition, initial work has begun to select superior trees available to contribute scion material for grafting into the new (Old Flat Orchard).

Project Approach

The MRACTGA has partnered with the Virginia Department of Forestry to find a suitable site for the establishment of the “Old Flat” Superior Fraser fir Orchard. A major portion of the funds from this grant were used in surveying and mapping the Old Flat area. The Virginia Division of Forestry has been invaluable in arranging for the availability of land at the Old Flat site. They have made all arrangements for a land trade with the Virginia State Parks Division and have made sure that the State Legislature and Governor approved the transfer between the Divisions. A formal dedication of the site was made in late June and it has now been named **The Old Flat State Forest**.

The Association has also partnered with Virginia Tech and North Carolina State Universities to obtain technical support in the establishment of the orchard. North Carolina State University’s Tree Improvement Cooperative in the College of Natural Resources continues to contribute to the selection and evaluation of potential families to be grafted into the orchard. They have committed to the long term evaluation of tree selections and are offering significant advice in managing the orchard. They have done this to date at no cost to the Association.

The establishment of the Old Flat Seed Orchard has been initiated with the site prepared and the root stock planted. Work has been begun on locating Red spruce tree seedlings for the establishment of the protective border and wind break surrounding the “Old Flat” orchard. Wildlings have been located and plans are now in process for collecting cones and seed from several areas on Whitetop Mountain and Mount Rogers. Several youth groups have volunteered to help with this project and are continuing with their commitment. Two different Christmas tree growers and seed processors have also volunteered to help collect, clean and process the seed collected in 2011. The purpose of these trees is to act as a wind break for the Fraser fir trees in the orchard and help the orchard to blend in with the remaining native stands of Fraser fir and Red spruce found on Mount Rogers.

The identification of superior trees from the Grayson Highlands Orchard and commercial tree farms in the Grayson County area is continuing. Approximately 80% of the needed trees have been selected for evaluation. Additional samples will be taken from the selected trees in November for studies on their needle holding ability. Those trees judged to be the best at holding their needles after harvesting and other characteristics will be grafted into the new orchard. This is an ongoing project with more selections to be made over the next months and years.

Other attributes of potential “superior” trees are also being evaluated for the different trees selected. Each attribute will be used in ranking those trees worthy of inclusion in the orchard. This will be a long term and ongoing activity and will continue as long as adequate root stock and physical room remain in the Old Flat Orchard.

Goals and Outcomes Achieved

The new “Old Flat” orchard establishment continues on a timely basis. The completion of the site survey and a long term agreement between the Division of Forestry and the Association have been major accomplishments. The establishment of the root stock with associated site preparation has also been accomplished. Progress continues on the selection of superior trees from commercial plantations and previous progeny test sites. Evaluation of potential families for grafting in the orchard will be an ongoing project as long as root stock and physical room remain for the addition of new genetic material.

The long term objective of providing a continuing source of the unique Mount Rogers Fraser fir genetic material will be accomplished through the Old Flat Superior Seed Orchard. This effort is the basis of ensuring a viable Christmas tree industry in Grayson County and surrounding area. It is also a part of preserving this unique strain of Fraser fir for future generations.

Additional time and investments will be needed to reach the goal of identifying, evaluating and grafting all of the superior tree families into the Old Flat Orchard. Although this will be a continuing work of the Association, a minimum of an additional two years will be needed to complete the first phase of this project. This will be beyond the original deadline of August 25, 2011. The time required to do this was not known when the Grant proposal was developed. Additional monies associated with these activities will be needed. This money will be raised by the Association through seed sales and through other grants.

Goal: Improve the profitability of cut Christmas tree farming by improving the quality of seed stock

The initial steps of identifying genetically superior families of Mount Rogers Fraser fir trees have been accomplished. Approximately 60 different superior families have been located in grower’s fields and are now being evaluated for needle holding ability and other criteria that will improve the quality of future Fraser fir Christmas trees.

The objective of this project has been to identify those families that would lower the relative cost of producing faster growing and more attractive commercially grown Fraser fir Christmas trees. An important factor in this endeavor has been determining the family’s ability to hold its needles after being cut. A cooperative agreement with North Carolina State University College of Natural Resources has been entered into. This effort includes a formal evaluation of needle holding ability of each family. Those families judged to hold their needles better than other candidates will be included in the new grafted orchard located at the Old Flat State Forest.

Superior growth rates, bud set capability (thus more dense trees in a shorter time); natural color and other factors are all being included in the evaluation of the various families identified. At this time, each family is being judged on all of those factors that would meet the objective of decreasing the number of years required to produce commercially superior trees. Each of the trees/families identified to date has been 18 to 24 inches taller than the surrounding plantation trees. Assuming that the average commercial height averages six to eight feet, the identified trees and their progeny should reach this height in one to two years less time.

Thus, the time required and the cost to produce commercially marketable Fraser fir Christmas trees can be reduced by approximately 20 to 25 percent. This can also be expressed as reducing the ratio of cost to sale price from 71% to 50%. These ratios will also reflect the improvement in potential selling price because of increases in attractiveness and ability to remain fresher throughout the Christmas tree season.

Beneficiaries

The major beneficiaries of the establishment of the Old Flat Orchard will be the 250 Christmas tree growers in Grayson County and surrounding area. The value of Virginia's cut tree market is over 30 million dollars per year. The availability of seed to grow seedlings and transplants for the establishment of new plantations on their farms is a significant factor in the profitability of these farms. In addition, every citizen will benefit from the assurance that the unique Mount Rogers source of Fraser fir will be preserved for the future. The loss of natural stands of Fraser fir due to the balsam woolly adegid on Mount Rogers and the decline of the Grayson Highlands Orchard means that the Old Flat Orchard may become the only remaining genetic pool of Mount Rogers Fraser fir.

The establishment of a grafted orchard with superior scion material will also contribute to the production of a superior Christmas tree product in a shorter time period.

Lessons Learned

The major lesson learned from this project has been the value of cooperation with other entities that may have the same or parallel objectives as the Association. The Virginia Department of Forestry, Grayson Highland State Park, Virginia Tech, NC State University, The Virginia Department of Agriculture and several volunteer groups have all come together to achieve the goal of preserving this unique genetic pool. The Mount Rogers Area Christmas Tree Growers Association could not have accomplished the initial phase of this project without the support and encouragement of all of these groups.

The establishment of this Orchard has been initiated but not completed. The Association has learned that this is long term project with several steps needed to be taken before the job is complete. Through the guidance and support of all of the organizations above, the orchard will be contributing to the Christmas tree industry and the people of Virginia in a timely manner in the near future.

Additional Information

The identification and evaluation of potential families for grafting into the Old Flat Orchard will continue through the next two or more years. The planting of the natural Red spruce wind break surrounding the Fraser fir orchard will be accomplished in the near future when seedlings can be grown. Grafting of scion material from selected superior trees will begin in the Fall of 2011. This will be done with funds obtained through other grants and funds raised through other activities of the Association

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Project # 16: Enhancing Specialty Crop Production and Marketing (Final)

Project Summary

Profitability of farm production is getting harder to ensure. The costs of inputs have leveraged production of traditional crops to the point where profitability is difficult if not impossible to attain. Many of our traditional vegetable crops, while not commodity priced, are nearly traded as such due to over-production. The “little guy” has to constantly be on the lookout for opportunities to carve out a niche for his/her production and specialty crops offer a huge potential for this need.

The NNVGA is a producer group of 30 member farms, most of which are direct marketers, with access and experience in specialty crop production and sales to populations in Northern Va. The region has a long history of vegetable production and processing but change has been inevitable. Interest is high and constant among producers to try new things and to see what works. It’s not just a profit centered thought process, innovation is a vocation with many of these producers.

Va. Tech Extension research has shown that farmers learn better from each other, seeing things first hand and talking to farmers (Franz, et al.). Field trips assure this transfer of knowledge. It also provides a forum for sharing experiences and perhaps even inputs among the organization members before, during and after the trip. Producers have expressed a strong preference for traveling when they aren’t busy with their own operations, during the winter (January and February). This limits trips to see production to the Southern U.S. and West Coast and perhaps even overseas.

Project approach

An eight day field trip was conducted from January 1-14, 2010 (see attached itinerary summary). Members attended the Southeast Fruit and Vegetable Conference in Savannah, Ga. While there, they attended various pertinent educational sessions, meetings and also made important connections with vendors at the trade show.

Upon leaving the SE Fruit and Veg. meeting, members drove to southern Florida for on-farm visits to personally see and evaluate production methods.

On the trip home the Extension staff person, Sam Johnson, conducted a survey of the growers and what their perceptions were at that point. Then in September, Extension staff person Liddington, conducted an interview survey of producers to see what they had implemented or still thought they would implement in the future of the practices seen.

Initial survey results included:

Specific production techniques and best management practices to be implemented such as:

- Fertilizer use and application to reduce nutrients used
- Irrigation system design and placement of drip tubes to reduce water used and increase efficiency of fertility used.
- Food safety and traceability issues are a reality
- Celery production
- Use of credit cards and ebt’s for retail sales
- Care and management of blueberry plants
- Spray equipment selection

New techniques and information being used by September interviews:

- Established new business contacts between growers and with vendors from the show
- New watermelon varieties
- Bee selection
- Portable freezer units
- Irrigation system changes (5 reported this)
- Improved strawberry production techniques, fertility and irrigation
- Bought Kennco equipment
- Reading labels on food at the store
- Food safety and traceability system investigation, still shopping
- GAPS certification being started (2 reported)

Goals and Outcomes Achieved

Goal

Fifty percent (50%) of the producers in attendance will verify through survey that they have seen an enterprise or practice that is of interest and use to them for implementation in their operation.

Outcome

Fifteen operations were represented in the group and 100% of the participants found at least one practice they were looking to implement in their operations in the future during a preliminary evaluation of the trip

Goal

Producer's implementing a specialty practice or crop will report the production output data to the NNVGA for reporting to the grantor.

Outcome

In the post trip evaluation(Sept.), producers from 8 operations were polled and all reported at least 3 practices or benefits of the trip being realized and/or implemented this season!

Goal

Increase producers awareness by their visiting at least 4 new facilities/operations during the field trip.

Outcome

Seven vegetable operations were visited on the field trip portion of the project. All of the post trip evaluations reported a favorite and least favorite stop. See itinerary attached.

Beneficiaries

The members of the NNVGA were the primary beneficiaries of the trip. The group totaled 27 members in total. While the exact number of acres of this data were not collected and full implementation of these practices has not been achieved, it fair to say that eventually the changes in irrigation methods alone could impact over 500 acres in time and the eventual savings in fertility and water significant which could effect water quality in the Ches. Bay. Further data collection for specific numbers will be required at a future date.

Lessons learned

It can get cold even in January in southern Florida! One might recall record low temperatures were experienced during the time of this trip and they were there to see firsthand how it was dealt with.

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Project # 17: Eastern Shore Ag Conference and Trade Show (Final)

I. Project Summary

The Eastern Shore Agricultural Conference and Trade Show has been a mainstay for Eastern Shore vegetable and grain farmers for over twenty years. Over 80% of the vegetable operations on the Shore are represented at the conference.

Subjects covered at the Conference are many and varied, from Marketing innovations and information to production issues, food safety Good Agricultural Practices and more. It is the one time of year where vegetable growers, scientists, and marketing specialists can interact on a variety of issues, such as those listed above.

In the past we have relied on exhibitors and sponsors to underwrite the cost of the Conference, and have kept those costs at reasonable levels so that both growers and vendors would have the opportunity to discuss issues with agribusiness men and women.

The funding provided by the grant has enabled us to continue to provide the latest and best information to specialty crop growers.

II. Project Approach

Event held annually in January 2010, 2011 and 2012.

<u>Activity</u>	<u>Due Date</u>
Set Date & Location of Conference	8/1
Letter Announcing First Committee Meeting	8/5
First Committee Meeting	8/19
Mail Letters to Potential Sponsors & Exhibitors	9/1
Contact Motels for rates and initial bookings	9/15
Arrange for Drapes and Tables	9/16
First Program Cut	10/1
Second Committee Meeting	10/21
Second Program Cut	11/1
Confirm all Speakers	11/1
Print Tickets to Banquet and Reception	11/15
Send letters to Special Guests	12/1
Send letters to all Speakers	12/2
Third Program Cut	12/5
Third Committee Meeting	12/8
Develop Survey	12/15
Publicity in County Agent's Newsletters	12/15
Arrange personnel for Registration Table	12/15
Special News Release	12/20
Arrange for Video Equipment	12/21
Final Program	1/6
Print Final Programs (With all Sponsors & Exhibitors)	1/6
Committee evaluation of Ag conf.	1/30

Budget Narrative:

Contractual / Building Rental: Specialty Crop Grant funds were used to offset meeting infrastructure costs. The grant funds were used specifically to pay for the design, tables and drapes of the exhibit area.

III. Goals and Outcomes Achieved

□ **Goal:** Provide a venue for all specialty crop growers on the Eastern Shore of VA and surrounding areas that will provide tools and resources to allow individuals to increase their competitiveness and profitability.

Performance Measure: # Specialty Crops producers at each conference (measured by registration and on-site survey)

Benchmark: We set the benchmark by means of a sign in registration at the entrance of the conference for each day. The status of growers was reviewed by extension and VDACS personnel.

2010-we had average attendance of 152 registrants for both days

55 registrants that were specialty growers

2011-125 average attendance

60 specialty growers- increase of 5 growers from 2010 to 2011- 9% year over year increase

2012-144 Average attendance

63 specialty growers increase of 3 growers from 2011 to 2012- 5% increase year over year

We exceeded our target of 2% increase yearly. According to estimates by Extension and VDACS personnel we attracted operations that represented between 80 and 90 percent of the commercial specialty crop growers on the Eastern Shore of Virginia

IV. Beneficiaries

Virtually every specialty crop farmer on the Eastern Shore and many of the service providers and agribusiness operators benefitted by the conference. In addition, it is a great venue for scientists, state and federal agencies, and NGOs to present the latest information to and interact with the Eastern Shore specialty crop community.

V. Lessons Learned

Farmers are hungry for information presented in the type of venue growers, scientists, agribusiness and NGOs can interact with each other both in presentations and casual individual meetings in the exhibit area.

VI. Additional Information

The total cost of the 2012 Ag conference was \$11,246.00, the specialty crop funds that paid for the infrastructure \$2945.00 was 26% of the total cost. The number of specialty crop growers constituted over 44% of the attendance. The comparison of percentages of cost to attendees indicates that the allocation of expenses to income that more than the entire grant amount was used specialty crop growers. With the exception of poultry, every session had applications for specialty crop growers. Almost every specialty crop grower represented at the conference grows crops other than specialty crops, almost all grow agronomic crops as a rotation for vegetables to maintain yields and help control insects and disease. Thirty two of Fifty four presentations dealt with specialty crop issues. Applying the same metric (percentage of cost to percentage of presentations) to that aspect of the Conference, 59% of all of the presentations (32 of 55) applied to specialty crop growers, far in excess of the 26% of the budget represented by the grant funds.

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