Maryland Department of Agriculture
Specialty Crop Block Grant
Agreement Number: 12-25-B-0928
Final Report

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FINAL REPORT
Project Title: Reducing the Barriers Facing Maryland Fresh Fruit and Vegetable Produces in Implementing an Effective Food Safety Program (GAPS)

PROJECT SUMMARY

The Maryland Department of Agriculture's (MDA) Food Quality Assurance Program (FQAP) has conducted Good Agricultural Practices (GAPs) and Good Handling Practices (GHPs) audits for fruit and vegetable producers and handlers through a cooperative agreement with USDA, AMS for several years. FQAP has also assisted the University of Maryland with providing training sessions to producers concerning GAPs and GHPs. During the audits and training sessions, FQAP identified economic and technical barriers for specialty crop producers trying to implement GAPs and/or GHPs. The purpose of this project was to mitigate food safety risks by reducing the economic and technical barriers to implementing GAPs. This project was important to producers as it was implemented as more and more buyers were requiring GAP certification as a condition for purchasing specialty crops. This project built on a previously funded project "Good Handling Practices and Good Agricultural Practices (GHP/GAP) Certification Cost-Share Assistance" that provided cost share assistance for certification fees for producers obtaining USDA GAP certification.

PROJECT APPROACH

The GAP program geared towards direct marketers and MD farm to school fruit and vegetable producers was developed and finalized. Fify producers attended training sessions geared towards USDA GAP certification. The USDA GAP training sessions included segments concerning trace back along with the basic principles of GAP (water, worker health and hygiene, manure use, livestock and wildlife). An additional 160 producers attended four training sessions that were intended for Direct Marketers but attended by both direct marketers and wholesale marketers as they still covered the basics of GAP. Trace back was not covered as it is not relevant to direct marketers. The MDA Direct Marketers/Farm to School program consists of attendance at an approved GAP training, development and implementation of a GAP Food Safety Plan and inspection by MDA. Criteria for passing the inspection has been established and is included as part of this report. MDA inspectors inspect actual farm operations and records to determine if the producer is in compliance. All producers receive a copy of the inspection report along with recommendations for improvements to their GAP program. Producers that pass the inspection receive a certificate from the MDA.

Criteria and application process for cost share was developed for the implementation of GAP practices and cost share was issued. One hundred producers received cost share for worker health and hygiene educational materials to implement good sanitation practices for production, harvest and packing workers. Thirteen producers received cost share assistance to implement good agricultural practices that improved water quality, improved sanitation of harvest and packing equipment, and improved pest control in packing sheds. Eighteen producers received cost share reimbursement for USDA GAP audit fees. The target audience was notified through training postings on MDA's website, direct emails to fruit and vegetable producers registered with MDA's Maryland's Best program, development of a University of Maryland Extension Bulletin and press releases.

The program determined that the seasonal nature of GAP inspections in Maryland would require cross training of additional staff to conduct GAP audits and/or inspections for the MDA Direct Marketers/Farm to School GAP program. Two additional MDA Food Quality Assurance Employees received training to become qualified as GAP/GHP auditors. Training included attendance at USDA training sessions, University of Maryland training sessions, the National GAP program GAP course and courses available on USDA's Ag Learn.

The overall scope of this project did not benefit commodities other than specialty crops. The University of Maryland including Cooperative Extension was a partner in this project and made significant contributions. In particular, they assisted FQAP in planning and presenting training, developing training materials and notifying specialty crop producers of the project.

GOALS AND OUTCOMES ACHIEVED

One of the goals was to increase the number of specialty crop farmers certified/approved by MDA as being in compliance with GAP. Thirty different farmers have become USDA GAP certified during this project. The same farmers do not always become recertified each year depending on crop yield and sales so the number has not increased significantly each year. However, MDA verified all thirty of these farmers have implemented GAPs that meet the USDA audit standards. Additional farmers have become implementing GAPs but have not yet requested the MDA inspection to verify compliance. Through communications with these farmers at training sessions, telephone calls and letters, MDA believes at least 100 farmers are in the process of implementing practices with the intention of requesting the MDA GAP audit.

Another goal of the project was to increase the number of specialty crop farmers that implement Good Agricultural Practices. One hundred producers have implemented better worker health and hygiene policies as a result of cost share of educational materials. Thirteen producers have implemented good agricultural practices related to water quality, harvest and packing equipment sanitation, and pest control using cost share reimbursement from this project.

Over two hundred producers have attended training sessions provided during this project. The training sessions provide specific details on improving the on farm good agricultural practices for specialty crop production. It is assumed that most of the 200 farmers attending these sessions have implemented at least some of the good agricultural practices.

BENEFICIARIES

Producers of fresh fruits and vegetables for the wholesale market, direct to consumer market and/or the farm to school market benefited from this project in several ways. Training sessions were provided that assisted over 200 producers in developing and implementing GAP programs. Many of these producers were being required by buyers to implement a GAP program if they wanted them to continue purchasing their specialty crops. Thirty specialty crop producers have been able to obtain USDA GAP certification. Another 100 have been working on their plans and have contacted MDA concerning their intentions to get the MDA Direct Marketers/Farm to School GAP inspection. Without the assistance in developing a GAP program, many of these producers would no longer be able to sell to retailers requiring GAP certification. Another 13 specialty crop producers applied for and received cost share assistance to make purchases

necessary to implement good agricultural practices related to water quality, harvest and packing equipment sanitation and pest control.

LESSONS LEARNED

Interactions with farmers concerning GAP identified the actual writing of food safety plans to implement GAPs is the biggest barrier. FQAP has obtained other Specialty Crop grants to assist farmers in writing and implementing GAPs to continue the work of this project. The goal of steadily increasing the number of farmers that are GAP certified was difficult to meet. Although producers implemented and requested audits initially, many did not request in subsequent years as their crop may have suffered significant pest damage, was being sold for processing instead of for the fresh market, etc. Initially, FQAP anticipated that once a producer became GAP certified they would maintain that certification each year. The primary reason farmers gave FQAP was there was no sense in spending the time and money for an audit if their buyer was not requiring it or they had little crop to sell.

CONTACT PERSON

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ADDITIONAL INFORMATION

MDA Good Agricultural Practices (GAPs) Inspection Report

Review Date _____

Farm Name
Location Address
City, State, Zip
Person Responsible for Overseeing GAPs

What high-risk crops are grown on your farm?
Leafy greens, tomatoes, berries and melons are considered to be the high-risk crops. Other uncooked crops can also pose a risk.

Does the farm have a written GAP/GHPs plan that addresses the requirements of the program?
☐ Yes ☐ No

Documentation: *Note that audit points 1, 9, 12, 13,15,19, 21(optional), 30, 33, 34, 35, 41, and 42 require documentation. This is shown as "Doc" in bold on the audit. The type of*

documentation required is explained under each corresponding statement. Example logs can be found on the Cornell National GAPs website (www.gaps.cornell.edu).

Farm and Field Section

Workers

1. Training on proper sanitation and hygiene practices is given to all staff and family.
   □ Yes □ No □ **Doc**
   Showing the Cornell Health and Hygiene video, and having workers sign a log after seeing it will be adequate.

2. Employees are following good hygiene/sanitation practices, including washing hands after eating and when using the bathroom, and before or when returning to work.
   □ Yes □ No

3. Signs are posted in bathrooms to remind workers of hand-washing and sanitation practices.
   □ Yes □ No

4. All toilet/restroom facilities are cleaned on a scheduled basis. They are supplied with paper towels, toilet paper, hand soap, and potable water.
   □ Yes □ No

5. Smoking and eating are done in designated areas, separate from where food is grown and handled. □ Yes □ No

6. Sick workers (with diarrheal disease or symptoms of other infectious diseases) are kept from handling fresh produce.
   □ Yes □ No

7. There are procedures in place for dealing with produce or food contact surfaces that have come into contact with bodily fluids. All workers follow these procedures.
   □ Yes □ No

8. Workers are required to seek treatment for cuts, abrasions, and other injuries.
   □ Yes □ No

9. Pesticide applicators applying restricted materials must have a pesticide applicator's license or work under the supervision of a licensed applicator.
   □ Yes □ No □ **Doc (Copy of pesticide applicator's license)** □ N/A, we do not use restricted materials.

10. If field sanitation units (ex: porta-potties) are used, they are placed in a location accessible to workers, and are not placed in crop production areas, and measures are taken to reduce the possibility of contamination.

□ Yes □ No □ N/A, we do not use portable toilets.
An example distance would be having porta-potties placed at least 30 feet from fields.

11. Procedures are in place in the event of a spill or leak of field sanitation units or toilet facilities.
□ Yes □ No

Water

12. Water tests for *coliform* have been completed for each water source. If test results are undesirable, sufficient mitigation tests have been taken.
□ Yes □ No □ **Doc**
Water test results should be attached. Mitigation steps include treating pond with potassium permanganate, using sand filters, allowing time barrier between the application of water and harvesting crop, shocking the well, using chlorine injectors or using a different irrigation method.

List the water sources and type of irrigation you use on your crops, and what crops they are used on:

_____

_____

_____

Water testing guidelines
Water testing frequency:
Surface water source test: 3 times a season (at first use, peak use, harvest).
Well water tests: once a season (at first use).
Municipal: at least once a season, records obtained from county.

Water test results:
Contact water: Average should be less than 126 cfu/100ml water.
One sample is allowed to be 235 cfu/100ml water.
Contact water includes irrigation methods where water will touch the crop, such as sprinkler/overhead irrigation, frost protection, etc.

Noncontact water: Average should be less than 126 cfu/100 ml water.
One sample is allowed to be 576 cfu/100ml water.
Noncontact water includes irrigation methods where water does not touch the crop, such as drip/furrow irrigation.

13. Potable (drinkable) water is available to all workers.
□ Yes □ No □ **Doc**
Include a copy of any water tests for potable water sources. There should be one test done at the beginning of each year.

14. A water quality assessment has been performed to determine the quality of water used for irrigation purposes and frost/heat protection on the crops being applied.
    □ Yes □ No
    The water quality assessment should address type of irrigation used, water source, and risks associated with each practice.

15. Potable water is used for the application of pesticides and other chemical materials on crops.
    □ Yes □ No □ **Doc** □ N/A, pesticides and chemicals are not applied

16. Steps are taken to prevent the contamination of irrigation water (from direct or indirect sources).
    □ Yes □ No
    These steps may include preventing runoff with fecal matter to water sources in low-lying areas, having the septic system and wells located a reasonable distance from each other, and ensuring that the well casing and cap are secure, among others.

17. If land has been flooded with potential fecal contamination, the field is considered adulterated and is not harvested.
    □ Yes □ No □ N/A, land has not been contaminated or flooded.
    According to the FDA, produce flooded with fecal contamination is "adulterated", and must be thrown out. Any later plantings are fine (for example, if a field is flooded in July, a fall crop can still be planted and is considered fine).

Animals

18. Crop production areas are not located near manure lagoons, manure storage or animal production areas. If so, barriers exist to prevent contamination from those areas.
    □ Yes □ No □ N/A, we have no manure lagoons, manure storage, or animal areas.
    Barriers may include a grasser buffer strip, keeping crop fields/packinghouses uphill from animals, keeping animal production areas a distance from crop fields, and not planting high-risk crops near these areas.

19. Crop production areas and agricultural water sources are monitored for signs and presence of wild and domestic animals. Reasonable measures are taken to prevent animals from entering the fields and water sources.
    □ Yes □ No □ **Doc**
    Keep a log of animal (both domestic and wild) activity seen in fields. Reasonable measures of animal prevention include traps, kill permits, propane canons, etc.

20. If animal feces are found in fields, steps are taken to reduce contamination.
    □ Yes □ No
    This may include walking the fields before harvest and flagging fecal contamination. During harvest, crops are not picked within a specified radius of fecal matter.

21. **Fertilizer Type (check the option that applies, then answer questions under that option)**

□ *Option A: No Manure/Compost is Used*

a. No manure or compost is used.
   □ Yes □ No
b. Only synthetic fertilizers are used.
   □ Yes □ No

□ *Option B: Raw manure*

a. If raw manure is used, it is incorporated into the soil at least 2 weeks before planting and is applied 120 days before harvest (90 days for crops that do not touch the ground).
   □ Yes □ No □ **Doc**

b. Manure is stored properly prior to use, with efforts made to reduce contamination into crop production areas.
   □ Yes □ No

□ *Option C: Composted Manure*

a. Only composted manure is used as a soil amendment.
   □ Yes □ No
b. Composted manure is properly treated and composted.
   □ Yes □ No □ **Doc**
   A log needs to be kept of date, temperature, and how often compost is turned.
   Proper composting includes: Carbon to Nitrogen ratio of 25:1 – 40:1.
   Compost reaching temperatures between 131°F -- 170°F for at least 15 days.
   Turned 5 times during the process.

c. Composted manure is properly stored, so that contamination to fields is minimized.
   □ Yes □ No

d. If compost or treated manure was bought, a certificate of compliance is included from the manufacturer.
   □ Yes □ No □ **Doc** □ N/A, compost was not bought.

Field Harvesting and Transportation

22. If the farm history has been something other than agricultural for the past 3 years, it is explained in the plan. Previous potential land-use risks have been assessed and mitigated.
   □ Yes □ No □ N/A, the farm has been agricultural for over 3 years.

23. All harvesting containers and bulk hauling vehicles that have direct contact with crops are cleaned and/or sanitized on a scheduled basis. Measures are taken to remove excess dirt and mud from produce and containers during harvest. Damaged containers are properly repaired or disposed of.
   □ Yes □ No

24. All hand harvesting equipment and implements (such as knives, pruners, etc) are kept as clean as practical and are disinfected on a scheduled basis.
    □ Yes □ No □ N/A, no hand harvesting equipment is used.

25. Harvesting equipment and/or machinery that comes into contact with the product is in good repair. □ Yes □ No □ N/A, no machinery comes into contact with the product.

26. Light bulbs and glass on harvesting equipment are protected, so that produce is not contaminated if one breaks. If anything breaks, a procedure is set for cleanup and disposal.
    □ Yes □ No □ N/A, no light bulbs or glass are over the produce.

27. If crop contamination by chemicals, petroleum, or pesticides occurs, there is a cleanup procedure.
    □ Yes □ No

28. If crops are mechanically harvested, the crop is inspected at harvest for glass, metal, rocks, and other foreign items.
    □ Yes □ No □ N/A, crops are not mechanically harvested.

29. Harvesting containers and baskets are not used for carrying/storing non-produce items.
    □ Yes □ No

30. Water applied to the harvested product is potable.
    □ Yes □ No □ **Doc** □, N/A, no water is applied to the harvested product.
    Records for this water source may already be included, if source is used for drinking water or irrigation.

31. Transportation equipment for moving crops is clean and in good repair.
    □ Yes □ No

32. Containers used in field pack operations are stored under cover and are protected from contamination.
    □ Yes □ No

Packing House and/or Storage Area

33. Any water and ice used in the packinghouse or for storage is potable.
    □ Yes □ No □ **Doc** □ N/A, no water or ice are used in the packinghouse or for storage.
    Records may already be included. If the ice was purchased, include a receipt.

34. If dump tanks are used, or water is reused, the water needs to be treated to reduce microbial contamination. If not, alternative mitigation steps are in place.
    □ Yes □ No □ **Doc** □ N/A, dump tanks are not used.
    This may include treating with bleach at a rate of 50-200ppm (or up to 4ppm for organic production). If a sanitizer is used, the ppm, water temperature, and water pH (between 6

-7.5) must be monitored and recorded. This allows for maximum effectiveness of the sanitizer in reducing microbes.

35. Any surfaces that contact water or the crop during packing, storage, and transport (packing lines, dump tanks, flumes, coolers, trucks, etc.), are cleaned and sanitized on a scheduled basis.
    □ Yes □ No □ **Doc**

    Include a log of when cleanings occur.

36. Product flow zones are protected from contamination. Any glass materials over product are contained, and pipes, fans, and the ceiling above product are clean.
    □ Yes □ No

37. Only food-grade materials and chemicals are used on the packing equipment. Chemicals not approved are stored away from the packing area.
    □ Yes □ No □ N/A, no chemicals are used on the packing equipment.

38. The packing house and storage area is reasonably clean, free of litter and standing water.
    □ Yes □ No

39. Worker's break facilities are located away from the product and packing area. No eating, smoking, etc. are done at the packing line.
    □ Yes □ No

40. Pallets and containers are cleaned on a scheduled basis.
    □ Yes □ No

41. Measures are taken to exclude animals and pests (such as flies, pets, rodents, and birds) from storage and packing facilities. The pest control program is explained in the food safety plan, and a log is kept for pest sightings and kills.
    □ Yes □ No □ **Doc**
    Various measures can be taken to control pests: mouse traps (sticky, snap traps, and reusable claw traps), live traps, sticky fly traps, and bird deterrents. Poison traps may only be used on the outside of the packinghouse, where contamination to produce cannot occur.

42. The temperature of any climate-controlled rooms and areas (such as coolers) are monitored and recorded on a scheduled basis.

□ Yes □ No □ **Doc** □ N/A, we have no climate-controlled rooms.
A log should be kept with the date and cooler temperature.

43. Produce is not loaded or stored with potentially contaminating products. Trucks and any means of transportation are thoroughly cleaned before hauling produce.
□ Yes □ No

Audit Summary

Immediate Action Required

The following conditions will result in an **automatic failure**. In order to pass, the grower will correct the unsatisfactory points and have the auditor come out at a later date.

- Having no documented and written food safety program that incorporates Good Agricultural Practices.
- The presence of rodents, an excessive amount of insects and other pests during packing, processing, or storage, and/or other gross unsanitary practices.

- Having a "No" answer for any of the following audit points:
  - 1. Training on proper sanitation and hygiene practices is given to all staff and family.
  - 12. Water tests for *coliform* have been completed if water is used for crops…
  - 17. If land has been flooded with potential fecal contamination…
  - 21, option A, a.: If raw manure is used, it is incorporated into the soil….
  - 21, option B, b.: Composted manure is properly treated and composted.

Corrective Action Necessary

This section refers to any of the audit points not listed in the above "Immediate Actions Required" section. By themselves, a "No" answer to these audit points **does not result in an audit failure**, but may require some attention. The auditor will fill out the suggestions for compliance below.

Suggestions:

Auditor Signature: _____
Date: _____

Grower Signature: _____
Date:_____

FINAL REPORT
Project Title: Maryland's Best – Promoting and Marketing of Maryland's Specialty Crops

PROJECT SUMMARY

The Maryland Department of Agriculture (MDA) created the "Maryland's Best" program to enable producers to capitalize on the consumer's preference for local agricultural products including specialty crops. The Specialty Crop Block Grant program enabled MDA to enhance the Maryland's Best program for specialty crop producers including website and various media promotions for retail and wholesale markets.

In surveys of Maryland specialty crop farmers in the winter of 2008-09, Maryland Department of Agriculture documented producers' desire to increase demand for their products and their access to markets. In addition, reports from Governor Martin O'Malley's Transition Team for Agriculture and the Maryland Agricultural Commission have identified marketing as a top priority. This project was designed to accomplish both of those tasks. Maryland is the fourth largest retail market in the nation, with a population of more than 5.6 million and $82.1 billion in retail sales in 2005. Maryland consumers represent an affluent market for products and services. With an identified preference for Maryland-grown specialty crops, the Maryland's Best program was positioned to leverage federal specialty crop funds into increased market opportunities for Maryland farmers.

PROJECT APPROACH

MDA's promotions connected Marylanders through radio, TV, print, and online media by advertising nursery and greenhouse plants and flowers, strawberries, wine, the Buy Local Challenge, watermelons, peaches, apples, pumpkins, and Christmas trees as part of the strategy to promote specialty crops and stimulate the demand for local agricultural products. We did not set specific goals for pageviews, bounce rate or time spent on the web site. We monitor this information monthly to determine the usage of Maryland's Best web site. In addition we connected specialty crop producers to consumers and wholesale buyers through special promotions and event such as the Buyer-Grower Expo and PMA Fresh Summit.

Project Activity	Timeline	Notes
Developed a advertising/promotion campaign to promote Maryland specialty crops with Maryland's Best	December 2009 – February 2010	Completed by MDA
Identified appropriate media mediums, i.e. radio, tv, social networking	February 2010	Completed by MDA
Implemented campaign (April – Maryland wine; May- specialty crops including strawberries, asparagus,	April 2009 – December 2011	Completed by MDA

greens; June-specialty crops at farm-stands, farmers markets and along vacation routes; July-Eat Local Specialty Crop Challenge, Maryland peaches, fruits, vegetables; August-Maryland watermelons; September – Maryland green industry, nursery products; October-Maryland apples; November- December-Maryland Christmas trees)		
Measured results to website by using Google Analytics	Ongoing	Completed by MDA
Developed a watermelon and apple promotion at Produce Marketing Association Trade Show targeting wholesale buyers	September 2010, September 2011	At PMA Fresh Summit MDA and Apple Farmers exhibited and networked with Buyers from grocery retailers.
Organize buyer-grower meetings	December 2009, Dec. 2010	Completed by MDA
Hold buyer-grower meetings	January 2010, January 2011	Completed by MDA

2010 Advertising

Month	**Target Promotion**	**Target media**	**Web Visits**
April	Wine	WYPR, WTOP	3,314
(***) is made possible by the Maryland Department of Agriculture, inviting listeners to tour one of Maryland's five wine producing regions to enjoy the quality vintages offered by the areas' wineries. To find a local vineyard, as well as stores and restaurants featuring Maryland wine, marylandsbest.net.			
May	Strawberries	WYPR, WTOP, Press Release	3,299
(***) is made possible by the Maryland Department of Agriculture, inviting listeners to enjoy fresh Maryland strawberries. When selecting berries, be sure to look for a full, bright-red color, and firm, plump flesh. To find farms stands and farmers' markets featuring Maryland berries, marylandsbest.net			
June	Specialty Crops on Beach Routes	WTMD, WSCL, WYPR, WAMU, Press Release	3,024
(***) is made possible by the Maryland Department of Agriculture, inviting listeners to stop at a Maryland farm market on the way to the beach or other vacation destination. Enjoy locally produced berries, greens and other products. To find a local farm stand, marylandsbest.net			
July	Buy Local Challenge	WBAL, WJZ, WSCL, WTOP, WYPR, Press Release	4,936

(***) is made possible by the Maryland Department of Agriculture, inviting listeners to eat locally grown and produced foods during Maryland's ' Local Challenge' July 17th through the 25th. Available at farmer's markets, farm stands and the "local aisle" of grocery stores. For information, marylandsbest.net. Eating local is good for the environment and good for Maryland.			
August	Watermelons/Peaches	WYPR, WTOP	3,612
Summer is in full swing, and what better way to enjoy a hot day than with a cold slice of homegrown watermelon. The Maryland Department of Agriculture invites you to try locally produced Mar-Delicious watermelons. To find a market featuring fresh, juicy watermelons, marylandsbest.net			
September	Nursery & Greenhouse	WTOP, WYPR, WSCL, Q105	2,128
This hour is sponsored by the Maryland Department of Agriculture and Maryland Nursery and Landscape Association, inviting listeners to enjoy the outdoors and to care for gardens. To learn about planting trees, shrubs, bulbs and flowers to enjoy next spring and summer, and to find a local nursery, marylandsnest.net			
October	Pumpkins	WYPR, WTOP,	3,102
(***) is made possible by the Maryland Department of Agriculture, inviting listeners to venture outdoors and discover Maryland's pick-your-own pumpkin patches. This fall, local farms have pumpkins, corn mazes, hayrides, and more. To find these and other activities, marylandsbest.net			
December	Christmas Trees	WYPR, WJZ, WBAL, Baltimore Sun	2,208
(***) is made possible by the Maryland Department of Agriculture, inviting listeners to venture outdoors and visit Maryland's cut-your-own tree farms. This holiday season, local farms have trees, wreaths, garlands, and more. To find a farm, marylandsbest.net			

2011 Advertising

Month	**Target Promotion**	**Target media**	**Web Visits**
April	Nursery and Greenhouse	WYPR, WAMU, WJZ	3,082
(***) is made possible by the Maryland Department of Agriculture, inviting listeners to enjoy the outdoors and to care for gardens. To learn about planting trees, shrubs, bulbs and flowers to enjoy this spring and summer, and to find a local nursery, marylandsnest.net			
May	Strawberries	WYPR, WAMU, Press Release	2,994
(***) Support for WAMU comes from the Maryland Department of Agriculture, inviting listeners to enjoy fresh Maryland strawberries. When selecting berries, be sure to look for a full, bright-red color, and firm, plump flesh. To find farms stands and farmers' markets featuring Maryland berries, marylandsbest.net			
June	Wine	WTMD, Urbanite, Press Release	3,444
July	Buy Local Challenge	Urbanite, Washington Post, WJZ, WSCL, WTOP, WYPR, Press Release	4,464

(***) is made possible by the Maryland Department of Agriculture, inviting listeners to eat locally grown and produced foods during Maryland's Local Challenge, July 23rd through the 31st. Available at farmer's markets, farm stands and the "local aisle" of grocery stores. For information, marylands best dot net. Eating local is good for the environment and good for Maryland.			
August	Watermelons/Peaches	Urbanite, Washington Post, WJZ, WYPR	2,965
September	Apples	Urbanite, Washington Post, WYPR, Press Release	2,044
October	Pumpkins	Urbanite, WTOP, WJZ, Washington Post, WYPR, Press Release	3,227
(***) is made possible by the Maryland Department of Agriculture, inviting listeners to venture outdoors and discover Maryland's pick-your-own pumpkin patches. This October, visit a local farm to select a pumpkin for the perfect jack-o-lantern or to make your favorite fall treat. To find a pumpkin patch near you, go to marylandsbest.net			
December	Christmas Trees	Urbanite, Washington Post, WJZ, WYPR, WTOP, Press Release	3,567
(***) is made possible by the Maryland Department of Agriculture, inviting listeners to venture outdoors and visit Maryland's cut-your-own tree farms. This holiday season, local farms have trees, wreaths, garlands, and more. To find a farm, marylandsbest.net			

Buyer-Grower Event

In January, MDA hosted a Buyer-Grower Event at the Elks Lodge in Annapolis, MD. This tradeshow style event is designed to connect Maryland specialty crop growers with buyers from grocery retailers, restaurants, schools, and other venues. In 2011, we had nearly 200 participants in the event which included specialty crop buyers from Ahold, Hanover Foods, Wegmans, Safeway, Fresh Market, Whole Foods, and top Maryland restaurants. In addition, a Buyer-Grower Event directory was created and distributed to link specialty crop producers with buyers.

Maryland's Best Soundbooks and DVDs

MDA continues to work with a professional photographer to expand on our "Sound Books." Sound Books bring the story of Maryland's farmers to the consumer; it's a photographic slideshow with narration from the farmer. Cut flowers, fruits and vegetables, PYO's and microgreens were profiled in the sound books. The soundbooks were placed on Maryland's Best website and shown in some grocery store chains and trade shows. The images and sound are of high quality and it made an attractive promotional item. Links to the soundbooks can be found at Maryland's Best Soundbooks. They are also promoted through social media to Maryland's Best followers including journalists, food bloggers and consumers.

PMA Fresh Summit

From October 15-17th the Marketing Office of the Maryland Department of Agriculture exhibited at the PMA Fresh Summit in Atlanta, GA. Fresh Summit is one of the largest fresh produce and floral expos and includes over 800 exhibitors and more than 18,500 attendees. MDA's 2011 Fresh Summit strategy was to reach out to specialty crop buyers and directors for grocery retailers and government commissaries. The initial contact with the specialty crop buyers was made through an email and calling campaign, offering MDA's services and efforts in finding out how we could best serve the retailers and commissaries. A number of these contacts confirmed that they would be stopping by our booth and were very interested in learning more about specialty crops from Maryland growers.

During the trade show, MDA had a 10ft x 10ft booth that featured a DVD on Maryland specialty crop growers, Maryland grower directories for buyers, new Maryland's Best promotional give-aways, informational handouts on Maryland "Local" laws and market research on Maryland consumers, and a chance to meet and get an autographed picture from the 2011 Mar-Del Watermelon Queen.

In total, we had over a hundred people stop by our booth and 50+ meaningful attendees stop by for networking opportunities, inquiries on Maryland specialty crop growers, and information on MDA marketing campaigns. This included meetings with the following retailers and buyers: Acme Markets Inc, BJ's Wholesale Club, C.H. Robinson Worldwide Inc., Coosman's DC Inc., DY Import Co. (H-Mart), Food Lion, Giant Eagle, Harris Teeter, Mars Super Markets, Inc., National Farm, Philadelphia Wholesale Produce Market, Safeway, Teddy Bear Fresh, and Yates Mushroom Co. Inc. In addition, we met with a former commissary buyer who now works as a consultant, to discuss MDA's strategy to work with the commissaries on buying local Maryland specialty crops.

MDA's presence was important at this trade show and the benefits of strengthening our working relationships with retailers, continues to show. The follow up from the event included helping buyers source Maryland grown specialty crops, arranging for farm tours for large retail buyers (Harris Teeter and Costco, more to come), introducing Maryland specialty crops to commissary buyers, collaboration on Point-of-Purchase advertising, and additional advertising opportunities.

Specialty Crop Promotional Items

MDA purchased and distributed over 5,000 Maryland's Best bags, 1,000 notebooks and notepads, 1,000 sharpies, and 200 posters all of which promote specialty crops or instruct consumers to go to the Maryland's Best website to find specialty crops. These promotional items were given to Maryland specialty crop consumers and wholesale specialty crop buyers.

This project only funded specialty crop promotions as indicated in the work plan. Other Maryland's Best promotions and advertising were charged to Maryland state general funds or other through support from commodity groups.

GOALS AND OUTCOMES ACHIEVED

Goals	Outcomes
Increase visits to	In 2010, visits to the Web site increased from 25,279 to 35,914

Maryland's Best Web site	which is a 30% increase. This is 5% more than our goal of 25%.
Increase access of specialty crop producers to diverse marketing channels	During this period we have grown the Buyer-Grower Event to include 200 participants.
Maintain Maryland consumers' preference local through promotions and advertising.	According to the University of Baltimore's Schaefer Center study the consumer preference for local produce has stayed at 77 – 78%.

BENEFICIARIES

Specialty crop producers throughout the state benefited from marketing efforts funded by the Specialty Crop Block Grant. According to the 2007 USDA NASS Census there are 1,581 farmers in the state who produce specialty crops. To break it down: there are 518 vegetable farms, 390 fruit producers and 673 greenhouse and nursery farms. Additionally consumers of specialty crops benefited from the connection to Maryland producers. Using Maryland's Best visits as an approximation would imply more than 50,000 consumers were able to identify sources of local specialty crops in the period of this grant.

LESSONS LEARNED

After reviewing the results of the research conducted for the watermelon industry, the Maryland watermelon growers decided they did not want to follow up on the Canadian project and to continue with regional watermelon marketing efforts only. MDA kept the findings from the research on the Canadian market and will use them at a later date when the Maryland growers are ready.

CONTACT PERSON

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ADDITIONAL INFORMATION

Various ads used in promotions

FINAL REPORT
Project Title: Jane Lawton Farm to School Program – Promoting Healthy Eating and Marketing Maryland Specialty Crops to Maryland School Children

PROJECT SUMMARY

In 2008, the Maryland General Assembly established the "Jane Lawton Farm-to-School Program" to promote the sale of Maryland farm products to local schools. The program is now called the "Maryland Farm to School" program. The legislation included developing a farmer database, an annual promotional event, and experiential learning for students. There was no funding and no authority to force participation. Rather, the legislation set an expectation of collaboration among state agencies and Local Education Agencies (LEA's). First year participation included 22 of Maryland's 24 LEA's and more than 30 farmers, with coverage in more than 36 news articles and news spots. In Maryland, each LEA has different procurement regulations and they are self-operating except for one LEA, i.e. the LEA runs the USDA Childhood Nutrition programs instead of contracting out the service.

This project built on that strong beginning to increase consumption of specialty crops. The grant allowed us to implement educational and promotional programs to increase student awareness and consumption of Maryland-grown fruits and vegetables, study the potential of Maryland frozen specialty crops, and promote partnerships involving local businesses, parents, and other interested citizens.

PROJECT APPROACH

With the combination of promotions, connecting producers with Foodservice Director's at the Buyer-Grower meetings, workshops, and the use of the website, Facebook and Twitter, the Maryland Farm to School continues to drive increased consumption of locally grown produce in Maryland public schools. Each of the 24 county school systems participated in buying local fresh fruits and vegetables for the program. For example, in Harford County Public Schools (HCPS) the school system buys direct from 8 farms, they have 38,000 students in 54 schools with 15 production kitchens and serve nearly 5 million meals during the school year. In the Maryland growing season, HCPS purchased 70-80% of their produce locally. The school system also received a grant to install a walk-in cooler specifically for its farmers to deliver directly to HCPS. In another example, a Maryland apple producer which provides apples to a county for 9 months out of the year was called "a rock star" by the local FoodService Director (FSD). This acknowledgement of the apple producer would not have happened it wasn't for the Maryland Farm to School program. Funds were used to solely enhance the competitiveness of specialty crops by emphasizing the purchase of fruits and vegetables for the schools.

The Maryland Farm to School program created a website which lists "County Resources" which listed the FSD's, Agricultural Extension Agent, Agricultural Marketing Professional and others. This information connects the various entities to each other. If a producer wanted to find out about the procurement contract practices for each of the counties, the producer would be able to

find the contact information on the website. We found it was difficult to obtain procurement information for variety of reasons, i.e., contracts are changing on a annual basis and the passage of the Healthy Kids, Healthy Food Act.

Buyer-Grower Event
Through the Maryland Department of Agriculture Buyer-Grower events, FSD's and their distributors are invited to attend the event to meet with the producers. These events are great opportunities to learn of the FSD's needs and to connect them with the producers at the event. This past year, we had 9 of the 24 FSD's attend the event. It is through the Buyer-Grower meetings and the Directory that connects the buyers and producers to one another to forge a relationship. In the Farm to School program, we learned that while the Directory is useful, it's through workshops and meetings and word-of-mouth that created a connection between the buyer and producer.

Soundbook and Video Contests
Created a "Soundbook" (http://mda.maryland.gov/farm_to_school/Pages/farm_to_school.aspx) which focused on Harford County Food Service Director and a local farmer, and a implemented a video contest among Maryland school children.

Maryland Homegrown School Lunch Week
There has been a "Maryland Homegrown School Lunch Week" since the inception of the program. The purpose of the week is to see more local, fresh food in school lunches, not only to improve childhood health but also to help students them learn about the importance of Maryland farms to our environment and daily lives. The Homegrown School Lunch week not only provides effective learning activities, it's also a lot of fun for students and other participants. Governor Martin O'Malley has officially designated the third week of September as Maryland Homegrown School Lunch Week. The kick-off event for Maryland Homegrown School Lunch Week has been celebrated in the following counties: Montgomery, Anne Arundel, Harford, St. Mary's and Dorchester. Over 1,500 posters and 300,000 bookmarks and\or stickers at the Point of Sale were also distributed to the 24 county public school systems, one poster and 200 bookmarks and\or stickers for every school in the state prior to the kick-off.

Workshops
We held a *Maryland Farm to School Workshop: Growing the Connections* in February 22, 2012 on Maryland's Eastern Shore. The purpose of the workshop is for Maryland fruit and vegetable producers from the Eastern Shore to explore opportunities to incorporate more local product in school meal programs. All nine FSD from the Eastern Shore of Maryland attended the day-long workshop along with 20 specialty crop producers.

A staff person from MDA's Marketing Dept. was co-chair and the Farm to Institution track leader for the *2012 Future Harvest conference: Farm to Institution: Making Local Food Economies a Reality*. This track looked at different aspects of how specialty crop producers and local institutions including schools can connect to the benefit of agricultural economy and the institution's bottom line. One of the highlights of the track included a workshop on "Turning

Good Food Into Great Meals Kids Will Eat" which featured Andrea Early of the Harrisonburg City Public Schools in Virginia and Ed Ed Kwitowski, of DC Central Kitchen.

GOALS AND OUTCOMES ACHIEVED

Goal	Objectives
Increase participating counties from 22 to 24.	Maryland is the first state in the country to achieve 100% participation from its LEA's. In 2012, 24 out 24 school systems participated in Maryland's Homegrown School Lunch Week and provide over 800,000 million public chool students with improved knowledge and consumption of locally grown produce.
Increase participating farmers from 30 to 45.	The number of participating farmers in the program as of 2012 was 60 producers.
Increase public involvement; increase participants in the Maryland Farm to School initiative from 150 to 300.	We created a Facebook page and Twitter feed to increase public participation and updated the "County Resource Map" on the Maryalnd Farm to School website. We have over "300" likes on the Facebook page.
Increase transparency of school procurement regulations and availability of locally-grown products in schools	Populated the Maryland Farm to School website with more information and created a handbook on the website (www.marylandfarmtoschool.org) which includes a County Resource Map to connect interested farmers to school food service directors and vice versa. Under
Extend and expand marketability of locally-grown products	Researched distribution and IQF processing needs to expand processing throughout the school year (e.g., frozen vegetables, pizza sauce).

BENEFICIARIES

Over 800,000 students enjoy lunches that include Maryland yellow squash casserole, cucumbers, zucchini, corn on the cob, cherry and grape tomatoes, apples, peaches, lettuce, sweet potatoes, and watermelon to name few. Sixty specialty crop producers have diversified their business and marketing plans by selling to the schools. Twenty-four LEA's have either develop relationships with their local specialty crop producers or worked through their foodservice distributor.

LESSONS LEARNED

MDA worked extensively with 2 processors in 2010 to determine the feasibility of expanding the market of locally-grown specialty crops for Maryland public schools. The Maryland Correctional Enterprises (MCE), a state agency which trains and employs offenders in a conglomerate of business units located in the major State prisons, developed a business plan to create a processing plant to process approximately 7 million pounds of Maryland grown vegetables. In 2011, MCE decided to focus its capacity elsewhere. MDA also invited several commercial vegetable processors to a meeting in 2010 and only one vegetable processor accepted the invitation. The vegetable processor has an IQF facility and it processes several Maryland specialty crops which would be ideal for the schools. However, most of the public

schools purchase or get "credits" for their frozen vegetables through the USDA commodity program. Since the schools receive "free credits" for the vegetables, it's difficult for a commercial processor to compete with the USDA commodity program.

The USDA's Food and Nutrition Service Small Procurement threshold is $150,000 while Maryland's Small Procurement Threshold is $25,000 and in some cases, it may be smaller according to the procurement rules of the LEA's. The State's small procurement threshold maybe a challenge for LEA's to use to purchase local specialty crop products.

The Maryland Farm to School video contest in 2011 did not occur this year due to staff's limited-capacity since a staff person left MDA's marketing unit.

Seasonality, volume, and processing continue to be a challenge for Maryland specialty crop producers to sell to schools.

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ADDITIONAL INFORMATION
Promotion Materials

Farm to School sticker

Example of Farm to School Poster for Specialty Crop Producers (the school poster is similar minus the tag line on the bottom of the poster)

2012 Maryland Homegrown School Lunch Week Activities
Listed by County

Below is a snapshot of activities that are occurring during Maryland Home Grown Lunch Week based on a survey of school systems, it is not necessarily an inclusive list of all activities.

Allegany County Public Schools	
Local Products	Red Gala Apples
Local Farmers	Rinehart Orchards
Special Events	Local apples will be the choice for fresh fruit on the menu. Featured on the menus and posters in the cafeterias.
Anne Arundel County Public Schools	
Local Products	Green Beans, Grape Tomatoes, Watermelon, Nectarines, Red and Golden Apples, Yellow Squash, Zucchini
Distributor	Coastal Sunbelt
Local Farmers	C & E – Green Beans Lipman – Grape Tomatoes Coast Growers – Watermelon Colora – Nectarines, Red and Gold Apples Piscataway – Yellow Squash, Zucchini
Special Events	Local food items will be incorporated into school lunch menus.
Baltimore County Public Schools	
Special Events	West Towson Elementary School will celebrate all week long with tastings, table tents with the name of the produce and the farm from which it was sourced, the students do morning announcements on the TV station with fun facts about each type of produce and recipes.
Calvert County Public Schools	
Local Products	Corn on the cob
Local Farmers	Swann Farms
Special Events	Homegrown School Lunch Week Celebrations at Beach Elementary on Sept. 19 and St. Leonard Elem on Sept. 21. Each school will feature: Farmer Joe, aka Joe Swann; Cornelia from the S. MD Ag Development Commission; Seed ID and Planting and Growing. Students will also husk corn to be served in the school lunches.
Caroline County Public Schools	
Local Products	Tomato salad, corn, melon, lettuce, sweet potato
Special Events	Local food items will be incorporated into school lunch menus.
Carroll County Public Schools	
Local Products	Watermelons and Tomatoes from Deep Run Farms, Macintosh Apples from

	Baugher's Orchard, Potatoes from Wike Farm in Carroll County. Nectarines and pluots from our produce vendor that were grown on neighboring county farms.
Special Events	Carroll County Public Schools will be featuring locally grown produce from Carroll County and surrounding areas in ALL 43 school locations. Signage will accompany the products when possible actually identifying the farm it was purchased from. This week that celebrates the bounty of our local farming community ties in nicely with our overall campaign to increase the amount of fruits and vegetables being eaten by the students as part of their school lunch and school breakfast. Along with the Partnership for a Healthier Carroll County, Carroll County Public Schools have been encouraging healthy eating in both the classroom instructional setting and the practicing setting of the cafeteria. By offering fresh local products during MD Homegrown School Lunch Week and whenever possible in Carroll County we support our students and local farm community.
Cecil County Public Schools	
Local Products	Asian pears, apples, watermelon, green peppers, red onions, corn, and ice cream
Local Farmers/Growers	Brick House Farms, Fairwinds Farms, Priapi Gardens, Milburn Farms,Colora Orchards, Hudock Apple Orchard, and Kilby Cream
Special Events	Displays in various schools sponsored by Fairwinds Farms, Milburn Farms, Hudock Apple Orchard, and Kilby Cream
Dorchester County Public Schools	
Local Products	Bison, sweet potatoes, apples, tomatoes and watermelon
Local Farmers	Emily's Produce, Friendship Farm, Humphrey's Reid Farm, Simmons Center Market, Chicone Farms, Loyal Purpose Farm and SB Farms.
Special Events	F2S Celebration Event will be held at N. Dorchester High School on Tues, Sept. 18. See MDA's press release
Frederick County Public Schools	
Local Products	Watermelon, apples, peaches
Local Farmers	Catoctin Mountains
Special Events	Local food items will be incorporated into school lunch menus.
Garrett County Public Schools	
Local Products	Corn, hydroponic lettuce from high school, hamburger, sausage
Education Connection	Northern Garrett High School raised the hogs for the sausage. Southern Garrett High School Ag raised the hydroponic lettuce for the school system during Maryland Homegrown School Lunch Week.
Harford County Public Schools	
Local Products	Watermelon, apples, nectarines, peaches, green peppers, grape tomatoes, large tomatoes, zucchini, yellow squash, cantaloupes and cucumbers
Local Farmers	Susquehanna Orchards, Shaw Orchards, Jones Family Produce Farm The Mill of Bel Air, Lohr's Orchard, Wilson's Farm Market, Keany Produce. More information on the website: http://www.hcps.org/departments/businessservices/foodandnutrition.aspx

Special Events	Recently installed a walk-in cooler specifically for local farmers to drop off their product for the schools.
Howard County Public Schools	
Local Products	Apples, tomatoes, cucumbers, watermelon, cantaloupe, honey dew melon, yellow squash
Special Event	Local food items will be incorporated into school lunch menus
Kent County Public Schools	
Local Products	Pears, sautéed summer squash, tomatoes, corn on the cob, apples, watermelon and cantaloupe.
Local Farmers	Lockbriar Farms
Special Events	Local food items will be incorporated into school lunch menus. Elementary school students will be husking sweet corn
Montgomery County Public Schools	
Local Products	Grape tomatoes, green beans, corn, honeydew, assorted fresh fruit, baby spinach, chopped romaine, baked sweep potato, cucumber. Lancaster Foods is the distributor
Other	See website for more information: http://www.montgomeryschoolsmd.org/departments/foodserv/special/farm.shtm
Prince George's County Public Schools	
Local Products	apples, corn, yellow squash, zucchini, watermelon
Special Events	Local food items will be incorporated into school lunch menus
St. Mary's County Public Schools	
Local Products	Yellow squash cucumbers, zucchini, corn on the cob, cherry and grape tomatoes, and watermelon
Local Farmers/Growers	Loveville Produce Auction, local farmers
Special Events	St. Mary's County Extension will be involved with educational presentations at Lettie Marshall Dent (650 kids), Sept 14, and Piney Point (530) Sept. 17. Extension will also help facilitate the Farm to School Menus - Cornelia will be visiting both schools and has a full 2 days of presentations and St. Michaels in Ridge (200) on 9-13.
Talbot County Public Schools	
Local Foods	Watermelon, cantaloupe, honey dew, tomatoes
Special Events	Local food items will be incorporated into school lunch menus.
Washington County Public Schools	
Local Products	Apples, pears, cantaloupe, watermelon, cherry tomatoes, potatoes, green beans, Chesapeake Mac & Cheese with Palmyra Cheddar Cheese, Italian Chicken Sausage made by a local meat processor from Perdue Chicken
Local Farmers/Growers	Palmyra Farm Cheese, Rinehart Orchards
Special Events	Third graders from a severe need elementary school will walk to the Farmers Market at Meritus Medical Center on Tuesday, Sept. 18. The hospital chef will do a food demo, and a Register Dietician will talk about good nutrition.

Wicomico County Public Schools	
Local Products	Corn on the cob, green beans
Worcester County Public Schools	
Local Products	Watermelons, zucchini, corn-on-cob
Local Farmer	Wimbrow Farm, County Line Farm
Special Events	Local food to be incorporated into menus, school newsletters, lunch lines

FINAL REPORT
Project Title: "Maryland's Best" Wine Promotion Program

PROJECT SUMMARY
The Maryland Wineries Association applied for this grant with the intent of growing Maryland-grown wine through marketing products, while adjusting previous reputations and misconceptions about the brand and products of Maryland wineries. The long-term goal of the grant program is to fortify Maryland's' rural agricultural community, and further preserving agricultural land through the development of additional vineyards and wineries.

The purpose of the project was to increase awareness of — and demand for — Maryland wine. Two misperceptions of Maryland wine, discovered by a market study of retail and restaurant industry were that Maryland wine is not of high quality, and that Maryland wine is overpriced.

As the Maryland wine industry grows, new vineyards and wineries start each year. As the market grows and more wineries have product to sell, it is –and was– imperative that the misperceptions about local wine change in order to meet the needs of the industry. The industry cannot remain sustainable unless the market share increases.

PROJECT APPROACH
The project took a multi-dimensional approach in reaching several goals. The first goal of the grant was the redesign of MarylandWine.com. The web design firm, MissionMedia, redesigned MarylandWine.com with several new features for the user. In addition to a full listing of wineries in the state, and the wine trails of Maryland, each winery now has the opportunity to feature each of the wines they make. Through this feature, wineries describe the grape varieties, blends of wines, offer food pairings, and users can keep track of the wines they have tried. Also part of the site is a winery only site. Here, wineries can obtain information about the industry, promotional events, legislation, and a variety of other tools that help them in their day-to-day business plan.

Another arm of the project was the development of a program called "Maryland Wine Week." This projects specific goal was to increase consumer acceptance of Maryland wine—most specifically, the grape varieties grown in Maryland—while also increasing wine retailer acceptance of our brand. From June 3–12, 2011, 23 local wine shops and twenty local restaurants featured special local wine promotions. These included discounts on purchases, a special local wine by the glass, food and wine pairing and flights of Maryland wine. In addition, several pieces of POS materials were developed and widely distributed to the public through these partner restaurants and wine shops.

An additional goal included in this grant proposal was to increase traffic to our local wineries and wine trails. Part of this initiative was to launch a "passport" program. The Maryland Wine Passport launched in January of 2011, branded with the "Maryland's Best" seal. This passport connects our wine trails and encourages winery visitors to learn more about the local wines and grapes used to produce them. This program was created to reward winery visitors for their support of local businesses, local products and local agriculture. Beautifully designed passports

provide a listing of all wineries and wine trails and is a convenient means of recording winery visits via stamps and codes, which will soon be redeemable on Marylandwine.com for exciting rewards. The printed passport can be obtained at Maryland wineries, where they can be stamped just like a real traveler's passport.

In addition to the passport program, the Maryland wine trails have also been active. We have continued with the regular printing and distribution of the wine trail brochures, and have added wine trail information to MarylandWine.com. The wine trails have also hosted several wine trail events through out the year. One event in particular was modeled on each trail. It was called "The Wine Trail Goes Local." These events would span over two days, a weekend, and wineries would invite a local producer to come and sell their goods. Customers could browse local farm products, cheeses, seasonal and local fruits and vegetables, etc.

To educate consumers about the growth of our industry, we teamed with Custom Media Options to create a new free publication called "Maryland Wine Press." The Wine Press has been three times, and is published twice annually. It was created through in-kind staffing from MWA. The cost of printing was paid for through advertising.

GOALS AND OUTCOMES ACHIEVED

One of the original goals for the website component of the grant was to increase unique visitations to Marylandwine.com from 14,000 average per month to 18,000 per month within two years, and to increase average visit length from 3 minutes to 5 minutes. In 2011, the newly launched MarylandWine.com has had 139,690 visits, 96,350 of which have been unique visitors. The average monthly visitation rate has reached as high as 21,686 visitors in a month. Our next goal will be to reach this traffic rate *every* month. The average time spent on the site is about three minutes and 44 seconds. Users visit about four pages and come from the following cities, ranked in order of use: Washington, Baltimore, New York, Frederick, Towson, Columbia, Arlington, Westminster, Silver Spring and Annapolis. Website traffic comes from a variety of places including browsers, face book and other wineries websites. The eighth highest source of traffic comes from the Maryland Department of Agriculture's website.

The second goal of the original grant was to increase tasting room traffic by 15%. We have attempted to reach this goal through our Passport Program, our wine trail program and our twice annual "Maryland Wine Press" publication. In a survey sent out to wineries, 75% of the responders indicated that the wine trail events of 2011 increased tasting room traffic. We also know that since it's launch in January, 12,000 passports have been distributed, and approximately 500 people have signed on to the passport program via MarylandWine.com. We have garnered much demographic information about them. We know that they have come from Georgia, New York, Colorado, Washington D.C., Delaware, Florida, Indiana, Massachusetts, Maryland, Michigan, North Carolina, New Jersey, New York, Ohio, Pennsylvania, South Carolina, Utah, Virginia, Washington, Wisconsin, West Virginia and Wyoming.

The second and third goals were to distribute Maryland's Best-branded POS materials to stores and restaurants and to hold staff seminars and trainings. The Maryland's Best-branded POS materials went to a number of wine shops and restaurants through our Maryland Wine Week program. We distributed 10,000 brochures, 15,000 checkbook inserts and 15,000 bookmark sized

information cards. We also distributed "We Pour Local" window stickers to each of our partners. Each piece of POS material included information about the industry, the grapes grown in our state and direction to MarylandWine.com. In addition to the actual program, the staff of MWA met with several retailers and restaurants to discuss the changes in the local wine industry, our new strengths and developments.

In addition to the above promotions, the program also received a large amount of (free) publicity through our public relations efforts surrounding the program. We were featured in the following outlets:

WBAL
Carroll County Times
Baltimore Magazine
Bowie Patch
TheBayNet.com
CBS
The Capital (Associated Press)
The Baltimore Business Journal
TBD.com
Urbanite Magazine
East Coast Wineries Blog
Frederick News Post
Broadneck Patch
Chesapeake Family

A follow up survey was sent to the participating restaurants and wine shops, and seven of the 43 replied. The survey had ten questions. The information garnered about the program was very positive. We learned that the public responded very positively towards the program. One wine shop said:

> "We have a good representation of Maryland wines overall and in time will provide room for more placements as we grow and expand our selections of all local wines in the future. We are still receiving compliments about the promotion and the sales have remained strong since Maryland Wine Week ended. Our stock clerks have even commented, 'This is the most Maryland Wine we have ever sold.'"

All but one respondent said they saw an increase in sales, and all but one added a new Maryland wine brand to their selection for the promotion.

While we didn't hold large format staff seminars and trainings, we provided many opportunities for both MWA staff, and for wineries to meet with restaurants and wine shops to discuss the goings on of the wine industry. These were in preparation for Maryland Wine Week.

Since the grant application was submitted in 2009, the sale of Maryland wine to retailers has increased by 2,468 gallons. Overall sales of Maryland wine have increased by 22.9%, or

approximately 340,589 bottles of wine and the industries market share has increased from 2.07% in 2009 to 2.38% in 2011.

Increase number of stores carrying Maryland wine by 20% within 12 months, 30% within two years.
Increase number of restaurants carrying Maryland wine by 10% in 12 months, 25% within two years.
Increase sales from 1.7% to 3.4% within two years.

BENEFICIARIES

Many different groups, or publics, benefitted from this grant effort. The first group is made up of the winery businesses of Maryland. Through each of these efforts, their product was more widely marketed and promoted. The second group is the grape growers of Maryland. The goal of increasing wine's market share should increase demand on the wine, and therefore would increase demand on the ingredient — Maryland grown grapes.

A third group impacted by the projects outlined in this grant was the general public. The public had several new opportunities to learn about Maryland wine, and to be exposed to the quality of product and quantity of wineries in the state. The public was a driving force of several of the projects, including MarylandWine.com and the wine trails. They heard the positive message of high quality, reasonably priced wines through their local wine shops and restaurants during Maryland Wine Week and they were solely responsible for increasing the market share.

Two other groups who were impacted through this grant were the restaurants and wine shops of the state. Through the Maryland Wine Week component of this grant, these groups had a new opportunity to try local wines and carry them in their stores. In addition to restaurants and wine shops, the tourism industry was also impacted through this grant. Not only did the efforts drive Internet traffic, but they also drove traffic to our wineries, and therefore to local restaurants, hotels and attractions near and around wineries.

LESSONS LEARNED

Through these grant programs, we have learned many lessons. The first is that there is truly a market for Maryland wine and related products. Consumers are open to learning about local wine, and provided the correct approach, can become loyal consumers.

Through our Passport Program, we learned that printed materials are still a useful part of marketing campaigns despite the leaning towards mobile and online marketing and advertising.

We were surprised to learn that some restaurants and wine shops are still hesitant to sell and promote local wine. MWA will be hosting a second annual Maryland Wine Week in 2012, and we hope to see an increase in interest.

CONTACT PERSON
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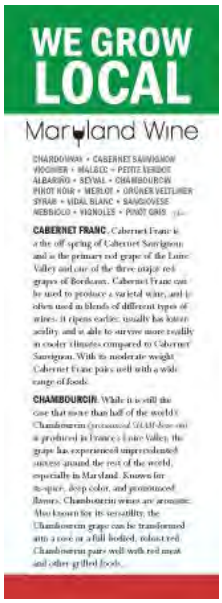
ADDITIONAL INFORMATION
Bookmark we distributed in wine shops and at wineries



Door Decal we distributed to sponsors, partners

Check insert we distributed via restaurants

Screenshot of new Marylandwine.com homepage

Screenshot of winery page showing how individual wines are now highlighted

Passport

FINAL REPORT
Project Title: Maryland Christmas Tree Association

PROJECT SUMMARY

The 2009 season extended from November 27 through December 24 which included four weekends which are the highest traffic days for sales of real trees. The year also was affected by two major snow storms on two of the available weekends which greatly affected consumer access to the farms. Twenty-two farms were unable to operate for at least one weekend due to the weather.

However, our member survey indicated that overall the goals of increasing consumer awareness of real Christmas trees and buying one at their local farm were achieved. Of the farms that were able to operate through the two massive snowstorms that blanketed the area, an overall average increase in sales and customer traffic of 4.5% was seen. Sixty-seven farms had year over year increases in sales and traffic for the days they were operational.

In order to gather sales results at the farm level, a member survey was distributed to all member farms. Ninety surveys were distributed to cover farms with direct sales operations (excluding wholesalers and farms not selling in 2009) and 45 responses were received. Twenty-two farms had increased total sales for the year and 23 did not due to the weather, however they did have increased year over year sales for the days they were open.

PROJECT APPROACH

The plan to use a mix of media channels to deliver the message was successfully achieved and exceeded expectations. Our click thru rate on all web advertising averaged .057% which exceeded the industry average of .030% for a successful program and the MCTA web site had 6,796 visits during the program period.

We also determined that a more effective measurement of advertising effectiveness on our web based channels was to measure the ad impressions and "click through" rates instead of "web hits". The industry average for an effective click through rate is .030.

WEB advertising

Coordinated ads were placed on radio web pages and selected print media sites to further expand the reach of our message and allow for easy connection to the MCTA web site for farm listings.

- Gazette.com WEB page from 12/3 to 12/30 178,195 impressions
- Carroll County Times.com from 12/4 to 12/23 34,926 impressions
- Facebook from 12/13 to 12/23 206,107 impressions

MCTA develop 12 radio and web ads and tried several different messages to determine which ad would resonate with the public. Thirty-four of all farms had customers mention seeing or hearing our ads and 62% had customers mention buying real vs. fake trees ad for 2009.

In cooperation with a team of Senior Marketing students at Mount Saint Mary's University a marketing communications program was developed that identified key target areas and demographics and proposed media selection based upon available funding.

The Maryland Department of Agriculture (MDA) supported the program by a cross-promotion campaign with MCTA and provided a hyperlink to the MCTA website. MDA also arranged a visit by the Governor and family to a local MCTA farm for the selection of their family Christmas tree along with media coverage. Pictures of the event were also placed on the Governor's web site as well.

GOALS AND OUTCOMES

The following details the goals and outcome for each measurable project element.

Increase traffic and sales at farms: 5-7% sales growth 10% traffic growth	All farms able to operate throughout the snowstorms experienced an average of 4.5% growth in sales and customer traffic 34% of all farms had customer mentions about program ads 62% of all farms had customer mentions about real vs. fake trees ads
Achieve state wide marketing coverage 12,000 media web impressions and .030 Click through Achieve 5,000 hits on MCTA site	On radio station web sites our ads experienced 187,628 impressions with a .085% click thru rate On all other media based websites our ads experienced 419,228 impressions with a .045% click thru rate The MCTA web site experienced 6,796 visits during the program period with an average length of 1:31 minutes and 11% of visits were from program related web sites The program achieved 606,856 total impressions with an average click thru rate of .057%

BENEFICIARIES

The direct beneficiaries of the program were the member farms of the MCTA which saw an increase in traffic and sales volume ranging from a high 23% to a low of 2%. These were the farms that were operating despite the snow storm. We also can project that non MCTA affiliated farms most likely saw an increase in real tree sales as well as a result of our extensive advertising for real trees across the state.

LESSONS LEARNED

- The 2009 season was severely impacted by two major snow events which affected nearly 50% of all farms resulting in them being unable to operate for one or more weekends during the selling season.

- The 2009 season had four weekends available for sales operations
- Facebook advertising was only operational for one weekend due to logistics of establishing separate bank account for grant funding and obtaining debit card for payment
- Member farms that do not utilize email make it difficult to keep everyone informed of program implementation and local involvement.
- Increased focus on enabling the individual members to develop and implement their own locally customized advertising messages and media mix will be necessary as the WEB continues to develop
- Member farms that do not utilize email make it difficult to keep everyone informed of program implementation and local involvement.
- Social media is extremely vital for the members of the MCTA – more so than ever. Customers rarely refer to printed advertising today – they seem to find member farms through various social media and Internet sources. The general public was also attracted by radio and TV advertising that drove them to MCTA's website to find member farms.

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FINAL REPORT

Project Title: "Developing the Capacity to "365" Service Maryland Grocery Stores with a Berry Line Exclusively Produced in Maryland"

PROJECT SUMMARY

In our modern society, fresh fruits and vegetables are available 365 days per year in local supermarkets. Efficient refrigerated transportation and a global economy now makes it possible and affordable to offer fresh fruits and vegetables year round, however a majority of the off season fruits are coming from great distances from Maryland. Maryland has a unique geographical diversity that stretches from the mountains of western Maryland to the southern shores of the Eastern Shore. This diversity in climate should allow for a wide window of locally produced fruits. Coordinating production systems between early spring production in the east, summer production in the west and late fall/winter production near the coast could allow Maryland farmers to produce and market fresh local fruits nearly year round. This project examined the most extreme production systems for out of season production tied with typical fruit production in various areas of Maryland to examine the possibility of selling fresh local Maryland produced fruits year round in grocery stores.

Using tunnels on Maryland's Eastern Shore and cool weather in the mountains of western Maryland, we were able to produce raspberries for 219 days, strawberries for 343 days and blueberries for 142 days in Maryland. It is of significance that we did not heat with carbon fuels except in one case in Garrett County. With the use of carbon fuels to heat a greenhouse, the blueberry season can be extended another 83 days bringing the total to 225 days. Off season yields varied, but were generally considerably less than traditional in season yields. It needs to be pointed out that the systems we used are primitive in some cases and improvements can be made, some by simply moving the production to the Lower Eastern Shore, where there is some zone 8 climate in Maryland. Some improvements can be made by breeding, new varieties adapted to these situations; an example of this is the summer fruit yields using the new generations of everbearing varieties. Off season yields of 15,000 lbs per acre are now common in Garrett Co and a new, albeit small, summer strawberry fruit production area has been growing since the mid 2000's. There are now two Maryland based strawberry breeding programs who are interested in producing new off season fruiting varieties. This effort will be needed to allow Maryland growers, either in cooperation, or separately, to fill local groceries with local fruit for each day of the year.

PROJECT APPROACH

The objective of this research was to utilize the extended growing season in Eastern Shore tunnels and the cool summers at 2500+ ft in elevation of the Allegany Highlands to produce local small fresh fruit for Baltimore-Washington market throughout the year. Accordingly, several experiments were conducted to take advantage of insulation and heat harvesting technology to heat tunnels at the primary fall-winter research facility at the Wye Research and Education Center of the University of Maryland. These trials were later extended to a tunnel at the University of Maryland-Eastern Shore at Princess Anne, MD; however, they are ongoing and not part of this report. The cool spring-summer fruit part of this project took place at several farms

in Garrett County MD. All season extending research took advantage of new varieties available to match the new systems and make them more profitable.

GOALS AND OUTCOMES ACHIEVED

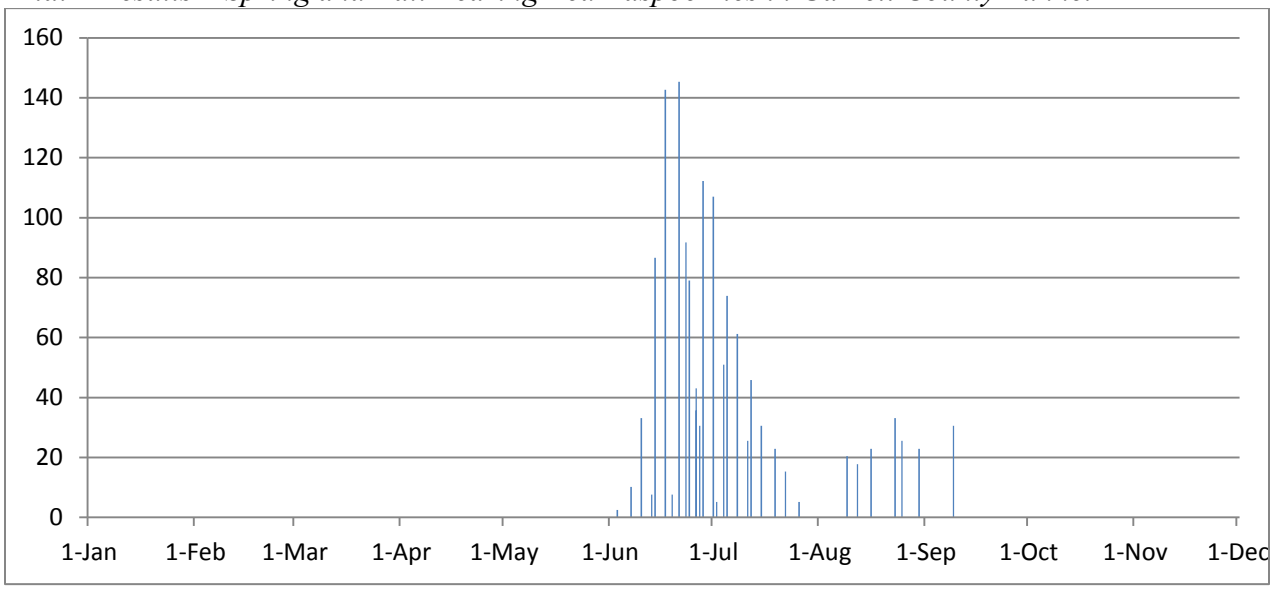
This report is organized into several experiments in the three main small fruit produced in the state: raspberries, strawberries and blueberries. The data on graphs is presented in grams of fruit per plant as harvested over the Julian Calendar for each experiment.

Raspberries

As raspberry production for commercial market is very uncommon in the Washington-Baltimore area, experiments were conducted for possible production throughout the year.

Trial 1: Pot Grown Spring and Fall Bearing Red Raspberries Grown in a Garrett County Tunnel. The following chart is the grams per plant of 1 year old 'Tulameen' and 'Marcianna' Red Raspberry plants grown in 7 gallon pots. The plants were grown from cuttings at Five Aces Breeding Nursery in Garrett County for one season. The pots were transferred to Charles DeBerry, Garrett County, in fall and winter cold stored under floating row cover in their unheated tunnel. The plants were forced in March and kept from freezing using propane heat.

Trial 1 Results – Spring and Fall Bearing Red Raspberries in Garrett County Tunnel



Overall, 563 half pints were sold from the 65 plants in the tunnel. This amounted to 92 kg of fruit or 1.415 kilograms per pot or plant (= 3.11 lbs/plant). The yield was primarily from 'Marcianna', starting June 3rd, then 'Tulameen' floricanes then the smaller second peak was from 'Marcianna' primocanes starting August 9th.

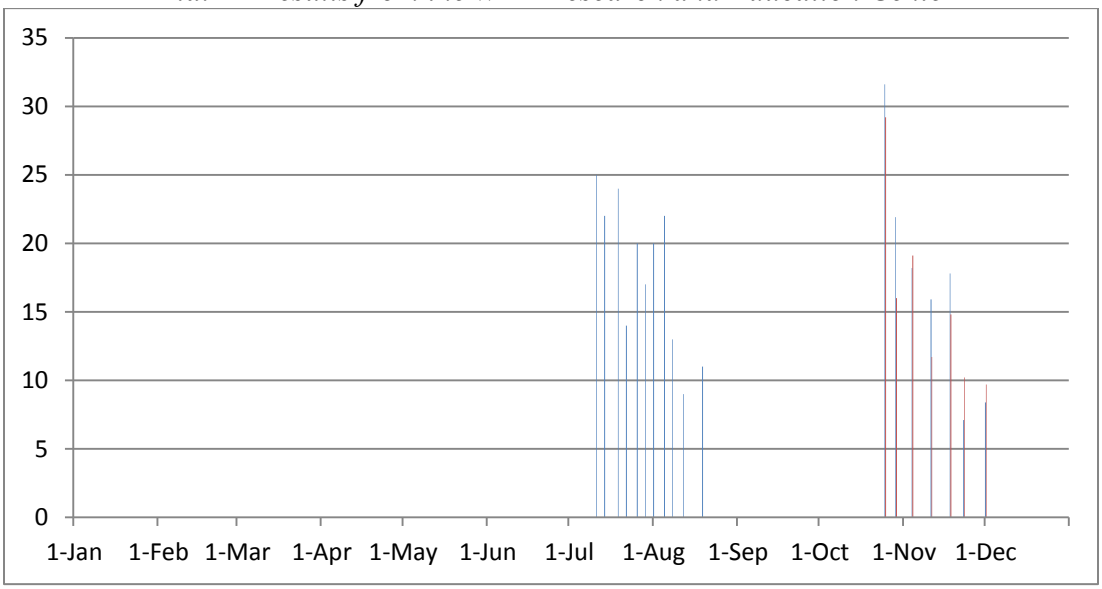
The grower, Charles DeBerry, sold most of the fruit at farm markets. At $3.00 per half pint, the income would be $1689. Potted plant cost was $3.85 per pot or $250.25. Pots can be renovated indefinitely at around $0.70 each of new potting soil. Renovation consists of pruning the root ball, discarding moss or weeds (oxalis and cress) on the surface soil and refilling with new peat perlite mix. The root prunings can be placed at the top of another pot that was half filled with soil, covered with about an inch of new soil and kept moist to produce a new potted raspberry

plant. This process can be used for any of the potted raspberries in the rest of this section. The cost of the pot is around $1.

Trial 2: Pot Grown Fall Bearing Red Raspberries Grown on the Eastern Shore in insulated tunnel.

This was a trial using a short cycle (= early primocanes) low chill and a late fruiting primocane fruiting raspberry selection. The plants were grown in pots in the Five Aces Breeding tunnel in Garrett Co and transported to the Wye in September and October. The plants were grown in a well insulated tunnel at the Wye with protection from the cold provided by the use of a spunbound floating row cover drawn over the plants and the use of an earthtube. The earth tube was a 150' long 4" drain pipe that was buried six feet deep and connected to a small duct fan. The fan pulled air into the house to provide moderated air for heating.

Trial #2 Results from the WYE Research and Education Center



There was little difference in the late fall yield between the two cultivars. Each was harvested from the 25th of October until December 1st. The yields were similar, at 120 g/plant for the short chilling selection (blue lines) and 110 g per plant for the long chilling selection (red lines). Fruit weight for the long chilling cultivar started at 3.8 grams and fell to 2.6 grams in December. The short cycling variety started at 3.0 grams and ended at 2.7 grams per fruit, this consistency of size is typical of its preformance. The short chilling type was pruned to the ground to have a second primocane crop. As it is short cycling (early primocane fruiting), it produced a second crop in the tunnel from the 11th of July to the 12th of August of 197 grams per plant. Fruit size was considerably smaller at 1.8 to 2.1 g initially falling to 1.2 to 1.5 g at the very last harvests, similar to other August bearing primocane types on the Eastern Shore.

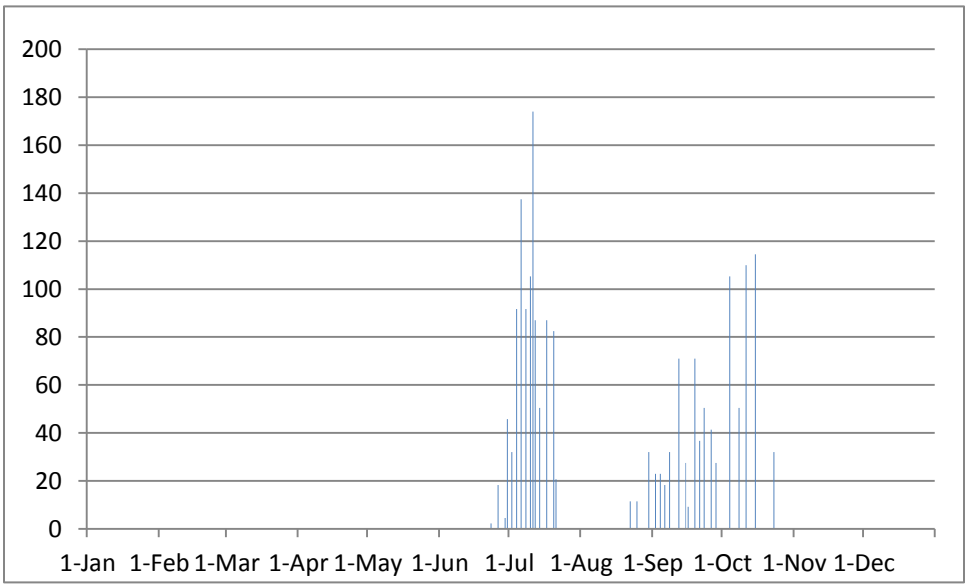
The yields for the short cycling type was thus 317 g per pot or 1.92 half pints. At $3.00 per half pint, income would be $5.76 per pot. Although about 2/3 of the yield was obtained in the summer, the timing of the fruit was earlier than that of primocane fruiting cultivars outdoors and after the summer fruit has been picked from the floricane varieties. It is therefore off season in both cases.

Trial 3: In Ground Tunnel Production in Garrett County

This was a trial of an in-ground planting of 'Marcianna' dual season red raspberry grown in a tunnel in Garrett County. The plants were 2 years old at the time of fruit collection in Fall 2010. The fruit was also harvested in Spring of 2011 and fruit size was measured on an early, midseason and late harvest.

Summer yield commenced on the 23rd of June and ended on the 21st of July. The fall crop started on the 22nd of August and ended on the 23rd of October. Although we had a couple light frosts in late September and October, in the tunnel leaves and fruit were not damaged. Fruit yield was 1,417.5 grams per plant (at 2 ft x 6 ft spacing) on the floricanes and 1,233.8 grams per plant during the primocane season. This total yield was 2.651 kg/plant or 5.85 lbs/plant or 16 half pints/plant. Sales would be around $48 per plant. Fruit size was 6.6 g at the beginning of the season to 4.4 g at the end of the spring harvest. Yields of other unnamed selections in the trial were as high as 9.1 lbs/plant for the combined spring and fall seasons. This is the equivalent of 25 half pints per plant.

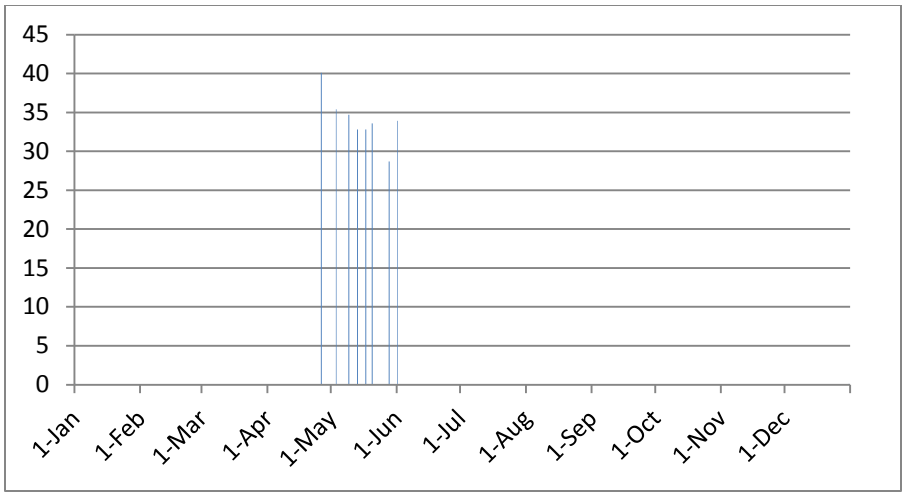
Trial 3 Results – In-Ground Tunnel Production in Garrett County



Trial 4: Pre-chilled Eastern Shore Spring Bearers grown in an Eastern Shore Tunnel

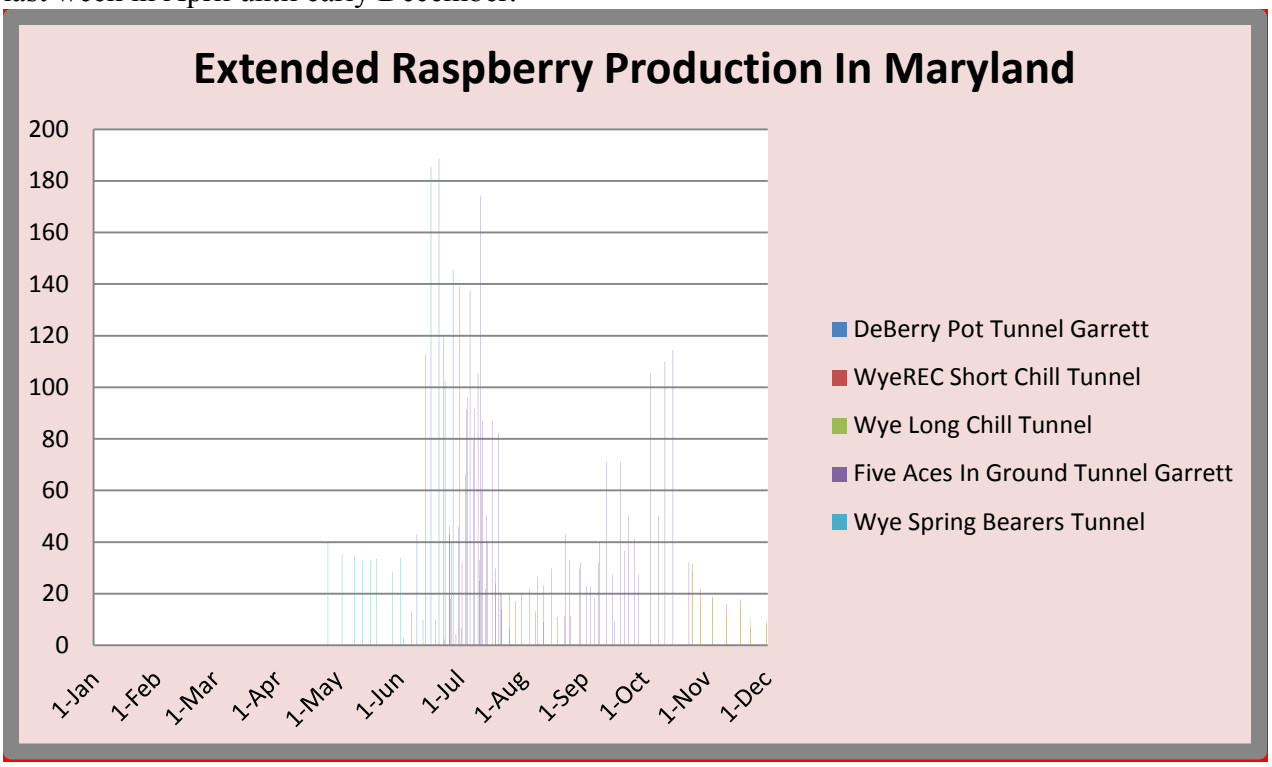
This data is preliminary data for this proposal using 'Lauren' spring bearing red raspberry which was pot grown outdoors at the Wye REC, refrigerated and grown in a heated tunnel at the same location. Harvest commenced on 26th of April and ended on the 1st of June. Per pot yield was 272 grams or 1.65 half pints per plant.

Trial 4 Results – Pre-chilled Eastern Shore Spring Bearers Grown in a Tunnel



Total trial production, 219 days of Harvest.

Using tunnels for season extension on the Eastern Shore, and the cool weather in the highlands of Garrett County, we were able to produce a local supply of raspberries of 219 days, from the last week in April until early December.



Yields varied from around ½ lb per plant to 5 lbs per plant. In general off season production was lower, although part of this could be explained by either the youth of the potted plants in trial 2 or the use of Eastern Shore grown plants in Trial 4. The comparison of trial 1 vs. trial 4, while using different varieties of traditionally equal yield, illustrates to some extent the differences between Eastern Shore outdoor grown vs. Garrett County tunnel grown nursery stock. While there was a difference in where the fruit was grown, the Garrett County plants were over 8 ft. in height, while the Eastern Shore plants were around 4 ft. in height.

Summary of Raspberry Yields in Trials 1 - 4

	Type	Substrate	Nursery	Fruiting	Season	Yield
Trial 1	SB + FB	Pot	Garrett	Garrett	JJ+AS	847
Trial 2	FB	Pot	Garrett	Wye	OND +J	306
Trial 3	DUAL	Ground	Garrett	Garrett	JJ+ASO	1204
Trial 4	SB	Pot	Eastern Shore	Wye	AMJ	272

Key to Chart: Type SB=Springbearers, FB=Fallbearers; Substrate Pot=5 or 7 gal black plastic, ground=raised bed, under weed barrier and straw; Nursery and Fruiting are locations of each part of the life cycle; Season JJ=June, July, OND= October, November, December, ASO=August thru October, AMJ=April, May, June; Yield is Yield per plant in grams.
There was an interesting comparison of 'Marcianna' in Garrett County, where an unheated tunnel at 2800 ft elevation of in-ground plants grew near (5 miles) to a heated tunnel/greenhouse at 2500 ft elevation of potted plants. These growing conditions should represent the earliest vs latest of the tunnel raised crops in the mountains: 1. the enclosure and heating in spring vs just rain covered (no end walls) and 2. pots (early) vs in ground (later, plus with straw mulch). For 'Marcianna', the differences in growing conditions resulted in a 20 day difference in spring harvest and a 13 day difference in primocane harvest. By comparison, cultivars can be found with similar differences (20 days) in floricane harvest dates based on their genetic differences. The 'Tulameen' crop virtually started after most of the earlier 'Marcianna' crop was picked at DeBerry Farm for example.

In the original proposal, we suggested that we could get an early floricane crop on the short chilling/short cycling raspberry selection. Unfortunately, the short chill type that we used does not respond to the cooler temperatures of late winter in Maryland. Further, we managed the Eastern Shore tunnel to produce a late primocane crop on this variety, which it did until December 1. For early floricane fruiting, plants should be chilled as soon as possible then forced with as much heat as possible in winter. There are earlier floricane selections in the Five Aces Breeding Program. These respond to temperatures less than 50 F with early bud break and flowering.

The Feb 7th pictures on the left are a typical long chill variety, the short chill selection that was used in the project and a low chill, cool temperature responding type (right). This greenhouse in Garrett Co was heated to 55F on Feb 1st, and kept from freezing the previous 4 months.

Fruit should ripen on this new short chill-cool responding selection in this heated Garrett County greenhouse around March 18th, 3 months before the spring season in unheated tunnels. In future

years, we will try this selection with Garrett County grown potted plants, chilled until December 1 and grown in an Eastern Shore tunnel (heated or at least insulated) and in the Zone 8 region of the state.

Strawberries

In the past 8 years, our research team has explored off season production of strawberries: specifically fall production during the protracted growing season at the Wye REC and day neutral production in the cool mountain climate of Garrett Co. Typical results are summarized in this chart:

location	planting date	varieties	start fall harvest	end fall harvest	yield in grams per plant	start spring harvest	end spring harvest	yield in grams per plant	start summer harvest	end summer harvest	yield in grams per plant
Wye	4-Sep	sweet charlie	21-Oct	8-Jan	49.80	9-Apr	11-Jun	560.00			
Wye	12-Sep	sweet charlie	12-Nov	21-Dec	81.70	28-Mar	5-May	527.00			
		sweet charlie	7-Nov	1-Jan	40.60	31-Mar	9-May	445.00			
	Day Neutrals										
8 Sum Pi Farm	5-May	Seascape							21-Jun	20-Oct	267
Ryan's Glade		EV2							21-Jun	20-Oct	835
Rock Hill		Everest							23-July	16-Oct	526
Penn State		EV2							23 July	16-Oct	225

Fall production at the Wye REC on the Eastern Shore utilized plug plants initiated on the 1st of July and planted in tunnels in the ground in early September. Although May varieties were tried, 'Sweet Charlie' gave the earliest fruit, covering production from October to January. Although fruiting could continue, with a flower to ripe fruit growth cycle extended from 30 to 50 days, cool temperatures necessitate the use of supplemental heating.

Day Neutral Strawberries (Everbearers) was the subject of previous USDA-SARE grants in Garrett County and Rock Hill, PA (Penn State). Using either large plug (32 cell trays) or dormant plants, the season starts in early July and continues until the first frost, which is September outdoors, and October indoors, or when the floating row cover can no longer provide protection to the fruit. Yields were up to 1.8 lbs per plant (835 grams), although more typical yield in the mountains were nearer to one pound per plant or 15,000 lbs per acre. In the Penn State trial, the hotter mid-summer temperatures resulted in a distinct bimodal production of early and late. In Garrett Co., production continues throughout the summer.

Thus, using these two locations and tunnel production, fruit was ripe from July 2 to January 1 or later, with a small hole in production in late September and October. Spring harvest in tunnels on the Eastern Shore start the 28th of March and continued until mid-June, earlier than outdoor spring bearing fruit at the Wye, but typical of the outdoor season in Richmond, VA or on the southern Eastern Shore. Spring bearing plants in Garrett County produce into early July, therefore, the only other "hole" in year around strawberry production in Maryland is in the months of Jan, Feb and early March.

There were two research trials to investigate forcing fruiting in these periods.

Trial 1. To stimulate earlier fall production on the Eastern Shore, the Five Aces Nursery in Garrett County altered the type of nursery plant used to make the fall bearing plugs. As in California, dormant *flower initiated* weak day neutral or short day plants were used instead of runner tips in July to produce 32 cell plug trays for fall production. The thought was to move pre-flowering and root dense plug cells to the Eastern Shore in September, and the fruit would be ripe in 30 to 40 days. Unfortunately, although the trial worked, and dormant plants produced fruit in these larger cells, the season of production was August and the plants were still in Garrett County. The tunnels were too hot for transfer to the Wye REC at that time. The initiation of the dormant plants in the plug trays will need to be later in August for this to work. Similar forcing of dormant plants gives about 200-300 grams per plant in Europe in pots or the ground. These yields are typical of fall production in Maryland. Dormant plants are about 10 cents per plant, slightly more expensive than a runner tip. The cost of establishing the runner, misting in particular, would offset this difference in price.

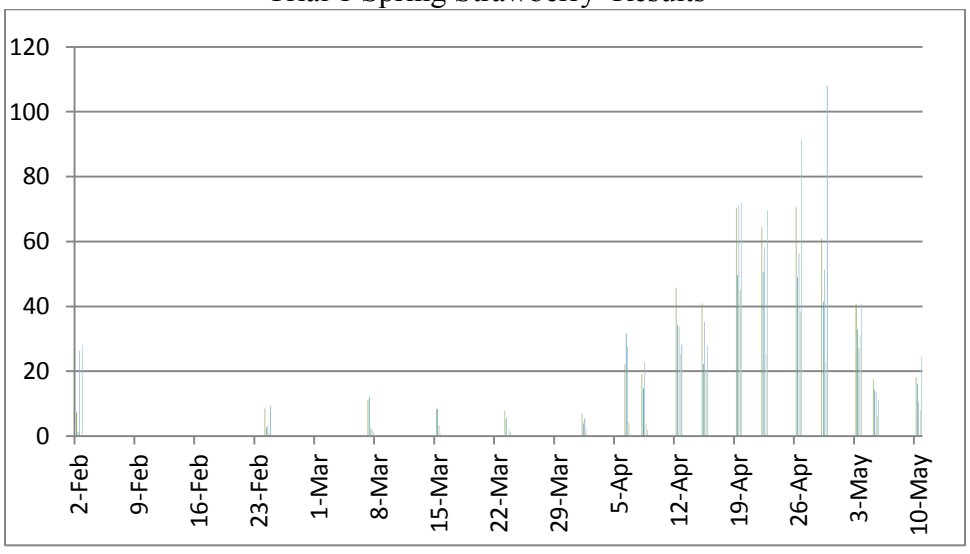
It was hoped that the removal of the flower buds would give a return flowering early on these well-established plants. The variety used, 'Festival'-which is recommended for fall production in the southeastern states, did not reflower early enough to useful for fall production. The plants stayed green in the tunnel and continued to initiate flowers through November and December. Once warmer conditions were obtained, with more light and chill having been obtained, these plants flowered and produced fruit starting in early February.

Summary of Strawberry Production

Wye							Per Plant	
Planting	Nursery	Grams	Grams	Grams	Grams	Grams	Grams	grams
Date	Variety	23-Mar	15-Mar	7-Mar	24-Feb	2-Feb	Marketable	avg fruit size
22-Sep	Garrett Festival	7.9	8.5	11.1	8.5	7.3	520.9	14.5102136
11-Oct	Garrett Festival	5.5	8.3	12.0	2.7	1.3	390.4	15.1558514
22-Sep	USDA Festival	0.0	3.4	2.5	3.3	26.4	448.5	14.6552288
22-Sep	Garrett Dover var	2.4	0.7	2.2	0.8	0.0	238.6	10.5934579
22-Sep	Garrett Tangi var	1.3	0.0	1.3	9.2	28.0	515.8	9.75210084

This spreadsheet was actual early yield and total yields for the various strawberries and total year average fruit weight in grams. Plants were grown at the Wye REC. Below is a yield per plant graph for the whole year.

Trial 1 Spring Strawberry Results



The left axis gives the yield in grams per plant at each harvest date for the five types of strawberries in the Wye trial. Of interest, 'Tangi', an old Louisiana variety, did produce well early in the trial. Unfortunately, 'Tangi' fruit were smaller and softer than 'Festival'.

Trial 2. The other experiment addressed the winter production hole and a nagging problem for northern plasticulture spring production: low yield due to lack of return crop. Below the Mason-Dixon line, fall planted plasticulture plants under row cover management have the opportunity to initiate flowers in late September, again in November-December (before their leaves are lost) and finally in March, before the days lengthen to long days. North of this area, and at higher elevations in the south, winter allows only an October flower initiation. Consequently, southern plasticulture grower can benefit from three flushes of fruit in the spring, given moderate temperatures. Northern yield are lower because they only have one flush of growth. In Garrett County tunnels, especially ones with insulation, a more southern winter could be created. In addition, we attempted to determine how early we could push our spring crop.

For this research, we again used the same 'Festival' plants as above but this time they were planted 2 per 3 gallon pots in September. Plants were grown in Garrett County in an insulated (floating row cover) and wind turbine-heated tunnel throughout the winter. The plants maintained their leaves through the winter and began to produce flowers in February and March. Fruit ripened beginning May 1 and May yield was 153 grams per plant or about 5741 lbs per acre, typical for outdoor plasticulture plants in Garrett Co. Fruit weight was 12.41 g, larger than normally obtained in Garrett Co. After May, there was a second flush of fruit in June that totaled 49.4 grams per plant or 1837 lbs per acre of 10 gram fruit. In July, the third flush of fruit gave 47.2 grams per plant or 1772 lbs per acre of 7.8 gram fruit. The harvest season lasted until July 25th or a total of 86 days, three times longer than outdoors. Outdoor harvest season begins around June 1st in Garrett Co, like red raspberries in tunnels, a 3-4 week earlier season initiation can be expected if strawberries are grown in insulated tunnels .

Although we were successful in mimicking the winter experience of southern strawberry growers by producing a prolonged cropping season with spring bearers, we were not successful in producing fruit throughout the winter in Garrett County. For that, strawberries require supplemental lighting and temperatures above 55F from our experience. Fruit was harvested in the Five Aces solar heated greenhouse in Garrett County during the winter of 2011-12. As this was a breeding house, fruit numbers were taken, but weights were not determined. At minimum 965 fruit were obtained from 123 plants from Jan 1 through Feb 5th. This would translate into about 78 grams (0.17 lbs) per plant assuming a conservative 10 gram fruit. Florida yield for January would be in the range of 100 to 150 grams per month at this time, 300 grams in March.

Blueberries

Blueberry season starts in June on Maryland's Lower Shore and ends in late September, with Liberty, Elliott and Aurora late cultivars in Garrett County. In this proposal, we investigated the possibility of using a no-chill variety 'Paloma' to bridge at least part of this gap in production.

The three year old 'Paloma' plants in the Garrett County nursery

True to previous years, 3 year old 'Paloma' played flowered in September through March. In each of the two years of trials at the Wye REC, the first flush of flowers were lost to frost, in spite of the use of the floating row cover and earthtube. If 'Paloma' were grown in a greenhouse of 55F with constant 5% full sun (and normal Garrett Co. sunlight), the first flush of flowers would develop and set fruit as would a subsequent flushes. The following is a picture of a non-frosted, greenhouse grown 'Paloma' ripe fruit taken on February 16th. Unfortunately, yield per plant would be around 1 gram as most fruit abscised.

The problem with 'Paloma', and several other varieties, is that the leaf buds require some chilling and the developing fruit is starved for photosynthate, not only because of the lack of leaf surface, but also because of the short days of winter. For the first flush to be harvestable in February or March, a short chilling period must be applied before flowering in September to break vegetative buds. In this project, attempts to break bud with kelp extracts with natural cytokine hormones and gibberellin sprays (even at twice the normal rate) were unsuccessful. A second and third flush was obtained at the Wye REC and fruit set resulted in the production of 410 grams per plant. Harvest started approximately a month and a half before normal outdoor harvest on the 12th of May and ended the 22nd of June with peak harvest around the 16th to the 20th of May. A similar group of moderate chilling 'Biloxi' blueberries had the same harvest start/end dates but peak harvest was the 27th of May. 'Biloxi' plants yielded 365 grams of fruit per plant.

BENEFICIARIES

The project has been featured at four field day/workshops. The WYE Research and Education Center has included the project in the 2010 and 2011 Strawberry Twilight Tour. Information about the project and preliminary results where shared with over 100 participants and was included in the tour booklet which is available on the WYE REC web site at http://agresearch.umd.edu/RECs/WREC/RecentEvents/2010Strawberry.cfm.

The project was shared with the participants at the 2011 UMES Small Farm Conference. Over 60 people attend the 4 hour pre-conference workshop with focused on extended season production. Preliminary results were shared and the participants visited the high tunnel site at UMES. A greenhouse and high tunnel field day was held in Garrett County in November of 2011 which visited two of the farms that participated in the project. Over 30 farmers participated in the four hour field day. A total of nearly 200 people participated in the four educational events that included tours and information about the project.

LESSON LEARNED

Raspberries

Even just considering tunnels (not heated greenhouses) and variety selection, a 5 to 6 week difference in the initiation of the spring harvest season can be obtained in Garrett County. The genetic differences in the initiation of primocane season, anywhere from the beginning of August

to mid-September or later, allow growers to begin their fall harvest without any special tunnel management. This means the Garrett Co. grower should strive to reduce the heat around the plants to improve fruit size. The short cycling red raspberry, when fruiting in the fall on the Eastern Shore produced 3 gram fruit; in the mid-summer in the same tunnel, the fruit size was less than 2 grams. In Garrett County in tunnels, the fruit size is over 4 grams.

The primocane season ended around December 1st, primarily due to failing light and subsequent leaf abscission. The late variety and short cycling selection used for this trial both performed equally. However, since the inception of this research, Five Aces has discovered several January/February fruiting selections in northern Mexico. These selections grow constantly in our minimally heated (>40F) Garrett County greenhouse in December and January. It too offers promise to extend the fall season on the Eastern Shore until the cold temperatures of the winter require heat in addition to the earthtubes and floating row covers, which gave 3 and 15 F protection in the trials at the Wye REC.

As with each of the crops in this project, supplemental light may enhance yields in mid-winter. In Quebec, the rule of thumb for greenhouse midwinter strawberry production is a 1% increase in light results in a 1% increase in yields. In heated greenhouse-grown midwinter raspberries (and maybe blueberries) in Maryland, additional light may be more effective from our experiences. Research to focus on enhancing natural light in midwinter grown crops may be highly fruitful.

Strawberries

Using the various growing systems, we have produced strawberry fruit in Maryland from February 2 until Jan 8 the next year, a total of 343 days. The economics of this production will require premium prices for off season fruit, but, these systems are in the primitive stage of development, lacking any off-season breeding for the area, technological advancements in tunnel insulation and low cost alternative heating and lighting, and a specialized nursery to produce off season plants.

Stretching the cold season can be helped by supplemental heating especially for growers on the far Lower Eastern Shore. In Garret County, using a 8 ft x 20 ft set of solar water heating panels, approximately 2,000,000 BTU's were harvested in December and 1,000,000 BTU's in January. On the Eastern Shore, where solar radiation is 25% greater and daytime winter temperatures average in the 40's, less daytime heat is required to reach the minimal 55F. At night, Crisfield is in Zone 8a (minimum 10-15F), which allows total protection under floating row cover without the addition of heat.

From Dec 1 to March 15, additional daytime temperatures for a 20 ft wide x 72 ft long double poly inflated tunnel to be kept at 55F throughout the day and night for one month (DEC-FEB) would require 12 million BTU's (assuming 14 hrs per day of heating). This would be 150 gal of propane or between 600 and 1000 square ft of solar water collector, about a $2000 investment for collectors alone. However, using floating row covers, would provide 10-15 degrees of added protection/heating and would reduce the 14 hr nighttime BTU and solar collector requirement significantly.

For Garrett County, a more effective alternative or accessory to straw or floating row cover mulch must be found to make spring bearing strawberries profitable on the plasticulture system. Perhaps a low tunnel with floating row covers can be used to contain two rows of fruit which will be covered with light weight floating row cover will be economical. The benefit per acre, about 3600 lbs of fruit (the June and July production from the potted 'Festivals' above), would pay for less than $7000 (labor and materials) of low tunnels per acre using typical Garrett Co prices. The tunnel would, however, be available for frost protection in these spring bearing varieties. The lack of large quantities of water for overhead irrigation for frost protection in Garrett County, makes alternative protection systems like the combination of tunnels and floating row covers very valuable. Low tunnels would have paid for themselves in 2009 as the total spring crop was lost to frost.

Blueberries

In the future, it may be possible to breed for leaf retention through the winter, with evergreen species in *Vaccinium*. Alternatively, breeding for enhanced winter leaf emergence is evidently a goal of the University of Florida blueberry breeding program as they have at least two varieties which have early leaf emergence. The presence of leaves, however, may not guarantee December or January production as it took 100 days for the 'Paloma' fruit to ripen. The use of early fruiting cultivars would be helpful. At this point, unless a grower used a more powerful bud break cocktail, midwinter production in Maryland will require sacrificing early winter production by chilling the 'Paloma' plants for 3 to 4 weeks at least before bringing them into the greenhouse for forcing. Adequate leaf surface and bud break was obtained on the 'Biloxi' plants in this study, a variety normally thought to need 600 hours (3 ½ weeks) of cool temperatures (35-45 F).

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