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**Specialty Crop Block Grant
Program-Farm Bill
FDA: 10.170**

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MDARD PROJECT TITLE 1

International Marketing - Michigan Pavilions for Specialty Crops at *Domestic and International* Trade Shows and Trade Mission for Specialty Crops - FINAL

Activity 1

Expo ANTAD – March 14-16, 2012, Guadalajara, Mexico – Replaced by the 2013 Chicago Market Gift Show; January 19-22, 2013. Minor Crop Summit – Maximum Residue Limit (MRL), February 21-22, 2012, Rome, Italy

Activity 2

US Food Export Showcase in conjunction with the Food Marketing Institute (FMI) Show – May 1-3, 2012, Dallas, TX

Activity 3

American Food Fair at the National Restaurant Association Show – May 5-8, 2012, Chicago, IL

Activity 4

USA Pavilion at Americas Food and Beverage Show – September 24-25, 2012, Miami, FL

Activity 5

SIAL Paris - October 20-24, 2012

PROJECT SUMMARY

The project addressed the need of the specialty crop industry to expand and grow their export sales to keep stable prices and markets for growers. The project built on previous funded projects by exhibiting at new trade shows and showcasing new products that were not previously available. The timing for these activities was important as many free trade agreements were set to be implemented in 2012 opening up new opportunities in Columbia and Korea.

The Michigan Bean Commission worked jointly with the Michigan Department of Agriculture & Rural Development (MDARD) International Marketing Program, to secure booth space at major domestic and international trade shows for Michigan specialty crop commodity groups and companies to exhibit at during 2012. The project assisted specialty crop commodity groups and companies in promoting their products at both domestic and international shows. The specialty crop groups attended the shows to showcase Michigan specialty crops and focus on increasing sales of the growers and processors of specialty crop products. Exhibiting at these shows helped to open up new opportunities for Michigan specialty crops in large crop years and help to educate current and potential buyers in years of crop failures.

The Michigan Department of Agriculture & Rural Development (MDARD) secured booth space at The Chicago Market gift show in Chicago, IL January 19-22, 2013. The booth space was offered to Michigan specialty crop businesses at a reduced price. The participating businesses promoted their specialty crop products to the gourmet, gift, and boutique industries at the trade show under the Michigan Pavilion, hosted by MDARD.

MDARD staff recruited Michigan specialty crop companies for The Chicago Market Gift Show to give them an opportunity to promote their high quality specialty crop products to new, niche, industries. Staff recruited companies, organized the pavilion, coordinated the companies' participation, assisted in providing media coverage for the exhibitors, and conducted an exhibitor evaluation of the event.

The show assisted specialty crop businesses in promoting their products to the gourmet, gift, and boutique industries. The show provided businesses with booth space, listing in print and online directory, exhibitor sign, promotional materials and preshow marketing. Exhibiting at this show opened up new opportunities for Michigan specialty crop participants.

PROJECT APPROACH

The Michigan Bean Commission worked jointly with MDARD to offer a number of domestic and international marketing opportunities to Michigan specialty crop groups. The groups participating in the various activities included commodity groups, Michigan farmers, growers and producers as well as companies and cooperatives. Booth space was purchased at a number of domestic and international shows for the specialty crop companies to exhibit at and to showcase their products. This approach was a great way for the groups to see existing customers as well as find new buyers and markets.

An e-mail was sent to all Michigan commodity groups representing specialty crops. The e-mail was used to generate interest and participants for all of the events that were selected by the committee of commodity groups to participate in during the 2012 calendar year. The commodity groups also helped to promote to shows and activities by sending information to their growers and processors.

Additionally e-mails specific to each activity were sent to specialty crop companies encouraging them to participate in the various trade shows and trade mission. Follow-up phone calls were made to companies as well.

Participation of the Michigan specialty crop companies and commodity groups was advertised to international buyers by placing an ad in *The American Exporter* magazine indicating the shows and booth numbers that specialty crop companies and commodity groups would exhibit at during 2012. This magazine is distributed to nearly 8,000 readers in over 50 countries and it is also distributed at the major international trade shows.

It was determined based on lack of response and conversations with the various commodity groups that the specialty crop commodity groups did not want to travel to Mexico for the ANTAD Show due to the violence in the region. Another factor was the economic softening in the country leading to a decrease in opportunity for Michigan specialty crop exports to the region. The group decided not to pursue the show and to instead used a portion of the money to send a representative to the Minor Crop Summit to discuss export issues for specialty crops due to Maximum Residue Limits (MRL's)

Dear Specialty Crop Commodity Group,

I am pleased to announce that the International Marketing Program is working with the Michigan Bean Commission to utilize funding from the USDA's Farm Bill Specialty Crop Block for booth space at some of the largest and most important international and domestic trade shows in 2012.

The goal of the Specialty Crop Block Grant is to promote Michigan specialty crops in the international arena. The trade shows we selected are among the most prominent in the world, which will bring high quality Michigan specialty crops to the forefront of the international buyers.

Booth space at large international trade shows can be quite costly. Creating Michigan Pavilions will help defray some costs and bring national and world attention to our Michigan specialty crops.

MDARD will manage and administer the booths at these shows. If you are interested in exhibiting at one of the following shows, please complete the attached document indicating the shows you are interested in exhibiting at during 2012 and return by December 31. Please contact me at (517) 241-3628 or zmitkoj@michigan.gov for more information.

2012 Michigan Pavilion for Specialty Crops:

- *ANTAD: Guadalajara, Mexico – March 14-16, 2012*
- *U.S. Food Showcase at the Food Marketing Institute (FMI) Show: Dallas, TX – May 1-3, 2012*
- *American Food Fair at National Restaurant Association Show: Chicago, IL - May 5-8, 2012*
- *America's Food and Beverage Show: Miami, FL; September*
- *SIAL Paris: Paris, France – October 21-25, 2012*
- *Trade Mission for Specialty Crops to the Dominican Republic & Columbia - Date TBD*

Activities Completed

- **Minor Crop Summit – Maximum Residue Limit (MRL), Rome, Italy – February 21-22, 2012**

The Executive Director of the Cherry Marketing Institute attended this major worldwide conference on behalf of the Michigan specialty crop industry. MRL's cause significant export barriers for many specialty crops grown in Michigan. Companies are often unable to export or have product rejected at the boarder due to no MRL limits being in place for chemicals in many countries or limits that are substantially lower than the U.S. The goal of the meeting was to bring various specialty crop industries as well as USDA, CODEX Alimentarius and regulatory officials from various governments from around the world to discuss solutions to the MRL issues.

- **Food Marketing Institute (FMI) Show, Dallas, TX – May 1-3, 2012**

MDARD secured a booth space at the FMI show for Michigan specialty crop commodity groups. The goal of exhibiting at this show was to showcase Michigan specialty crops to international and domestic buyers in the retail industry. Many buyers were already asking questions about the crop status of Michigan fruit at this show due to the early frost so much time was spent answering questions about the implications to the crop and product availability.

- **National Restaurant Association (NRA) Show, Chicago, IL – May 5-8, 2012**

MDARD secured a booth space at the National Restaurant Association Show/American Food Fair in Chicago, Illinois, May 5-8, 2012, for Michigan specialty crop commodity groups and companies to exhibit their products. The project was intended to assist specialty crop groups promote their products domestically and internationally. Due to the crop failure MDARD staff ended up staffing the booth for the specialty crop commodity groups and worked to promote specialty crops and explain the crop situation to buyers attending the show.

- **American Food & Beverage Show, Miami, FL – September 24-25, 2012**

The Cherry Marketing Institute along with MDARD helped specialty crop companies participate at the Americas Food & Beverage Trade Show in Miami, Florida, September 24-25, 2012. The show targets buyers from the Caribbean, Central and South American markets. Booth space was purchased for the Michigan Bean Commission to exhibit from and promote Michigan beans. Graceland Fruit, and Cherry Central, who also have specialty crop products, also participated in the Michigan Pavilion for a nominal cost that helped to pay for the booth space and signage. Exhibiting at this show helped to open up new opportunities for Michigan specialty crops. Evaluations were handed out to all exhibitors at the conclusion of the show.

- **SIAL Paris, Paris, France – October 20-24, 2012**

This is one of the largest food and beverage shows in the world, bringing 10 specialized trade shows together for one big show. Booth space was secured with the assistance of

the Michigan Bean Commission for the specialty crop industry. Booth space was offered to specialty crop commodity groups and companies to participate and showcase Michigan specialty crops to buyers from around the world. Company participation was difficult to obtain due to the crop failure in early 2012. Specialty crop participants included: Michigan Bean Committee, Cherry Marketing Institute, and Graceland Fruit. This approach was a great way for the groups to find new international buyers and markets and also to talk about the crop situation for Michigan tart cherries and apples. Evaluations were handed out to all exhibitors at the conclusion of the show.

- **Chicago, Illinois - Chicago Market Gift Show; January 19-22, 2013**

MDARD sponsored Michigan pavilion at the Chicago Market Show; focusing on assisting Michigan specialty crop businesses in promoting their products to the gourmet, gift, and boutique industries by exhibiting under the Michigan Pavilion at The Chicago Market Gift Show in Chicago, IL on January 19-22, 2013.

MDARD negotiated a discounted exhibitor rate with the organizing association of the trade show. A discounted rate was then passed on to specialty crop businesses. Recruiting for the trade shows was done through e-mails from MDARD to an extensive Michigan specialty crop company database, in addition to follow-up phone calls to Michigan specialty crop companies. Staff aimed for the Michigan pavilion at The Chicago Market Gift Show to be filled with a minimum of four specialty crop businesses.

MDARD organized the pavilion and coordinated the companies' participation by communicating with the associations and overseeing all details of the Michigan pavilion at The Chicago Market Show. Invoices and forms were compiled to prove participation. Event details were given to all exhibitors.

Specialty Crop Block Grant funds paid to off-set the cost of booth space for specialty crop companies. Exhibiting businesses received booth space, listing in print and online directory, chair, wastebasket, exhibitor sign, freight handling, electrical outlet, promotional materials and preshow marketing. Funds also paid for travel expenses for MDARD staff to stay for the duration of The Chicago Market Show.

Evaluations were handed out to all exhibitors. Evaluation answers provided by specialty crop participants were compiled into a word document through open-ended questions and charts. Survey analyses for the Michigan pavilion at The Chicago Market Show can be found in the Additional Information section at the end of this report.

GOALS AND OUTCOMES ACHIEVED

Minor Crop Summit - As a result of the attendance at the Minor Crop Summit a meeting was organized and held in Michigan to share the information gained at the Summit. Phil Korson conducted a PowerPoint presentation on the discussions at the summit as well as an over view of the MRL issues and the process to set MRL at CODEX Alimentarius. The group then discussed their own experiences with exports being stopped due to MRL issues. Finally a discussion about possible solutions and actions that could be taken to assist specialty crop companies and growers more effectively meet MRL's and continue to export their products.

Phil Korson was able to highlight the specialty crop grower recommendations at the summit, which included:

1. Increase the pace of harmonization of MRL's worldwide
2. More global joint reviews

3. Great data sharing and review sharing to establish MRL's
4. Increase use of Codex MRL's (especially where no MRL's exist)
5. Great use of crop groupings
6. Greater regulatory opposition to food retailer MRL's

Food Marketing Institute Show

The goal was to have a minimum of two Michigan specialty crops highlighted at this retail show. The Michigan Apple Committee exhibited in the booth and information was shared about other Michigan specialty crops including dry beans, cherries, and blueberries. Since this show has gone through changes and was located in Texas, it was difficult to get a second specialty crop commodity group to exhibit at the show. The goal of educating retailers about Michigan specialty crops was achieved at the show as both domestic and international buyers attended the show. The Michigan Apple Committee reported receiving 20 contacts/leads as a result of their participation in the show.

National Restaurant Association Show

The goal was to have a minimum of two Michigan specialty crops highlighted at this major food service show. Unfortunately due to the frost damage in 2012 for the fruit industry the specialty crop commodity groups were not able to participate. Due to the fact that no specialty crop commodity groups were able to participate, MDARD had a booth dedicated to specialty crop promotion that passed out the Specialty Crop Brochures and received and distributed leads for specialty crops. The additional goal was to promote Michigan specialty crops into the market and increase the demand for products. The promotional goal was achieved as the 2012 NRA Show was attended by more than 40,000 industry professionals from 107 countries.

SIAL Paris

The goal was to have a minimum of two Michigan specialty crop commodity groups participate in the SIAL Trade Show. This goal was met and exceeded by having Cherry Marketing Institute, Michigan Bean Commission, and Graceland Fruit exhibit at the show for a total of three specialty crop participants. The additional goal was to promote Michigan specialty crops into the export market and increase the demand for products. The promotional goal was achieved as the 2012 SIAL Trade Show was attended by 155,000 trade visitors from 180 countries. The show was attended by 6,596 companies from 100 countries, focusing on retail trade and the food service and catering market. Increasing the demand for specialty crop products was also achieved as the Michigan specialty crop groups that participated in the SIAL Trade Show expect to receive a combined total of \$2,900,000 in increased sales.

Additional goals and outcomes are reported in the evaluation summaries included in the additional information at the end of the report.

Americas Food & Beverage Show

The goal was to have a minimum of two Michigan specialty crop commodity groups or companies participate in the Americas Food & Beverage Trade Show. This goal was met and exceeded by having Graceland Fruit, Cherry Central, and the Michigan Bean Commission exhibit at the show, for a total of three specialty crop participants. The additional goal was to promote Michigan specialty crops into the export market and increase the demand for products. The promotional goal was achieved as a total of 9,529 people, with 78% coming from the U.S. and 22% being international attendees. Buyers from the key target regions of the Caribbean and Central and South American markets totaled 1,800, showing the importance of this show in Michigan's efforts to expanding specialty crop exports into those regions. Increasing the demand for specialty crop products was also achieved as the Michigan specialty crop groups

that participated in Americas Food & Beverage Trade Show expect to receive a combined total of \$350,000 in increased sales.

Additional goals and outcomes are reported in the evaluation summaries included in the additional information at the end of the report.

Chicago Market Show

MDARD's goal as a first time participant in the Chicago Market Show was to branch out of Michigan to expand Michigan specialty crop products to new, niche, industries. MDARD had three specialty crop companies sign-up to participate in The Chicago Market Show (The Blueberry Store, Mi Farm Market and Pam's Pantry). The Blueberry Store was unable to attend the Chicago Market Show do to a last minute scheduling conflict. Mi Farm Market showcased specialty crop products from The Blueberry Store in their Chicago Market Show display.

MDARD's additional goal for The Chicago Market Show was to have exhibitors acquire one new buyer lead or new contract lead for each participating Michigan specialty crop exhibitor. This goal was also met, as Michigan specialty crop companies made a total of 141 contacts, with 100% of the contacts rated as "very good".

According to the surveys completed by the specialty crop companies that participated in The Chicago Market Show, 100% reported that participation increased their brand awareness within the gourmet, gift, and boutiques industries. The specialty crop companies that participated in The Chicago Market Show with Michigan Pavilion benefited as they experienced a combined total of \$2,100.00 in domestic sales, with additional expected sales over the next 12 months, as a result of exhibiting at the show.

BENEFICIARIES

Minor Crop Summit

The entire specialty crop industry in Michigan benefited from the information that Phil Korson gained and shared with the specialty crop growers, processors, and service providers to the specialty crop industry. A total of 39 people from 24 different companies or organizations attended the meeting to hear about MRL issues for specialty crops as it relates to exports.

Food Marketing Institute Show

Participants included:

- Michigan Apple Committee
- MDARD representing all Michigan specialty crops

National Restaurant Association Show

Participants included:

- MDARD representing all Michigan specialty crops

SIAL Paris Trade Show

Participants included the:

- Cherry Marketing Institute (Representing 540 Michigan tart cherry growers, 60 growers nationally, and 470 sweet cherry growers.)
- Michigan Bean Commission (Representing 1,500 Michigan bean growers.)

Additional Michigan companies in the pavilion selling specialty crops included:

- Graceland Fruit (farmer owned cooperative)

The Michigan specialty crop groups in the Michigan Specialty Crop Booth benefited greatly from the show as they received a total of 27 new buyer contacts and 18 new buyer relationships were established.

American Food & Beverage Show

Participants included the:

- Graceland Fruit (farmer owned cooperative)
- Cherry Central (Cooperative representing hundreds of fruit-growing farmers and processors)
- Michigan Bean Committee (Representing 1,500 Michigan bean growers)

The Michigan specialty crop groups in the Michigan Specialty Crop Booth benefited greatly from the show as they received a combined total of 11 new buyer contacts, and established a total of 13 new relationships with buyers.

The specialty crop companies that participated in the MDARD hosted Michigan pavilion at the 2013 Chicago Market Show benefited greatly from the shows as they received a total of 141 solid contacts/leads.

The Chicago Market Show

Participating specialty crop exhibitors included:

*Mi Farm Market

*Pam's Pantry

LESSONS LEARNED

The activities conducted both in the U.S. and abroad for the promotion of Michigan specialty crops continue to be very beneficial for Michigan specialty crop companies and commodity groups. There continues to be more interest each year for the trade shows especially as the cost of booth space at these shows continues to increase.

One change to the plan was the cancelation of the ANTAD Show in Mexico. The main reason for the cancelation was the concern about safety in traveling to Mexico and also the slowing of the economy in Mexico due to the recession. As a result of canceling the show early the group made the decision to re-direct funds to pay for a person to travel to the Minor Crop Summit in Rome, Italy to participate in the discussion related to Maximum Residue Limits (MRL's) and the affect they have on the export of specialty crop commodities.

Due to the shortage of fruit crops in 2012 because of frost damage, participation in the various activities was down and results were down as well. Much of the outreach at the various shows was to update current and potential buyers of the crop situation for cherries and apples. Much work was also done to encourage buyers to consider Michigan fruit in 2013 and not to consider other countries products.

The Michigan Pavilion at The Chicago Market Show helped MDARD to meet its goal of increasing the offerings of Michigan specialty crops products available to the gourmet, gift, and boutiques industries. These goals were met as a result of specialty crop exhibitors being present at the show and making contacts and leads with industry attendees.

Exhibiting for the first time at The Chicago Market Show presented some challenges. Participants in general had more cost related to participating in The Chicago Market

Show then other domestic MDARD shows. The length of the show and travel expenses contributed to the increase cost for specialty crop companies. The event conflicted with another specialty crop show which caused a decrease in buyers at The Chicago Market Show.

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Michigan Bean Commission

ADDITIONAL INFORMATION

Food Marketing Institute FMI



National Restaurant Association (NRA) Show



**Americas Food & Beverage Trade Show
 Michigan Specialty Crop Booth Evaluation Report
 Introduction**

**Miami, Florida
 Activity Date: Sept. 24-25, 2012**

Three Michigan specialty crop companies participated in the Michigan Specialty Crop Booth at the Americas Food & Beverage Trade Show in Miami, Florida, September 24-25, 2012.

No. of Participants: 3

No. of Returned Evaluations: 3

Specialty Crop Participants:

Graceland Fruit

Cherry Central

Michigan Bean Commission

Does your industry/company anticipate an increase in purchases over the next 6-12 months as a result of the trade show? Yes- 3 No- 0

If, yes approximately how much? (Please provide an estimated value) \$350,000 (total)

Did the Americas Food & Beverage Trade Show yield contacts with new buyers?

Yes- 3 No- 0 If yes, how many? 11

Did the Americas Trade Show result in any new buyer relationships?

Yes- 3 No- 0 If yes, how many? 13

Please rate the Americas Food & Beverage Trade Show on the following: (Excellent=5, Very Good=4, Average=3, Fair=2, Poor=1)

RATE THE ACTIVITY	MEAN
Pre-event planning & communication	4.7
Program execution	4.7
Fulfillment of your company needs	4
Cost/benefit returns to your company	3.7
Quality of contacts or information	3.3

Please estimate company financial and ‘overhead’ expenses for the activity:

Total Number of Staff Hours for Planning, Participation, & Follow-up	83
Direct Costs of Planning, Participation, & Follow-up (including travel)	\$17,000
Other Misc. Costs Associated with Participation in Activity	\$1,250
Total	\$18,250

Please rate the overall effectiveness of the show:

Excellent- 0 Fair- 0
 Very Good- 2 Poor- 0
 Average- 1

Do you have any additional comments for this activity or recommendations for future activities?

- *“We were hoping show would be larger and hope that it will grow as the S & C American markets are critical growth areas to our business.”*
- *“This show was broader in scope than retail food produce and beverages. You might want to communicate. Don’t lose the C. America, L. America and Caribbean focus.”*



SIAL Paris Trade Show Evaluation Summary
 October 21-25, 2012

Participating companies: Graceland Fruit, Inc., Michigan Bean Commission, Cherry Marketing Institute

Total increase in sales =\$2,900,000 with an average of 16% increase.

Total number of contact with new buyers= 27

Total number of new buyer relationships= 18

Average Activity Rating: (1 =poor, 5= excellent)

- Pre-event planning & communication 4.6
- Program execution 4.6
- Fulfillment of your company needs 4.3
- Cost/benefit returns to your company 4
- Quality of contacts or information 4.3

Combined total of staff hours= 285

Combined cost of participation= \$49,200

Overall effectiveness of show:

- Very Good (2) Excellent (1)

Additional comments:

-“Per our conversations at SIAL, we would be interested in participating in more shows wherein we share a booth with Michigan Ag.”

-“Certainly some of the increase comes from market conditions, but even for those, this show put us in a great position to get the business. Several companies we met with are currently in negotiations. Booth experience was very good.”

-“As overseas industry representatives, we are extremely grateful for the support received from Jamie Zmitko-Somers of the Michigan Department of Agriculture & Rural Development. Without this level of assistance we could not participate at this event, the cooperation is an excellent example of the industry and government working together to increase much needed returns to the farm gate.”



The Chicago Market Show





Chicago Market Show Michigan Pavilion-Event Analysis

Two Michigan specialty crop companies participated in the Michigan Pavilions at the Chicago Market Show in Chicago, Illinois January 19-22, 2013. Both participants of the Michigan Pavilions received a survey at the beginning of the show and were asked to return at the end of the show. Number of participants: 2 Number of returned evaluations: 2

Please rate the importance of your company's objectives in participating in this activity, as well as the activity's effectiveness in helping your company meet these objectives: (Poor=1, Fair=2, Average=3, Very Good=4, Excellent=5) (Averages listed below)

Buyer contacts, inquiries

Importance- 4.5

Effectiveness- 4

Direct Sales

Importance- 4

Effectiveness- 3

Agent/distributor search

Importance- 3

Effectiveness- 2.5

Test marketing/research

Importance- 3.5

Effectiveness- 3.5

Product/company exposure

Importance- 4.5

Effectiveness- 4

Is this your first time participating in the Chicago Market Show as a result of Michigan Pavilion? Yes- 2 No- 0

Did you receive any contracts/leads for markets/industries that are new to your product? If so please explain. Yes- 2 No- 0

- *"Met potential customers from all over the country" -Mi Farm Market*
- *"Mainly just new locations in states we have no stores or sellers in. Exciting to branch out."-Pam's Pantry*

Did you make contacts/leads here that would have been challenging to make otherwise? Yes- 2 No- 0

How many contacts/leads resulted from your participation? 141 (combined total)

How would you rate the quality of contacts/leads?

Excellent- 0

Very Good- 2

Average- 0
Fair- 0

Poor- 0

Did participating in this show increase your brand awareness within the industry?

Yes- 2 No- 0

Please rate the overall effectiveness of the show.

Excellent- 0

Fair-0

Very Good- 1

Poor-0

Average- 1

If applicable, have any on-site sales resulted from your participation in this activity? Yes-2
No- 0

If yes, please list sale in US\$: \$2,100.00

Would you have participated in this activity without the assistance of the Michigan Department of Agriculture & Rural Development (MDARD)? Yes- 0 No- 0

Please estimate company financial and "overhead" expenses for this activity:

Total Number of Staff Hours for Planning, Participation & Follow-up	162
Direct Costs of Planning Participation & Follow-Up (including travel)	\$600.00
Other Misc. Costs Associated with Participation in Activity	\$1,556.00

Would your company be interested in participating in the 2014 Chicago Market Show?

Yes- 1 No- 1

Any Comments of Suggestions:

- *"We pretty much had no idea what to expect when we booked this show so we were overall pretty happy with the experience. However I talked to another Michigan producer there who said she did much more in leads and sales in local shows like the Lansing gift market. Also talking to a few other veteran exhibitors they've said that the show has gotten progressively less busy as the years have passed. This may be due to the overall economy or this may be due to a decrease in small/specialty retail stores across the country. Not sure but when considering future shows it may be better to focus on shows that, although they're further from home, may have a better impact on sales (I don't think the Chicago Market Show is going to be as big an opportunity compared to other large scale shows in the country. Either way we'd like to be kept in the loop for future show ideas! Overall we had a great experience and we're looking forward to working with MDARD in the future! Thanks"-Mi Farm Market*
- *"We learned a lot, was a good get our feet wet, see how it works chance. Would love to be able to try one more time with the special pricing and see how we might be able to improve."-Pam's Pantry*

MDARD PROJECT TITLE 2

Domestic Marketing - Michigan Pavilion at Michigan Trade Shows - FINAL

PROJECT SUMMARY:

The Michigan Department of Agriculture & Rural Development (MDARD) sponsored and organized Michigan pavilions for specialty crop producers at the Annual School Nutrition Association Show (SNA) in Denver, Colorado, July 15-18, 2012; the Michigan Grocers Association Show (MGA) in Dearborn, Michigan, on September 10, 2012; and the Michigan Restaurant Association Show (MRA) in Novi, Michigan, October 16 and 17, 2012.

MDARD staff recruited Michigan specialty crop companies for these trade shows to give them a competitive advantage and opportunity for new growth in each of the shows' markets. MDARD passed along the lowest exhibitor group rate to specialty crop businesses. Staff recruited companies, organized the pavilions, coordinated the companies' participation, assisted in providing media coverage for the exhibitors, and conducted an exhibitor evaluation of the events.

The pavilions assisted specialty crop businesses and commodity groups promote their products to the Michigan retail and food service industries. The pavilions showcased Michigan specialty crops and focused on increasing sales of the products. It is important for the specialty crop businesses and commodity groups to exhibit at these shows on a regular basis to ensure existing and potential customers of the continued high quality and availability of specialty crop products from Michigan. Exhibiting at these shows also opened up new opportunities for Michigan specialty crops, which is extremely beneficial.

PROJECT APPROACH:

MDARD sponsored Michigan pavilions at the SNA, MGA, and MRA trade shows; focusing on reaching the school nutrition retail industry, large and small chain corner stores and supermarkets, and the restaurant and food service sectors.

MDARD negotiated a discounted exhibitor rate with the organizing association of each trade show. A discounted rate was then passed on to specialty crop businesses and commodity groups. Recruiting for the trade shows was done through e-mails from MDARD to an extensive Michigan specialty crop company database, in addition to follow-up phone calls to Michigan specialty crop companies.

Special emphasis was placed on recruiting new and established specialty crop businesses that had not previously participated in the Michigan pavilions at these trade shows. New businesses were recruited in efforts to broaden the presentation, and increase the promotion, of new Michigan specialty crop businesses and products into these sectors.

A state-wide press release announcing the opportunity to exhibit in the Michigan pavilions at the MGA and MRA shows and receive a discount rate for being a specialty crop business was also sent out by MDARD in efforts to attract specialty crop businesses. Staff aimed for the Michigan pavilions at the MGA and MRA shows to be filled with at least eight participating specialty crop companies, and the Michigan pavilion at the SNA show to have a minimum of two specialty crop commodity groups participate.

MDARD organized the pavilions and coordinated the companies' participation by communicating with each of the associations and overseeing all details of each Michigan

pavilion. Invoices and forms were compiled to prove participation. Event details were given to all exhibitors.

Specialty Crop Block Grant funds paid to off-set the cost of booth space for specialty crop companies and commodity groups, as well as signage, electricity, and exhibiting furniture for the specialty crop exhibitors of the Michigan pavilion. Funds also paid for the contractual staff to recruit specialty crop vendors, coordinate booth space, and conduct evaluations.

Evaluations were handed out to all exhibitors on the day of the show. Evaluation answers provided by specialty crop participants were compiled into a word document through open-ended questions and charts. Survey analyses for each show can be found in the Additional Information section at the end of this report.

GOALS AND OUTCOMES ACHIEVED:

Annual School Nutrition Association Show

MDARD's goal for the SNA show was to have a minimum of two specialty crop commodity groups exhibit. MDARD met this goal as two specialty crop organizations (Michigan Apple Committee and Cherry Marketing Institute) did exhibit at the show. MDARD's additional goal for the SNA show was to have a minimum of 100 lunch professionals receive information about Michigan specialty crops. This goal was also met, as Michigan specialty crop organizations that participated in the SNA Michigan Pavilion made a combined total of 130 contacts, with 100% of the contacts rated as "very good."

The specialty crop commodity groups that participated in the 2012 SNA show benefited greatly as they reported their participation in the show as being extremely effective in terms of product exposure.

The Cherry Marketing Institute (CMI) developed a contact with HealthCorps, a national nutrition foundation, set-up by Dr. Oz, which works with school-aged children to educate them about proper eating nutrition. Dr. Oz is a publicly known tart cherry advocate. CMI hopes to develop this contact into a relationship that will help introduce tart cherries to more school aged kids across the country.

Michigan Grocers Association Show

The goal for the Michigan Marketplace at the MGA show was to have eight specialty crop companies exhibit, with 50% of them realizing sales or making significant contacts at the show. MDARD greatly exceeded these goals with 15 specialty crop businesses exhibiting at the Michigan Marketplace and 87% of them realizing sales or making significant contacts. Eight of the 15 participants were first time exhibitors to the MGA Michigan Marketplace.

At the MGA show, Michigan specialty crop businesses made a total of 57 contacts, with 67% of the contacts rated as "very good." One specialty crop business connected with a new potential distributor; another specialty crop participant secured leads for entry into the east side of the state, a target area for the business; and at least three MGA Michigan Pavilion specialty crop participants reported meeting with several new stores interested in carrying their products.

According to the surveys completed by the specialty crop businesses that participated in the MGA Michigan Pavilion, 93% reported that participation increased their brand awareness within the Michigan grocers industry; additionally, 65% of specialty crop participants found the show to be effective when it came to increasing product and company exposure, which was the main show objective for 74% of specialty crop participants. Additionally 54% of specialty crop

participants reported making contacts and/or leads at the MGA show that would have been challenging to make otherwise.

Michigan Restaurant Association Show

The goal for the Michigan Pavilion at the MRA show was to have eight specialty crop companies exhibit, with 50% of them realizing sales or making significant contacts at the show. MDARD met these goals with eight total specialty crop businesses exhibiting at the Michigan Pavilion and 100%, all eight, realizing sales or making significant contacts. Four of the eight participants were first time exhibitors to the MRA Michigan Pavilion.

The Michigan specialty crop businesses that exhibited at the MRA Michigan Pavilion made a total of 195 contacts, with 63% of the contacts rated as “very good.” One participant (Mama C’s Finishing Sauce) established a contact with a Michigan restaurant that led to a contract with the restaurant to use Mama C’s Finishing Sauce as the “secret ingredient” for the restaurant’s house burger.

In addition to specialty crop exhibitors, the MRA Michigan Pavilion also hosted the Michigan Food and Wine Pairing. MDARD partnered with the Michigan Grape and Wine Industry Council to organize and provide this food and wine pairing, focusing on Michigan specialty crop products. A Michigan winery was on hand each day of the show to give attendees tips and information on pairing Michigan wines with Michigan specialty crop dishes and ingredients. This unique event proved successful as it educated attendees on various ways to cook with Michigan specialty crops, significantly increasing pavilion traffic.

Fifty-five food and wine pairing participants were surveyed about their use of Michigan specialty crops. Of those surveyed, 47% reported using Michigan specialty crops “whenever available,” and 40% reported using Michigan specialty crops “year round.” Seventy-five percent of food and wine pairing participants reported interest in receiving additional information on purchasing Michigan fruits, vegetables, dry beans, herbs, etc.

In addition to educating participants about the many ingredient uses of Michigan specialty crops, the food and wine pairing attracted many attendees to the pavilion area. This benefited Michigan specialty crop exhibitors by providing a chance to speak one-on-one with show attendees, enabling them to share information about their businesses while promoting their products. In addition, the event also increased restaurant owners’ awareness of Michigan specialty crop food dishes and wines.

Specialty crop businesses found the MRA show extremely effective in terms of product and company exposure, which was the main show objective of specialty crop participants. All eight specialty crop participants reported that their participation in the show increased their brand awareness within the Michigan restaurant industry. Additionally, 75% of specialty crop businesses reported the show’s overall effectiveness as “excellent” or “very good.”

The specialty crop businesses that participated in the MRA Michigan Pavilion benefited as they experienced a combined total of \$692.00 in domestic sales, with an additional \$1,000 expected sales over the next 12 months, as a result of exhibiting at the show.

Overall, participating specialty crop businesses found exhibiting in the Michigan pavilions at the SNA, MGA, and MRA shows to be beneficial. The most important objective desired by all participating specialty crop companies was to gain company exposure, and a majority of exhibitors from all three shows reporting beneficial company exposure.

BENEFICIARIES:

The specialty crop companies that participated in the MDARD hosted Michigan pavilions at the 2012 Michigan trade shows benefited greatly from the shows, as they received a total of 382 solid leads at all the shows combined. To clarify for the events listed: Bur Oaks Farms – Only exhibited their gourmet popcorn; Bon-A-Rose – Only exhibited their marinara sauce.

Annual School Nutrition Association Show

Participating specialty crop exhibitors included:

Cherry Marketing Institute Michigan Apple Committee

Michigan Grocers Association Show

Participating specialty crop exhibitors included:

Bon-A-Rose	Honee Bear Canning
Bur Oaks Farm	JaynRoss Creations LLC
Eastern Market Corporation	Little Diablo Salsa
Gourmet Coffee Roasters	Mama C's Gourmet Finishing Sauce
Safie Specialty Foods	Morano Foods
Great Lakes Potato Chip Co.	P & K Private Stock BBQ Sauce
Heeren Bros. Produce	

Michigan Restaurant Association Show

Participating specialty crop exhibitors included:

Bon-A-Rose	Honee Bear Canning
Cherry Creek Winery	JaynRoss Creations LLC
Eastern Market Corporation	Mama C's Gourmet Finishing Sauce
Sandhill Crane Winery	Safie Specialty Foods
Great Lakes Potato Chips	

LESSONS LEARNED:**Annual School Nutrition Association Show – July 15-18, 2012**

The SNA show was a new and effective way to reach qualified buyers and influencers representing a broad cross-section of professionals who work in the school nutrition industry. Many attendees spoke with SNA Michigan Pavilion specialty crop exhibitors for suggestions on implementing Michigan specialty crops into school lunches as a result of the recent USDA school lunch nutrition standards. Attendees showed a lot of interest in Michigan specialty crop recipes and in-depth nutrition information. Many attendees were well aware of Michigan's 2012 crop situation as a result of unsatisfactory weather conditions; which lead to questions about crop availability and expected future readiness.

Overall, show attendees were educated and extremely interested in the quality and varieties of Michigan specialty crops. It was a beneficial show for the Michigan pavilion specialty crop exhibitors and the overall promotion of Michigan specialty crops.

Michigan Grocers Association Show – September 10, 2012

The Michigan Marketplace at the MGA show helped MDARD to meet its goal of increasing the offerings of Michigan specialty crops products available at retail while promoting awareness to the supermarkets about Michigan specialty crops' availability. These goals were met as a result of specialty crop exhibitors being present at the show and making contacts and leads with industry attendees.

The MGA show continues to be important for specialty crop businesses and commodity groups to exhibit at on a regular basis, ensuring existing and potential customers of the continued high quality and availability of the specialty crop products from Michigan.

In addition, the MGA show allowed participating Michigan specialty crop companies to develop an understanding of what type of specialty crop products consumers are currently interested in, as the desire and need for Michigan grown and processed food continues to increase. The MGA show also supported a current “buy local” trend developing amongst local grocers, proving that retailers really do want to buy locally to both support Michigan businesses and strengthen Michigan’s economy.

MGA was a great opportunity for Michigan specialty crop businesses to meet with grocers and supermarkets to get their foot in the door of more retail outlets.

Michigan Restaurant Association Show – October 16 - 17, 2012

The Michigan Pavilion at the MRA show helped MDARD to meet its goal of increasing the offerings of Michigan products available at food service establishments in Michigan and promoting awareness about the Michigan specialty crop industry.

The MRA show was beneficial for participating specialty crop businesses as it provided an opportunity to connect with owners and managers of restaurants and hotels, with chefs, culinary students, and more.

This year there seemed to be a “buy local” trend developing amongst attendees. There was an increased interest in the type of specialty crops available in Michigan and requests for information on how and where to receive specialty crops. This developing trend confirms that local chefs and restaurant managers do want to buy locally to both support Michigan businesses and strengthen Michigan’s economy.

The MRA show continues to be an important show for specialty crop businesses and commodity groups to exhibit at on a regular basis, ensuring existing and potential customers of the continued high quality and availability of the specialty crop products from Michigan.

MRA was a great opportunity for Michigan specialty crop businesses to meet with restaurants and hotels and get their products into the industry.

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ADDITIONAL INFORMATION:

ANNUAL SCHOOL NUTRITION SHOW





Michigan Grocers Association Show



Michigan Restaurant Association Show



School Nutrition Association Show – Event Analysis

Two Michigan specialty crop companies participated in the Michigan Marketplace at the SNA show in Denver, Colorado July 15-18, 2012. Both participants of the Michigan Marketplace received a survey at the beginning of the show and were asked to return at the end of the show. Number of participants: 2 Number of Returned Evaluations: 2

Please rate the importance of your company's objectives in participating in this activity, as well as the activity's effectiveness in helping your company meet these objectives: (Poor=1, Fair=2, Average=3, Very Good=4, Excellent=5) (Averages listed below)

Product exposure

Importance: 4.5

Effectiveness: 4.5

Industry Contacts

Importance: 3

Effectiveness: 3.5

Obtain industry knowledge

Importance: 3

Effectiveness: 3

Test marketing/research

Importance: 3

Effectiveness: 3

How many contacts/leads resulted from your participation?

Combined total approximately 130

How would you rate the quality of contacts/leads?

Excellent:

Very Good: 2

Average:

Fair:

Poor:

N/A:

Please provide an explanation of your most valued contact.

Most valued contact was any school district from the Michigan area. My job was to convince them to make sure they are buying Michigan apples instead of other states' apples. Michelle Bouchard, Healthcrops. Michelle works with high school students to education them on nutrition. This foundation was set up by Dr. Oz. Dr. Oz is a great tart cherry advocate, and we hope to work with Michelle in the future to introduce tart cherries to more kids of all ages.

Please rate the overall effectiveness of the show.

Excellent:

Very Good: 2

Average:

Fair:

Poor:

N/A:

Would you have participated in this activity without the assistance of the MDARD?

Yes:

No: 1

Unsure: 1

Please rate the performance of the MDARD staff for this activity, as applicable, for the following areas: (averages listed below)

Pre-event planning & assistance: 5

Communication regarding event: 5

Assistance at event itself: 5

Please estimate company financial and "overhead" expenses for this activity:

Total of staff hours for planning and follow-up:

Combined total of 125 hours

- Direct costs of planning participation and follow-up (*including travel*):
Combined total of \$10,935.53
- Other misc. costs associated with participation in activity:
Combined total of \$4,800.00 for misc. costs

Would your company be interested in participating in the 2013 Annual School Nutrition Show? Yes: 2 No:

Any Comments or Suggestions:

- The SNA show provides CMI the opportunity to provide usage tips and health benefit information to school food directors and staff. Tart cherries are sometimes provided by Commodity, and this show is a great opportunity to showcase the versatility of tart cherries.

Michigan Grocers Association Show

Fifteen Michigan specialty crop companies participated in the Michigan Marketplace at the MGA show in Dearborn, Michigan on September 10, 2012. Each of the participants of the Michigan Marketplace received a survey at the beginning of the show and was asked to return at the end of the show.

Number of specialty crop participants: 15
 Number of specialty crop returned evaluations: 15

Note: The below information is tallied from the specialty crop companies only. Some answers were not completed by every exhibitor. All of the following figures are averages among the participants (rounded to the nearest tenth).

Please rate the importance of your company's objectives in participating in this activity, as well as the activity's effectiveness in helping your company meet these objectives: (Poor=1, Fair=2, Average=3, Very Good=4, Excellent=5) (Averages listed below)

Buyer contacts, inquires
Importance: 4.8
Effectiveness: 3.7

Direct sales
Importance: 4.3
Effectiveness: 3.0

Agent/distributor search
Importance: 3.6

Effectiveness: 3.1

Test marketing/research
Importance: 3.1
Effectiveness: 2.9

Product/company exposure
Importance: 4.9
Effectiveness: 4.3

Is this your first time participating in the MGA show as a result of the Michigan Pavilion?
 Yes: 7 No: 8

Did you receive any contacts/leads for markets/industries that are new to your product? If so please explain. Yes: 11 No: 3 No Answer: 1

- We made a contact for a co-packer (JaynRoss Creations)
- Distribution leads (P&K Private Stock BBQ Sauce)
- Markets on the east side of the state (Morano Foods)
- New stores interested (Great Lakes Potato Chips)
- Potential distribution (Great Lakes Pierogies)
- A processor that wants to buy ingredients wholesale (Eastern Market Corp.)

- Had a good possibility productive conversations with a couple of outlets with whom I have not talked before (Bur Oaks Farm LLC)
- Networking, will see outcome results (Bon-A-Rose)
- New independent and market opportunity (Gourmet Coffee Roasters/Java Masters)
- Several store owners took cards and one took bottle of sauce (Mama C's)

Did you make contacts/leads here that would have been challenging to make otherwise?

Yes: 8 No: 5 Maybe: 1 No Answer: 1

How many contacts/leads resulted from your participation? 57 (combined total)

How would you rate the quality of contacts/leads?

Average: 4 Fair: 0 Poor: 0 Excellent: Very Good: 10
N/A: 1

Did participation in this show increase your brand awareness within this industry?

Please explain.

Yes: 14 Maybe: 1

- I have seen a lot of the vendors at other shows, craft shows, farmers markets (Mama C's)
- Exposure to new and innovative concepts/programs (Gourmet Coffee Roasters. Java Master)
- Face to face contact builds awareness overtime. This is a good opportunity to build exposure at reasonable costs. (Bur Oaks Farm)
- Always good to be in front of current and future customers. (Great Lakes Potato Chips)
- We are a small Michigan business and exposure is beneficial for us. (Little Diablo Salsa)
- A new product, we need all the exposure. (JaynRoss Creations)
- Interaction with those in the industry. (Heeren Bros. Produce)

Please rate the overall effectiveness of the show.

Excellent: Very Good: 10 Average: 4 Fair: 0
Poor: 0 N/A: 1

If applicable, have any on-site sales resulted from your participation in this activity?

Yes: 1 No: 8 N/A: 6 If yes, please list sales in US\$: \$35 (total)

Does your company expect an increase in sales as a result of this activity?

Yes: 5 No: 3 N/A: 7 If yes, please list sales in US\$:

Would you have participated in this activity without the assistance of the MDARD?

Yes: 1 No: 10 Unsure: 4

Please rate the performance of the MDARD staff for this activity, as applicable, for the following areas: (averages listed below)

Pre-event planning & assistance: 5 Communication regarding event: 4.9
Assistance at event itself: 4.9

Please estimate company financial and "overhead" expenses for this activity:

Total of staff hours for planning and follow-up: **Combined total of 273 hours**
Direct costs of planning participation and follow-up (including travel): **Combined total of \$9,450.00**

Other misc. costs associated with participation in activity: **Combined total of \$1,410.00 for misc. costs**

Would your company be interested in participating in the 2013 Michigan Grocers Show?

Yes: 14

Maybe: 1

Any Comments or Suggestions:

- Much more buyer interest than two years ago when I last attended – Bur Oaks Farms
- More buyers from SE Michigan. Every buyer I talked to was from the West and North sides of the state. – Eastern Market Corp.
- Good contacts. Seemed to be more stores this year. – Great Lakes Potato Chips
- Ability to set meetings and contact buyers prior to show would be nice. – Honee Bear Canning
- Perhaps encouraging direct sales as well. - JaynRoss Creations
- It would be helpful to have retailers name tags display the company larger – easier to read. – P & K Private Stock
- Our representatives enjoyed this show. Felt it was beneficial and gave us the opportunity to showcase and inform others of our products. - Safie Specialty Foods

Michigan Restaurant Association Show

Eight Michigan specialty crop companies participated in the Michigan Pavilion at the MRA show in Novi, Michigan October 16-17, 2012. Each of the participants of the Michigan Pavilion received a survey at the beginning of the show and was asked to return at the end of the show.

Number of specialty crop participants: 8 Number of specialty crop returned evaluations: 8

Note: The below information is tallied from the specialty crop companies only. Some answers were not completed by every exhibitor. All of the following figures are averages among the participants (rounded to the nearest tenth)

Please rate the importance of your company's objectives in participating in this activity, as well as the activity's effectiveness in helping your company meet these objectives:

(Poor=1, Fair=2, Average=3, Very Good=4, Excellent=5) (Averages listed below)

Buyer contacts, inquires:

Importance: 5

Effectiveness: 3.8

Test marketing/research

Importance: 3.6

Effectiveness: 3.3

Direct sales

Importance: 4.6

Effectiveness: 3.1

Product/company exposure

Importance: 4.9

Effectiveness: 4.9

Agent/distributor search

Importance: 3.6

Effectiveness: 2.6

Is this your first time participating in the MRA show as a result of the Michigan Pavilion?

Yes: 5

No: 3

How many contacts/leads resulted from your participation? 195

Did you make contacts/leads here that would have been challenging to make otherwise or on your own? Yes: 6 No: 0 Maybe: 2

How would you rate the quality of contacts/leads?

Excellent: Very Good: 5 Average: 2 Fair: 0 Poor: 0 N/A: 1

Please rate the overall effectiveness of the show?

Excellent: 3 Very Good: 3 Average: 1 Fair: 0
Poor: 0 N/A: 1

Did participating in the show increase your brand awareness within the industry?

Yes: 8 No: 0

If applicable, have any sales resulted from your participation in this activity?

Yes: 3 No: 3 N/A: 2

If yes, please list sales in US\$: \$692.00 (total)

Does your company expect an increase in sales as a result of this activity in the next 6-12 months?

Yes: 7 No: 0 N/A: 1
If yes, please list sales in US\$: 1000.00 (total)

Would you have participated in this activity without the assistance of the MDARD?

Yes: 1 No: 6 Unsure: 1

Please rate the performance of the MDARD staff for this activity, as applicable, for the following areas: (averages listed below)

Pre-event planning & assistance: 4.8 Communication regarding event: 4.8
Assistance at event itself: 4.9

Please estimate company financial and "overhead" expenses for this activity:

Total of staff hours for planning and follow-up: **Combined total of 210 hours**

Direct costs of planning participation and follow-up (including travel):

Combined total of \$2,480.00

Other misc. costs associated with participation in activity:

Combined total of \$275.00 for misc. costs

Would your company be interested in participating in the 2013 Michigan Restaurant Show?

Yes: 6 Maybe: 2

Any Comments or Suggestions:

- Excellent show! Excellent exposure! We will be back next year – Great Lakes Potato Chips
- The staff did a fantastic job with the whole show – Mama C's

MDARD PROJECT TITLE 3

MDARD - Safe Food Risk Assessment for Small-Scale, Direct-Market Fruit and Vegetable Growers Program *Safe Food *A*Syst* - FINAL

PROJECT SUMMARY

An estimated 6,500 Michigan specialty crop fruit and vegetable producers who market directly to the consumer are not required to have a certified food safety audit. The Agriculture Commission for the Michigan Department of Agriculture & Rural Development (MDARD) is responsible for safe food for consumers. The Commission is concerned a food-borne illness involving a non-regulated Michigan direct market producer would significantly and negatively

impact the important fruit and vegetable industry in the state (\$787.5 million in 2010), and in the region.

The SCBG-funded project demonstrated a successful framework for a voluntary program to promote and to recognize safe food practices among smaller direct-market specialty crop producers in west Michigan (Berrien to Grand Traverse Counties). The trained program staff educated producers, provided technical assistance and recognized those who could appropriately implement the safe food practices on their farms.

With adequate funding, the Safe Food Risk Assessment Program could be expanded statewide to better address the potential food safety risks with direct-market producers.

PROJECT APPROACH

A project advisory group made up of university, government and non-government organizations interested in food safety on small-medium sized specialty crop farms provided input and guidance for the SCBG-funded project. A small farm food safety risk assessment, previously developed and tested under Michigan State University's Project GREEN, was used to educate and assess producer's food safety management practices.

Seven experienced Conservation District technicians who were familiar with the assessment format and delivery were trained to conduct food safety assessments, provide technical assistance and conduct a second-party farm reviews. Training was provided by MDARD and MSU staff, and self-study. Only two of the Conservation District technicians were funded with SCBG funds, the other five technicians and MDARD staff volunteered to participate in the project.

After numerous promotional outreach efforts, the voluntary food safety assessments and farm reviews were conducted by the trained technicians on the producers' farms during harvest and packing operations. Certificates of completion were issued to fourteen producers who demonstrated the food safety practices were appropriately implemented.

Following the 2012 production season, an evaluation of the program indicates a well-received and generally successful effort with numerous food safety practice changes implemented by the participating producers.

GOALS AND OUTCOMES ACHIEVED

Goal	Activities	Outcomes
Seek input from advisory and partner groups	The program staff periodically met and discussed the SCBG-funded project with the advisory group, the MDARD direct market committee, The MDARD Food Safety Committee and MDARD Pesticide and Plant Pest Management Division, USDA GAP inspectors.	The various groups provided input on the implementation of the program and outreach to potential users of the program.
Develop promotion materials and promote program	<ul style="list-style-type: none"> -Technicians conducted numerous promotion activities, including: newsletters articles, press releases, posting to websites, producer meetings, educational booths at trade shows, Conservation District annual meetings, executive board and service club meetings, and more. -MSUE news article was distributed statewide. -PowerPoint slide show with speaker notes was developed for use by technicians. -Promotional brochure that described the program was developed and customized for each local technician. -Educational presentations were conducted at the 2011 and 	<p>1000's of producers became aware of the Safe Food Risk Assessment. Some requests for food safety assistance were from outside of the counties covered by the trained technicians, and therefore not served.</p> <p>Some farm markets recognized program completion in lieu of</p>

	<p>2012 Great Lakes Fruit and Vegetable Exposition. -The Safe Food Risk Assessment posted to: MDARD http://michigan.gov/mdard/0,4610,7-125-50772-275514--00.html MIFFS http://www.miffs.org/gapghp/safefoodriskassessment.asp MSUE GAPs http://www.gaps.msue.msu.edu/safe_food.pdf and the Food and Farming Network, at MLUI's website: http://www.mlui.org/userfiles/filemanager/449/ -Video interview about the Safe Food Assessment posted on MDARD web: http://www.youtube.com/watch?v=qr7zYz-Sh7Q&feature=youtube_gdata -Technician video about first certification issued posted to Manistee News newspaper website: http://news.pioneergroup.com/manisteenews/2012/06/15/gross_nickle-farms-receives-safe-food-assessment-certification/ -MDARD statewide press release on the First Certification Issued in the Michigan Safe Food Risk Assessment. -Michigan Farm and Garden television show interview on the program</p>	<p>other more expensive third party audits.</p> <p>Food hubs in the process of creating locally grown food networks encourage specialty crop growers to use the Safe Food Risk Assessment.</p>
Technician training	<p>-Technicians attended a training sessions facilitated by MDARD program staff on the Safe Food Assessment. -Four technicians attended a Good Agricultural Practices food safety training class offered by Grand Rapids Community College in February 2012. - Five of the technicians and their MDARD Regional Coordinators attended the MDARD Food and Dairy Divisions in-service training. The Food and Dairy Division staff were also updated on the Safe Food Risk Assessment. -Additionally technicians have been encouraged to pursue self-study on food safety. Some of the reported activities included: -Attended MIFFS sponsored on-farm mock audit -Viewed Dr Les Bourquin's video on GAPs and Third Party Audits (2 hours) -Attended MSUE and CD grower meetings on food safety -Viewed Cornell University's video on Fruits, Vegetables and Food Safety: Health and Hygiene on the Farm</p>	<p>Technicians that were knowledgeable about food safety management practice were able to assist participating producers to implement safe food practices on their farms.</p>
On-farm safe food assessments	<p>Goals: 100 Safe Food Assessments 50 Safe Food Certificates of Completion</p> <p>Two weather factors significantly affected our ability to reach the planned goals: late spring frosts and summer drought. Some producers did not have any or had only limited crops to market in 2012.</p>	<p>205 one-on-one producer contacts 52 Assessments 14 Certificates</p>
Program oversight	<p>-Participating technicians provided monthly progress reports to the program staff. The reporting template follows in the additional information section. -MDARD Regional Coordinators met at least quarterly with technicians to assess technician progress and to encourage successful Safe Food Risk Assessment outcomes. -Four conference calls and two face-to-face meetings were conducted to maintain technician success in the project.</p>	<p>Regular communication between field-based technicians and MDARD program staff kept the project on track.</p>
Program	<p>Two evaluations of the program were conducted in</p>	<p>The evaluations indicate the</p>

evaluation	November/December 2012. The Producer and Technician questionnaires and evaluation summaries follow in the additional information section. The evaluation input along with the advisory group guidance will be used to update the safe food assessment for the 2013 growing season.	project was well-received by producers and considered a generally successful effort. Numerous food safety practice changes were implemented by the participating producers.
Seek permanent funding	The outcomes of the SCBG project are being shared with partner groups. Funding to expand the program to statewide service will be explored.	For FY2013, MAEAP funding will support expansion of the program for those Conservation Districts interested in providing the Safe Food Risk Assessment to their producers.

BENEFICIARIES

- 1 Michigan's and the region's specialty crop fruit and vegetable industries have more producers that understand and have implemented food safety practices. The potential for food-borne illness from farms that were reached by the SCBG-funded project is reduced.
- 2 The MDARD Agriculture Commission food safety concern has resulted in a successful framework for a voluntary program to promote and to recognize safe food practices among smaller direct-market specialty crop producers.
- 3 The fourteen producers who received a Certificate of Completion have differentiated their farm operation from others, resulting in a potential marketing advantage.
- 4 The Conservation Districts that participated in the SCBG-funded project have provided additional value to the citizens and producers they serve.

Some of the producers who received a certificate of completion were able to obtain new and profitable markets. Technicians reported: "A producer was using the certificate as a marketing tool for his produce... but not to get into a new market. I have heard that some of the Chicago markets are looking for certifications such as these from their vendors, but are not yet mandatory. I haven't spoken to the producer lately to ask if the certificate impacted profits or not.

"I have talked with producers (two) that have expanded their markets because of the certificate. Markets obtained that were confirmed by producers were Hospitals, Casino, Food Hubs and farm to school. Range of increased sales 15 to 20%."

"We had a producer in Northport use the certificate to solidify sales with Whole Foods. Additionally, our local foods distributor, Cherry Capital Foods, gives preferential treatment to those growers who have a food safety plan (and are very supportive of the Safe Food Risk Assessment to facilitate this). We do have specifics as to percentage of sales increase as a result of the program."

- 5 The project helped the Northwestern MI Food and Farming Network increase the resiliency of their local food systems.

LESSONS LEARNED

- The project was successful in affecting change -- implementing food safety management practices. Both the assessment tool along with the established local technician are required to encourage practice changes.
- Most smaller farms are not able to receive a Certificate of Completion (demonstrate at least 80% of the food safety practices) without the technical assistance provided by the trained technicians.

- Most smaller farms do not have a food safety plan nor a person designated as responsible for food safety on the farm.
- Most smaller producers do not test water used on the farm—irrigation, spray, drinking and produce washing.
- Some smaller farms are reluctant to become involved with a food safety review of their farm operations.
- The Safe Food Risk Assessment is not just for the small producers. Several larger farm marketers and producers were interested in the Certificate of Completion, even though they may already be USDA GAP certified.
- Sources of food safety technical assistance for both the technician and the producer are limited and in some cases not well defined (i.e. water testing for production and packing).
- The project confirmed the notion that food safety concerns and the resources needed to address those concerns are different on small farms rather than larger operations. Small specialty crop growers often do not have the staff and financial resources needed to meet standards geared toward larger operations.

CONTACT PERSON

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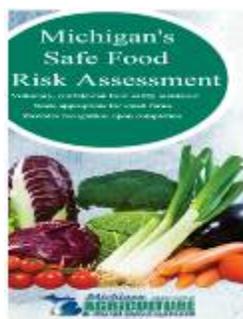
ADDITIONAL INFORMATION

Safe Food Risk Assessment Technician Monthly Reporting Template
 2012 USDA Specialty Crop Block Grant

Name:	CD:	Month:
Number of one-on-one contacts to setup potential assessments during the growing season:	Monthly total	Cumulative total
Number of Safe Food Risk Assessments completed:		

- 1) Promotional activities for greater producer awareness on the Safe Food Risk Assessment program (include activity, location and number of attendees):
- 2) Educational activities for greater producer awareness of safe food production and management practices (include activity, location and number of attendees):
- 3) Self-education and formal training activities on Good Agricultural Practices (GAP) for fresh fruit and vegetable production, farm audits and related topics (include date, topics, location and training type - i.e., classroom, webinar etc.):
- 4) After an assessment, what food safety risks identified on the farm was the producer able to mitigate? Please explain.
- 5) After an assessment, what food safety risks identified on the farm was the producer **not** able or not willing to mitigate? Please explain.
- 6) Other activities and comments related to the Safe Food Risk Assessment program:

Promotional Brochure



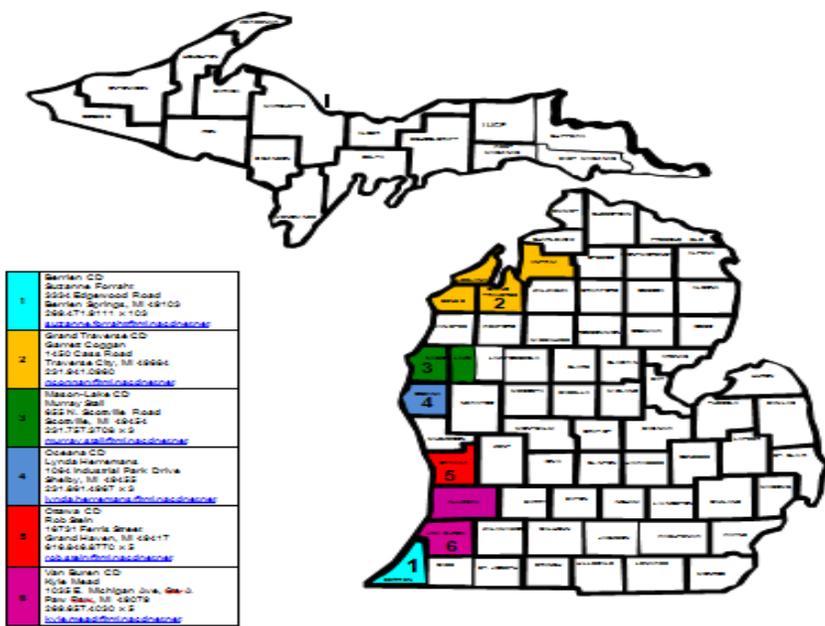


Certificate of Completion

Participating Technicians and Service Areas – next page



**MICHIGAN SAFE FOOD RISK ASSESSMENT
FY2012**



Revised: 01/18/2012

Producer Evaluation Summary

March 29, 2013

Dear Michigan Fruit/Vegetable Producer:

You have been selected to participate in a survey to evaluate the Michigan Safe Food Risk Assessment program offered to you by your local Conservation District during this past growing season. The purpose of the survey is to improve the program and to help protect Michigan's important fruit and vegetable industries.

You are one of a limited number of producers that have been selected to participate in this survey. Your participation is confidential and voluntary, and will provide valued input.

We all know that food safety continues to be discussed by decision makers at the local, State and national levels. Your input will help guide discussions to continue and strengthen your participation in the local foods industry.

Thank you in advance for taking time to share your food safety practices and opinions.

Sincerely,
Allen Krizek Michigan Department of
Agriculture & Rural Development

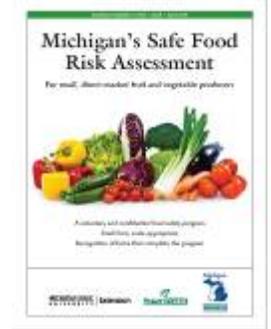
CD Technician

N = 14 questionnaires returned 1/29/2013

Estimated return rate: 50+ percent

Safe Food Risk Assessment Producer Questionnaire

Participation in this anonymous evaluation is voluntary. The result will be used to improve the Safe Food Assessment and to help maintain the fruit and vegetable industries in Michigan. Please complete and mail the questionnaire by December 8, 2012. A postage paid envelope is provided.



- 1) Did your participation in the Safe Food Risk Assessment provide a practical overview and assessment of good agricultural practices that can be used on your farm?
(14) Yes (0) No (0) Not sure

Comments:

-Great program.

-Increase my appreciation of frequent hand washing and for having designated areas for the various activities involve with food handling.

-I have been a home economics teacher (grad BS – MSU) and knew a lot of principles of food safety. These three courses that I have taken have enlightened me to many ideas for the farm

-This was an excellent process to include all levels of farms to be included in a food risk program. Advantage is coast and promotes awareness. Should be a 2-3 year certificate.

- 2) Please indicate if you have made, or are considering making any practice changes as a result of the Safe Food Risk Assessment. Check (✓) all that apply.

Made Change	Considering Change	
-------------	--------------------	--

- | | | |
|------|-----|--------------------------------------------------------|
| (8) | (2) | Develop a food safety plan |
| (11) | (0) | Designate a person responsible for food safety |
| (10) | (1) | Provide potable water for workers |
| (9) | (2) | Provide staff training on food safety |
| (7) | (3) | Establish a sick worker policy |
| (11) | (1) | Test irrigation water |
| (9) | (0) | Test chemical and fertilizer application water |
| (9) | (0) | Test water used to clean produce |
| (2) | (2) | Change manure use practices |
| (8) | (1) | Provide convenient toilet facilities for workers |
| (9) | (1) | Provide convenient hand washing facilities for workers |
| (7) | (1) | Clean bulk harvesting containers |
| (4) | (3) | Clean bulk hauling vehicles |
| (4) | (3) | Clean harvesting implements |
| (8) | (1) | Clean food contact surfaces |
| (9) | (1) | Use sanitized or new produce containers |
| (7) | (1) | Use sanitary storage of produce containers |
| (6) | (2) | Establish produce traceability |
| (9) | (0) | Improve pesticide record keeping |
| (3) | (0) | Other: |

-Working on MAEAP certification

-We already did all that pertains to our farm in regards to food safety certificate and assessment.

-We have signs up regarding food safety for our clients with our U-Pick operation – and gel sanitizer throughout our marketing building. Practice what we preach – example

*-Information for handling fresh produce to purchasers and u-pickers in the form of handouts
-This was a great way for us to show as farmers we use these practices, and provide a certificate that we do this.*

- 3) Does a Safe Food Certificate of Completion (issued when the farm scores 80% or better) improve market potentials for your business? (8) Yes (1) No (5) Not sure

Comments:

-Customers look for

-We are going to work on attaining GAP certification

-For sales in our roadside stand, for Farmers' Markets and especially for selling to restaurants

-So far it hasn't helped but probably will in the future especially if Michigan wholesale and retail outlets accept the Michigan Safe Food Risk Assessment

-We have the certificates up and many people read them and comment on the food safety issue and appreciate the fact we have done something.

-Not sure yet, I hope it will improve potentials. Not sure the numbers of people who stopped to do u-pick berries had ever picked before. Maybe 25-30% never handpicked any kind of fruit, another 25-30% handpicked when growing up and adult life. The remaining picked as a child at some point in time.

- My customers can ask and determine how safe we are in presenting safe produce

-Processors and buyers should also be explained this is an acceptable certificate

-We are not sure that the certificate is well known yet- but we are glad to be able to share with anyone the certificate that we do have.

- 4) If you completed the pre-assessment but have not yet received a Certificate of Completion, is there a particular issue that may be preventing you from doing so? If yes, please describe.

-Scheduling/setting up for Spring 2013

-I didn't get irrigation pond water tested this year and I haven't completed the development of a food safety plan

-I am not sure whether I have receive one from you folks but I have a certificate from MSU (course in Traverse) and Midland where we market twice a week. Murray Stall has approved us in Mason Co certificate?

-Not exactly sure what to do next, prior to the 2013 harvest

-We are a family operation and our part time help. When we use the restrooms we go to our personal bathrooms less than 1.5 miles away.

- 5) What improvements would you suggest for the Safe Food Risk Assessment?

-Need better name – Food Safety Certificate – drop completion

-None, very useful

-None, Linda did a great job working through any issues

-They did a good job

-Reduces costs

-Better screening of volunteers and employees to ascertain their understanding of food safety protocols

-Develop an on-line template for a farmer to use in developing their Food Safety Plan

-I believe someone should inspect every year if that is feasible. One could just drop in.

-None at this time

-We are told to have onsite hand washing on farms. When we take our produce to farmers markets, not all have hand washing stations at markets (unsafe at all fresh markets)

-Extend certificate term to 2 or 3 years

-I like it as it is. Maybe a sign we could post at our booth in the farmers market.

6) How can we encourage more producer participation in the Safe Food Risk Assessment?

-Signage similar to MAEAP

-Marketing meetings

-Incentives

-Tie it into GAP directly

-Introduce them to producers who have completed it. Educate them to the benefits especially peace of mind when safe handling procedures are in place.

-By getting Michigan and other states wholesalers and retailers to accept the Safe Food Risk Assessment instead of requiring GAP

-People just don't want to bother, and with growers going with big processors—they don't work the public directly.

-Education, meetings, people purchasing produce would be more comfortable doing u-pick and fresh purchased produce if a safe food risk assessment certificate was posted. At least I hope it would help.

-Send out info to all farmers; educate consumers of healthy eating and cleaning procedures.

-Explain that you get a certificate; the process will educate you in what's expected of a producer to comply. Get this certificate accepted by major buyers and processors.

-Hopefully it will become more well known in the coming year. It is just getting started.

Garrett is a very effective person to work in this program.

7) What do you perceive as the most important food safety issue(s) on fruit and/or vegetable farms, and how can the Conservation Districts and the Department of Agriculture & Rural Development assist producers to address those issues?

-Ones already covered

-Handling of fruits and vegetables

-Consumer trust – safe food

-For growers to use common sense

-Not disallowing cats/dogs from farm / They do deter rodents/raccoons/possum/squirrels and etc.

-Implementation costs and increasing costs for future years

-Cross contamination

-Contamination from humans handling the food

-Education and involvement of more producers in the safe handling program

-Probably worker and management sanitary attitude and compliance

-Food safety issue – pesticide management – proper sprays- so many days before harvest – both for the safety of people in the orchard and pesticides on the fruit – encourage people to wash fruit before eating. Encourage IPM and let the public know our practices. We can't be organic in such a commercial area, however we can do our best and follow the rules. Thank you for doing this and for your help. I would like to help you where possible. Carole Christofferson

-How people handle the fruit after it leaves the farm. Timely refrigeration, freezing, packaging. Many that visited the u-pick or purchased already picked berries are so poorly informed and worse miss informed about the raising and care of fruit, handling and what to do or not to do after they get it home.

-Using GMO seeds or trees, pesticides can be a silent killer or could cause many unknown health risks (such as using hormones in meat raising)

-Clean harvesting equipment and storage. Handling of product after harvest. Current certifying agents charge a fee for the certification but do not provide any liability for that fee - that's what I have a problem with.

-We appreciate being able to participate in this program. We felt like we were already doing 99% of the required—and it is nice to have a certificate to share with others.

Technician Evaluation Summary

Safe Food Risk Assessment Technician Questionnaire

(Please note that where *2 or *3 is highlighted in parenthesis, means that either 2 or 3 of the 6 Safe Food Technicians had the same comments regarding this subject. All other questions had one comment suggested.)

1) What specific risk questions and answers need to be edited to improve clarity?

1.03 – Is there an immediate food safety risk where produce is grown, processed, packed or stored?

This question should probably be boxed in and moved to the very last question in the assessment, as a “catch-all” question, just as in other assessments.

1.06 – Is there any evidence of falsification of any food safety related record?

This is a sticky question for a lot of growers...most don't have any records to falsify. Maybe we could clarify what the question is addressing.

2.01 – Does the farm operator provide workers with clean water that is safe to drink and to wash hands?

Need more clarity on what exactly to test water for and how often.

3.01 – Is irrigation water quality adequate for the crop being irrigated?

(*3) Need more guidance on water testing intervals and at what point before harvest the water needs to be potable (realizing that there is not much for published guidance on this issue).

- If irrigation water is only used early in the season, are 3 tests really necessary? Example wording for low risk could be: If irrigation water is provided by surface water, it is tested prior to and during use. Surface water is not used within (21?) days of harvest (or however many days should be recommended).

3.02 – Is water for chemical/fertilizer applications adequate for the crop being treated?

(*2) Again, need more clarity on what to test the water for and what is considered safe for the crop being irrigated because of the lack of published standards.

9.10 – Are harvest containers used for carrying or storing non-produce items?

This should be changed to: Are containers, currently being used for harvest, also used to store non-produce items?

12.03 – Are crop protection materials registered for use on the crops that are treated?

May want to make this a boxed question, or at least explain that the label is the law in the notes section. This seems to be a recurring problem with some smaller and newer growers.

2) What food safety risks not in the assessment should be added?

- We may want to have an educational question about using food-safe lubricants on harvesting or packing equipment that is in direct contact with the produce.

(*2) - Maybe touch on proper use of sanitizers in post-harvest processing/equipment cleaning.

- Possibly a question regarding food that has come into contact with the ground or floor. A producer told one technician that they had a trailer tip that was loaded with blueberries, then they picked up all the fruit and packaged it anyway.

- Better wording in 5.06 regarding pets (primarily dogs/cats) in food production area. This question mostly refers to wild animals and efforts to limit their access to production areas.

3) What food safety questions should be boxed or not boxed for scoring to determine if a certificate of completion is awarded?

Add box:

(*3) - 1.03 – Is there an immediate food safety risk where produce is grown, processed, packed or stored?

(*2) - 1.04 – Is there evidence of excessive rodents, insects or other pests in the production or storage areas of the farm business?

(*3) - 1.05 – Are employee practices observed that jeopardize the safety of produce?

(*2) - 1.06 – Is there evidence of falsification of any food safety-related record?

2.03 – Do all farm employees and visitors follow proper sanitation and hygiene practices?

2.05 – Are signs posted to instruct employees to wash their hands before beginning or returning to work?

2.08 – Is there a policy describing procedures regarding produce contact with blood and other bodily fluids?

(*2) - 12.02 – Is crop protection material mixing and loading adequately isolated from water sources and production fields?

(*2) - 12.03 – Are crop protection materials registered for use on the crops that are treated?

12.04 – Do crop protection material applicators read and follow the label instructions?

(*2) - 12.05 – Are pre-harvest interval requirements (days to harvest) followed? (If this item is boxed, it should contain information regarding crop protection materials.)

Delete box: None suggested.

4) What other improvements would you suggest for the Safe Food Risk Assessment?

(*2) – Information on ways to provide traceability and guidance on testing surface water as far as timing and what is considered adequate or safe.

- Number the risk questions on the checklist, for easier reference.

5) How can we encourage more producer participation in the Safe Food Risk Assessment?

- Inform producers of the SFRA when going over other assessments.

(*2) - Working with large farm markets to educate them on encouraging their growers to pursue the program. Work on promotion of the benefits of participation and adoption of safe food practices. Provide information to producers at MAEAP Phase I meetings and farm tours. Send out brochures to small producers and work on one-on-one contacts.

- More effective marketing techniques needed to encourage producer participation...many farms have a lot of risks but they don't think they can reduce those risks.

- Continue to strengthen partnerships with Farm Market groups.

- It would be good if safe food technicians could attend producer workshops, such as MIFFS, to encourage participation.

6) Do you have any other comments about food safety and how Conservation Districts and the Department of Agriculture & Rural Development can assist small producers?

- This program is an excellent way to provide assistance to small producers and a way to make contacts for possible MAEAP verifications. One concern is that this SFRA process is time consuming for the technicians and with the high demand for MAEAP verifications, it will be difficult to find time to work on many new SFRA's unless we can combine the two together.

- This issue will only increase in prevalence and importance, however, there seems to be producer reluctance to move forward until the Food Safety Modernization Act shakes out, or buyers require certain standards. Conservation Districts should continue to be a resource for growers with any type of food safety or environmental question and refer growers to the appropriate sources.

- The biggest problem I see is giving technical help to the producers. We can identify risks on the farm but some of the assistance is hard to get. An example would be sanitizing produce. We can say to the producers that this produce needs to be washed, etc., but how do they do that best? Much of that knowledge is gained from trial and error and experience but we have a difficult time giving them answers as technicians.

- It would be nice if maybe the MDARD Food Inspection Division or another group could possibly help us with proper sanitation procedures and effective mixes for use on various foods that kill bacteria.

- MDARD can help districts seek out grants to continue servicing producers through SFRA's and workshops that focus on "hot" topics such as water testing, sanitation, and traceability. This information was gathered from the following Safe Food Technicians involved in the risk assessment program:

Garrett Coggon, Suzanne Forraht, Linda Herremans, Kyle Mead, Murray Stall, and Rob Stein
 Compiled & Submitted by: Suzanne Forraht on 1/8/2013

Food Safety Tour Stop – Mason County, August 2012



Technician Promotional Materials



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Current Issues
 July 2012 • Vol. 10 • Number 12

Below and to the left are the left side of the page or across the bottom, you'll find all the most current issues.

New Food Safety Program To Aid Area Farmers
 By Carrie Henderson

new food safety program to aid area farmers
 agriculture producers
 ALLEGAN – Food is comfort, but recent aspects of widespread salmonella and other outbreaks make that a dilemma of the grocery store and local stand. Concerned shoppers demand better inspection practices, but lack of the time and resources to conduct them.

currently, the U.S. Department of Agriculture offers food agricultural practices (FAP), a 100-to-200 program that needs

Ag forum: Keeping local food safe
<http://record-eggle.com/business/3399013478>
 /Ag-forum-Keeping-local-food-safe)

Garrett Coggon, left, of the Grand Haven Congregation District, presents a food safety certificate with David Zander of the Zander Farm near Eggle. (Special to the Record-Eagle)

Garrett Coggon

By Garrett Coggon
 (MEdwards@eggle.com)

Our region is fortunate to have an abundance of small farmers from whom we can purchase fresh, locally-grown produce while supporting the people who work the land we all love. In addition to freshness, and some times, consumers also demand their food be safe to eat. The management practices that a farm uses are the first step toward the production of safe, healthy, local food. Good Agricultural Practices (GAPs) are a set of management practices that, if followed, help growers reduce the risk of microbial contamination of fresh produce.

Microbes are naturally present in our environment, however, some of them can cause us serious illness if they enter our bodies, such as salmonella and E. coli. All fresh produce has the potential to become an incubator and a vector for these microbes.

While it's not possible to completely sanitize fresh produce, growers can take steps to minimize the likelihood of harmful microbial contamination. These steps include following proper field tillage, irrigation, pruning techniques, correctly timing harvest, crop rotation and proper fertilizer application, properly training workers on health and hygiene as well as cleaning and sanitizing produce, and applying "trace back" systems and documentation to ensure farmers are able to grow produce and distribute food safely.

MAEAP PHASE I & FOOD SAFETY MTG.

OCEANA, MASON-LAKE & MANISTEE CONSERVATION DISTRICTS

Agenda

- 9:30 Sign-in & refreshments
- 9:45 **Welcome** - Lynda Horvath, Oceana & Mason-Lake CD & Nancy Myers, MSUE
- 9:50 Video - NRCS
- 9:45 **Roundtable Discussion** on NRCS cost-share programs: Mary Kelly, NRCS - Ogemaw County; Seth Paul, NRCS - Mason County; Scott Hagley, NRCS - Manistee County
- 10:00 **Agri Chemical Storage** - Above Ground Fuel Storage Facilities - Merilee and Peter Mangerson, Plan
- 10:45 **Break**
- 10:50 **Cover Crops** - Cristina Casati - MSUE
- 11:00 **MI Agricultural Environmental Assessment Program** - Josh Apichy - MSU&D
- 11:45 **Water Use Reporting and Irrigation Management** - C. Dorell
- 12:00 **Lunch** - Potluck (bring)
- 12:45 **Food Safety Program** for small, direct-market fruit and vegetable producers: Nancy Sall & Lynda Horvath - West Central Water Stewardship; Norm Myers - MSUE; Mark Hill - Ogemaw County Department
- 2:30 **Adjourn**



THURS FEB 26
8:00AM - 1:00 PM

Location: Mason-Lake County, 218 Hwy 41, BSE & One of Two - Port Huron, MI



This meeting has been awarded a Priority Registration Credit to Private Citizen Credit/Charitable Org.

A \$2 fee will be charged to cover lunch at the dinner or to buy lunch per your lunch.

Please register by February 23rd so we can get our business & refreshments by mail.
Oceana Conservation District - 231-681-6972
Mason-Lake Conservation District - 231-755-7256, or
Manistee Conservation District - 231-486-7511

New Michigan's Safe Food Risk Assessment for small West Michigan farms

The Michigan Safe Food Risk Assessment, developed by Michigan Department of Agriculture and Rural Development and Michigan State University, will be available to assist small producers to understand and document on-farm food safety practices.

A recent addition of the Michigan Department of Agriculture and Rural Development is to assist its priority for a safe, smart and vibrant food supply program. Michigan agricultural producers, and growers, are invited to join a pilot project with Michigan State University to develop Michigan's Safe Food Risk Assessment. The voluntary, confidential assessment process helps small producers to market that do not require the food Agricultural Practice (FAP) certification. During 2010, Michigan's Safe Food Risk Assessment was piloted with 12 growers in preparation for broader implementation.

After launch, Michigan Department of Agriculture and Rural Development, at the 2011 Great Lakes

Michigan's Safe Food Risk Assessment



Direct, registered grower growers conducting the risk assessment if your market requires GAP certification. The assessment is a voluntary one that can be done at your own pace and at your own cost.

Participants in our Safe Food Michigan conservation districts are prepared to provide on-farm tours. The addition of practice on-farm market

Oceana Herald-Journal

SMART, EFFECTIVE.

Volume 4, Issue 2

Page 5

Conservation District offers SAFE FOOD Risk Assessments

Recent Conservation Districts pleased to announce a response of a grant through the State of Michigan to offer technical assistance to producers of Fresh Market Fruit and Vegetables for the purpose of conducting a safe food risk assessment. Recent Conservation Districts has been one of the counties to participate in the pilot program to perform Safe Food Risk Assessments and provide education on the program.

The new Safe Food Risk Assessment has been developed and is aligned with USDA Good Agricultural Practices (GAP) requirements, but is small farm scale appropriate. The purpose of the project is to encourage more farmer adoption of cost-effective food safety management practices that can be implemented and maintained by those producers not currently seeking a certified food safety audit. It is designed to educate producers, create on-farm practices, provide food safety technical assistance and recognize small, locally grown fruit and vegetable growers who follow safe food practices. This is a free, voluntary program and will be followed by a trained Conservation District technician. A Safe Food Farm Certificate of Completion will be awarded when a participating grower implements an action plan to correct potential food safety risks identified on the farm and is able to demonstrate or document conformance with at least 80 percent of the key food-safety management practices. The program will enhance grower awareness and adoption of safe food management practices, as well as improve their competitiveness in the marketplace.

Many growers, both small and commercial producers have well-documented consumer food safety concerns by engaging a Certified Food Safety Farm Audit from their local produce growers and suppliers. A number of public and private organizations are assisting producers who wish to have a certified audit. The Safe Food Risk Assessment is one for farms that require a certified food safety farm audit; however, the completion of the assessment will help prepare for a certified food safety farm audit.

A successful completion of the assessment will support the growing public interest in healthy local foods. For details about the program, or to make an appointment to conduct the assessment, contact Suzanne Forst at the Berrien Conservation District at 269-474-9111 x121, or email her at suzanne_forst@mc.manistee-mi.gov



Remaining RUP testing and review session dates for March and April

Commercial and private produce application certification and registered technician credentials expire on December 31st every third year. There are two ways to renew these credentials. Annual training sessions during the application's 3-year cycle.

Safe Food Risk Assessment

Michigan's Safe Food Risk Assessment is a small-farm, scale-appropriate voluntary program designed to educate producers about food safety and recognize those who are safe food management practices. This assessment is geared toward growers who are not currently required to have a certified food safety audit. The Safe Food Risk Assessment tool guides growers in reducing the risk of food-borne illness.

The Safe Food Risk Assessment covers:

- Worker Health and Hygiene
- Water Usage
- Sewage Treatment
- Animal/Wildlife/Livestock Exclusion
- Manure and Municipal Biosolids Application
- Soils
- Field Sanitation and Hygiene
- Field Harvesting and Transportation
- Produce Packing
- Produce Traceability
- Pesticide and Crop Protection Materials

The Safe Food Risk Assessment program improves and standardizes food safety practices amongst small fruit and vegetable producers to create a safer local food network.

Contact the Grand Traverse Conservation District to schedule a Safe Food Risk Assessment:

Garrett Coggon
gcoggon@gtcd.org
cell: 231-590-0620
office: 231-941-0966x27



Local Conservation Districts Offer SAFE FOOD Risk Assessment

This is a free, voluntary, confidential program delivered by a trained Conservation District technician. Designed for small farms and markets, a **Safe Food Farm Certificate of Completion** will be awarded when a participating grower implements an action plan to correct potential food safety risks identified on the farm and is able to demonstrate or document conformance with at least 80% of the key food-safety management practices. The program will enhance grower awareness and adoption of safe food management practices, as well as improve their competitiveness in the marketplace. Successful completion of this assessment will support the growing public interest in healthy local foods.

For complete details on the program, or to schedule an assessment, contact:

Your local conservation district

Michigan's Safe Food Risk Assessment

For small, direct market fruit and vegetable producers

A voluntary and confidential food safety program
Tailor application to your farm
Provides an opportunity for you to complete the program

Water Testing

- Producers think surface water needs to test 0 for E.coli
- Production water is a potential source of contamination
- GAP is only guidance - not law
- No required threshold level
 - Water testing records
 - Appropriate water use based on water tests



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Water Testing

Water Testing

Water is a critical resource for all agricultural and food systems. Water is the lifeblood of agriculture and food systems. Water is the lifeblood of agriculture and food systems. Water is the lifeblood of agriculture and food systems.

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Water Testing	Water Testing	Water Testing	Water Testing
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Water Testing	Water Testing	Water Testing	Water Testing

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Discussion



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SUB-GRANTEE REPORTS

PROJECT TITLE

West Michigan Tourist Association – Regional Agri-Tourism Marketing Plan - FINAL

PROJECT SUMMARY

The purpose of the project was three-fold:

1. Make the public aware of specialty crops and its importance to Michigan's economy.
2. Promote specialty crops to the traveling public and Michiganders through effective marketing and promotional campaign that identifies specialty crops and informs where and when they can be purchased.
3. Solely enhance the competitiveness of specialty crops to the consumer.

The issues addressed by WMTA were the need to connect the specialty crops availability to the consumer. The consumer, traveler, and locals do not always know when specialty crops are available and what season they are available, nor do they always recognize where to buy specialty crops. This problem can be partially solved by identifying the wide array of specialty crops Michigan has to offer and alerting the public to what is available.

As a successful regional marketing association, our organization is motivated by the ability to highlight the agricultural opportunities of our area, and alert the traveling public and Michigan residents to Michigan's specialty crops. This project was very important to improving the competitiveness of the farms growing specialty crops and helping grow sales. With a lot more farm markets popping up in Michigan, this was the time to highlight this important issue.

As a past recipient of the specialty crop grant, we had laid the foundation to identify specialty crops, and this project helped us enhance and continue those efforts. We have developed a much stronger presence for the specialty crops by using a multi-faceted communication approach. By using a mobile site, Google ad words, billboards, consumer trade shows, internet campaigns, social media outreach, and publication communication, we were able to greatly build off of our previous specialty crop grant.

PROJECT APPROACH

There were many activities and tasks performed during the grant period: Carefree Travel Guide, Ag related website, consumer travel shows, mobile site, billboards, Travel Tips e-newsletter and Google AdWords.

The 2012-2013 Carefree Travel Guide featured three pages solely focused on Specialty Crops. A premium two page spread covered an A-Z guide all about specialty crops in West Michigan and a full page advertisement featured a harvest calendar; 150,000 of these printed guides were distributed to travelers this year. The website homepage featured a rotating banner advertisement where visitors can click on the banner and be re-directed to wmta.org/ag. For the past year, the average number of unique visitors to our agricultural page was 2,680 visitors per month. West Michigan Tourist Association attended eight consumer travel shows to promote specialty crops in West Michigan and distributed over 10,000 bags with the slogan "Find your Flavor at wmta.org/ag". On January 1, 2012, 40 billboards were put up each month, scattered around West Michigan, and had the tagline "Find your Flavor at [West Michigan Tourist Association http://www.wmta.org/](http://www.wmta.org/)". When you click on the "Find Your Flavor" banner, you will be directed to [Agri Tourism Michigan - West Michigan Tourist Association http://www.wmta.org/agri-tourism-579](http://www.wmta.org/agri-tourism-579), click on the "In Season" to be directed to [In Season - West Michigan Tourist Association http://www.wmta.org/in-season-588](http://www.wmta.org/in-season-588). Starting in April 2012, an advertisement featuring specialty crops was sent out in our traveler newsletter each month to over 40,000 subscribers. Also in April, our Google AdWords campaign was launched to promote specialty crops in West Michigan and has helped the click through rate to wmta.org/ag. We had many partners throughout this project. CBS Outdoor was a great contributor to our project and made a generous donation match as well as highly reduced rates for billboards. Gaslight Media was our web host and a major partner with our website redesign and mobile site. Members of WMTA made great project partners for us as they helped man trade show booths and distributed specialty crop information to the public.

GOALS AND OUTCOMES ACHIEVED

Many activities were performed to achieve our project goals and measurable outcomes. The 2012-2013 Carefree Travel Guide was printed with three pages that solely focused on specialty crops in Michigan. 150,000 copies of the guide were printed and distributed, playing a big factor in traffic to our agricultural website section, as well as alerting travelers to specialty crops in West Michigan. Another activity performed was a complete redesign of the website as it related to Specialty Crop promotion. This would help achieve our goal of website views and unique web visitors to our agricultural section. The website featured a permanent rotating banner advertisement on the home page featuring specialty crops that linked to wmta.org/ag. It also included side banner advertisements on every page, leading back to the agricultural section of the website.

Consumer trade shows was another activity in our project that would help achieve our measurable outcomes. Our booth at these eight shows featured a six foot banner with pictures and a list of specialty crops in West Michigan, as well as 10,000 bags that had the slogan "Find Your Flavor at wmta.org/ag." Another way we drove traffic to the agricultural site was through our mobile site. The site wmta.org/ag was converted into a mobile smart phone site which travelers could access through QR codes and organic URL's. A banner advertisement was placed on the mobile site homepage that directed traveler's right to the Agri-tourism section. In order to increase the number of e-newsletters we sent out, we make a strong effort to increase our subscribers. We were most successful at tradeshow, where we were able to add many emails to our email list.

Billboards played a huge role in promoting specialty crops in West Michigan. 40 billboards were scattered throughout West Michigan each month for 2012, and some of the billboards still exist into 2013. They included a picture of specialty crops along with the slogan, "Find Your Flavor at wmta.org/ag." Not only did these billboards promote specialty crops, they also directed travelers to the specialty crop section of wmta.org. The final activity that really helped drive our measurable outcomes was our Google AdWords campaign. Michigan, Illinois, Indiana, and Ohio were the targeted states. All specialty crops were assigned their own AdWords and phrases such as, "Specialty Crops in West Michigan," "Michigan Agri-Tourism," "Michigan Farm Markets," and "West Michigan Crops" were included. All of the above activities were performed to help achieve our measurable outcomes.

There was some difference between the actual accomplishments and the goals established for this project. 150,000 copies of the Carefree Travel Guide were printed and distributed, which was 50,000 less than our goal of 200,000; however, we did achieve our numbers by the combination of printed and online views of the Carefree Guide. In order to attempt to achieve our measurable outcome of 4 million website views, we did a complete re-design of the website. We ended up with 327,815 visitors rather than the projected 4 million. While our total web visitors was nowhere near our goal, we set a goal for ourselves of 781 unique web visitors a month to the agricultural section of our site, and we averaged 2,680 visitors a month. We accomplished this through a combination of activities: Google AdWords, billboards, banner advertisements, trade shows. All of these activities linked back to the agricultural section of our website which is why we believe our unique web visitors were significantly higher than our goal.

We set the goal of 450,000 travel show attendees, however, the combined total from all eight shows we attended added up to 196,529. We promoted the show on our end, but unfortunately have no control over how many overall people attend each show. To help distribute more copies of travel guides, we attended a "Michigan Day" at Union Station. This event was sponsored by Pure Michigan and with 100,000 visitors to Union Station each day; this was a great opportunity to hand out our guides containing information on Specialty Ag Crops. We also handed out guides containing Specialty Crop information at other special events like the Warrior Dash that had over 25,000 participants and spectators.

In order to achieve the measurable outcome of 126,000 e-newsletters, we worked hard at each travel show to increase our email subscribers. We ended up sending out 400,000 e-newsletters thanks to our ever-growing email list. The last measurable outcome we had for our project was 101,408,000 billboard impressions; however, according to CBS Outdoor, we had 9,360,000 for our traffic count passing by the billboards. We had 40 billboards placed throughout West Michigan each month, but had no control over where exactly they were placed, which could impact our impressions. Overall, there were some goals we met or exceeded, and some that we did not.

BENEFICIARIES

The major groups that were directly benefitted by our project would be farmers, farmer's markets, and agricultural festivals. Because of the exposure and awareness we raised for specialty crops in Michigan, including what crops are available where and when, we know this benefitted these three groups. Not only that, with unique web visitors of 32,168 this past year, we know many travelers received specialty crop information that may otherwise not have. While helping the farmers, farmer's markets, and agricultural festivals, we were in turn helping the Michigan economy. This benefit will not necessarily end just because the project is over; we are still carrying on the "Find Your Flavor" campaign on our website, which is where we saw the

2012 Find Your Flavor Survey Results (Beneficiaries)		13 Surveys Taken
1 Name of Business		
2 How Long has your business been in operation?		
Answer Options	Response Percent	Response Count
1-10 Years	0.70%	1
11-20 Years	30.70%	4
21-30 Years	15.30%	2
31-40 Years	0.00%	0
41+	0.00%	0
50+	15.30%	2
100+	30.70%	4
3 What are the main products you sell at your place of business?		
Answer Options	Response Count	
Food and Spirits	1	
Facilitate Operation of a Farmers Market	1	
Wine, Memories	2	
Fruit	1	
Entertainment and education	2	
Farm Market	2	
Chamber and Visitors Bureau	1	
Cherries, Peaches, Apples, Pies	1	
Apple, Pumpkins, Pies, Jams, Donuts, Farm Tours	1	
Dairy Products	1	
4 Have you heard of the WMTZs "Find Your Flavor" campaign?		
Answer Options	Response Percent	Response Count
Yes	84.6%	11
No	15.4%	2
5 Did you see any of the WMTAs "Find Your Flavor" billboards from January 2012 – December 2012?		
Answer Options	Response Percent	Response Count
Yes	61.5%	8
No	30.8%	4
Maybe	7.7%	1
6 Did you see an increase in traffic to your business this past year over the year prior?		
Answer Options	Response Percent	Response Count
Yes	61.50%	8
No	15.40%	2
Maybe	23.10%	3
7 Keeping in mind that it was a tough year for crops, do you believe that the West Michigan Tourist Association's agri-tourism "Find Your Flavor" campaign helped your business?		
Answer Options	Response Percent	Response Count
Yes	15.4%	2
No	15.4%	2
Can't Tell	69.2%	9

8 Do you support WMTAs efforts in promoting agri-tourism?		
Answer Options	Response Percent	Response Count
Yes	100.00%	13
No	0%	0
I don't know	0.00%	0

2012 Find Your Flavor Survey Results		113 Surveys Taken
1 Gender		
Answer Options	Response Percent	Response Count
Male	26.80%	26
Female	73.20%	71
2 Where did you travel from?		
Answer Options	Response Percent	Response Count
Michigan	86.30%	95
Illinois	6.30%	7
Indiana	2.70%	3
Ohio	1.80%	2
Wisconsin	0.90%	1
California	0.90%	1
Colorado	0.90%	1

Agri-Tourism		
3 Did you visit any farms or farm markets in 2012 that sell specialty crops or items grown in West Michigan?		
Answer Options	Response Percent	Response Count
Yes	88.60%	78
No	5.70%	5
Maybe, I don't Remember	5.70%	5

4 If so, did you purchase any specialty crops?		
Answer Options	Response Percent	Response Count
Yes	85.5%	71
No	4.8%	4
I don't remember	9.6%	8

5 If yes, how much did you approximately spend?		
Answer Options	Response Percent	Response Count
\$1 - \$10	3.8%	3
\$11 - \$20	28.8%	23
\$21 - \$30	22.5%	18
\$31 - \$40	13.8%	11
\$40+	31.3%	25

6 Have you heard about the West Michigan Tourist Association's Specialty Crops Promotion "Find Your Flavor?"		
Answer Options	Response Percent	Response Count
Yes	19.30%	17
No	71.60%	63
Maybe	9.10%	8

7 If so, how did you hear about it?		
Answer Options	Response Percent	Response Count
Travel Tips E-Newsletter	56.5%	13
Find Your Flavor Billboards	30.4%	7
WMTA.org	8.7%	2
WMTA.org/ag	0.0%	0
Word of Mouth	13.0%	3
West Michigan Tourist Association TV or Radio Appearance	4.3%	1
8 Will you return to West Michigan Farms or markets to purchase these products again?		
Answer Options	Response Percent	Response Count
Yes	91.80%	78
No	0%	0
Maybe	8.20%	7

LESSONS LEARNED

This project reinforced our belief in a multi-channel outreach targeting a central point of information distribution, which in this case was a website. Utilizing all marketing voices, our potential customer was directed to a central web site that offered a comprehensive review of where and when specialty crops products are available.

We also cemented the importance of agriculture and tourism and how they interact. Both of these industries are vital to the economic health of Michigan and our region. Many agricultural products are a tourism draw and of course we depend on Michiganders and out of state visitors to consume our specialty crops and help drive our economy.

We also restated how Michigan has a diverse specialty crop agricultural product offering.

What we also learned was the power of Google AdWords in driving customers to our website. We worked on SEO or search engine optimization and buying Google AdWords. We learned how we can increase our opportunity to bubble-up our website to the top when customers are looking for Michigan specialty crops. SEO and buying placement is a system where you can buy your popularity – which exceeded our expectations as far as delivering people to our website who in turn were looking for Michigan specialty agricultural products.

WMTA staff is confident that we delivered on all promised although we did not always reach the numbers stated in the application. WMTA diligently promoted specialty crops as stated in the grant application.

As requested, we have conducted a survey that was featured in our members newsletter. The newsletter goes to our visitor data base and was featured in the Michigan Department of Agriculture & Rural Development Grape and Wine Council e-newsletter. The results are divided by Ag industry beneficiaries and there is a separate survey for the traveler.

CONTACT PERSON

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ADDITIONAL INFORMATION

We have included a print out of what the billboards looked like, a screen shot with the side banner advertisement online, the 2012-2013 Carefree Travel Guide that includes that agricultural section, and the "Find Your Flavor" bags that we used for travel shows.

A. Additional Information

[Agri Tourism Michigan - West Michigan Tourist Association](http://www.wmta.org/agri-tourism-579/) - <http://www.wmta.org/agri-tourism-579/>

file:///S:/AgD_Grants/12-25-B-1235%20SCBG%20%2011-12\Final%20Reports\MDARD%20FINAL%20REPORT%20TO%20USDA%201235.doc

PROJECT TITLE

Michigan Plum Advisory Board - A Proposal to Expand the Michigan Plum Market by Identifying, Matching, and Communicating Plum Variety Characteristics to Packers, Shippers, and Buyers of Michigan Plums - FINAL

PROJECT SUMMARY

This project was initiated to help the Michigan plum industry transition from a processing to a fresh market orientation. The number of Michigan farms growing plums decreased from 180 in 2000 to 150 in 2011, with a corresponding decrease in acreage from 1000 to 600, according to the NASS fruit rotational surveys. This shift is in response to declining public demand for canned and pureed plums. The Michigan plum industry has centered on Stanley and Damson plums, two varieties used primarily for processing. In recent years Michigan growers have been reducing acreage of these two varieties.

This proposal addressed a major need of the Michigan plum industry—to help Michigan growers successfully market new fresh-market plum varieties. A range of relatively new plum varieties with great potential for the Michigan fresh market have become available through several breeding programs but Michigan growers and consumers are generally unfamiliar with them. Educating Michigan growers and consumers about these varieties is a critical step in rejuvenating the plum industry.

This project also addressed important problems facing other facets of this industry -- most potential growers, wholesalers, retailers, and buyers are unfamiliar with the new plum varieties now available that can help revive the Michigan industry. Our 2011 survey of Michigan plum growers revealed that over half had no growing or selling experiences with newer plum varieties such as Castleton, Bluebyrd, or NY9 that are better fresh market varieties.

GOALS AND OUTCOMES ACHIEVED

1) We surveyed the Michigan plum industry by mail and at the 2011 state horticultural meeting (Great Lakes Fruit, Vegetable and Farm Markets EXPO) as to perceived needs and awareness regarding new plum varieties. 105 surveys were distributed and 30 surveys were returned, 27 of these were from commercial plum growers. Michigan commercial plum growers generally agreed or strongly agreed that they need to find better plum varieties to grow and as well as more buyers for their fresh market plums. They also agreed that they could sell more plums if the fruit eating quality was better, a characteristic of better plum varieties.

Baseline information about Michigan plum industry perceived needs and awareness regarding new plum varieties as a basis for web site design and future documentation of impact of project was gathered.

The survey was designed by Michigan State University specialist Bill Shane and Michigan Plum Advisory Board (MPAB) Executive Director John Bakker. The MPAB distributed the surveys by mail to known plum growers in November 2011, and additional surveys were distributed at the state horticultural meetings in December 2011. Betty Elder of the MPAB assembled the results, and Bill Shane analyzed the results, summarized as follows:

Needs assessment

In general, Michigan commercial plum growers were supportive (**agreed or strongly agreed**) with the following statements:

- I need to find better varieties (plum) to grow on my farm
- I need to find better varieties to fill gaps in my harvest season
- I need to find more buyers for my fresh market plums
- I could sell more plums if my fruit eating quality was better
- A major bottleneck for my farm is short plum tree life

Michigan commercial plum growers were neutral (**equal number agreed or disagreed**) about the following statements:

- Nurseries do not carry the plum varieties I need
- I would like to advertise my plums on a Michigan plum industry web site
- A major bottleneck for me is low price per pound

Michigan commercial plum growers surveyed generally **disagreed or strongly disagreed** with the following statements:

- I could sell more plums if I had more attractive / better packaging
- A major bottleneck for my farm is small fruit size
- I could sell more plums if my fruit shelf life was better
- I could sell more plums if my fruit was more attractive
- A major bottleneck for me is insufficient labor for thinning and / or picking
- A major bottleneck for my farm is low plum crop yields
- Disease and insect damage is a major limitation for growing plums

We concluded Michigan plum growers want more information about better plum variety options for their farms. We learned that Michigan plum growers felt they needed help finding more markets for their fresh plums and better eating quality was needed. Also Michigan plum growers felt they needed help to maintain the productive life of their orchards. It is these aspects that are emphasized in the new plum web site and promotional material.

Variety awareness

In the same survey instrument, the commercial plum grower group was polled as to their familiarity with 43 Japanese, European, and hybrid pluot varieties to provide baseline information on the impact of this project. These varieties were classified by Michigan State University and the Michigan Plum Advisory Board as not recommended, recommended for fresh market, or worthy of small scale trial. Varieties labeled as recommended or worthy of small scale trial are being targeted in the new plum web site and promotional materials, and will be used to measure increased awareness by the Michigan grower community by this project.

II. Joint Michigan State University and Michigan Industry Plum Web Site

The goal is to build the initial framework and graphics for a web site aimed at growers, wholesale buyers and potential consumers of Michigan plums. The proposed web site would contain information about the Michigan plum industry, types of plums, harvesting and storage guidelines, growing areas, growers.

Initial web site concept, objectives and layout were assembled by Michigan State University specialist Bill Shane in fall 2011 in consultation with the Michigan Plum Advisory Board. Bill Shane conducted interviews with potential web site design companies, resulting in a contract with the company Cloudyreason Inc., Boca Raton, FL, beginning in January 2012.

Web site structure, graphics, links, templates, menus, page structure were developed and refined by Cloudyreason from January to June 2012 in consultation with Bill Shane and Betty Elder (now the Executive Director of the MPAB). The preliminary web site was reviewed by the Michigan Plum Advisory Board members in April 2012 and suggestions incorporated into the further construction of the site.

Additional web site graphics and information content is being written, assembled, and uploaded by Bill Shane, local web site developer Amber Nyblad, and Mira Danilovich, former Michigan State University Extension plum specialist.

2) A web site (Michiganplum.org) was constructed for the Michigan Plum Advisory Board (MPAB) aimed at growers, wholesale buyers and especially consumers of Michigan plums. The web site contains information about the Michigan plum industry including types of plums, recipes, health benefits, harvesting and storage guidelines, growing areas, and location of commercial growers in those areas.

Initial web site concept, objectives and layout were developed by Michigan State University specialist Bill Shane in the fall of 2011 in consultation with the MPAB. Bill Shane guided web programming work by CloudyReason, a Boca Raton, Florida web design company, with progress reviewed by the MPAB. Web content was developed by Bill Shane assisted by local web site developer Amber Nyblad, and Mira Danilovich, former Michigan State University Extension plum specialist.

3) An attractive, consumer friendly brochure "New Plum Varieties for Michigan" was developed for consumers, growers and marketers of Michigan plums. Initial concept was developed by Bill Shane with oversight by MPAB Director Betty Elder and MPAB board members. Brochure setup, format, and graphics were created by graphic designer Erica Haney.

The new plum website and brochure were presented to members of the Michigan plum industry at the December 2012 state horticultural meetings in Grand Rapids, Michigan. Features of the website and brochures were showcased in two presentations and at the trade show plum booth. The initial goal was to make growers and sellers of Michigan plums aware of the website and brochures in advance of the start of plum harvest in 2013 and to encourage growers to list their operations on the site to increase plum sales. Since the launch of the website in late 2012, web statistics show that 371 unique visitors have visited the website. Based on the experience with the Michigan peach industry web site, we expect an increase of consumer visits to the website as the plum season approaches. A stated goal in our proposal was to have 1000 unique visitors to the website during the peak summer month. This appears to be a very realistic goal for the summer of 2013. We plan to use local media to bring attention to the website as the plum harvest season begins. Strategic distribution of the new brochure will also help bring visitors to the website.

“Plum Varieties for Michigan” brochure overview. Brochure is a tri-fold, with information about plum recipes, plum harvest season, where to find plums, how to determine plum ripeness. See “Additional Information”.

As of mid-January 2013, 16 plum growers/sellers, approximately 10% of the plum farms in Michigan, have requested to be posted on the site. Plum growers were not generally concerned with marketing crops in 2012 due to poor crops. With a normal crop in 2013, it is expected that grower’s interest in marketing will rise. Web statistics will allow us to analyze the interest of visitors in various aspects of the plum site such as recipes, where to find plums, plum varieties, novel uses of plums, handling plum, and health benefits.

As of August 2013, 18 plum growers/sellers have been posted on the “Where to buy Michigan Plums” section of the web site.

Awareness of the Michigan plum web site by Michigan consumers and growers was accomplished by articles posted on the Michigan State University ‘News for Ag’ website July 16 and August 6, 2013, through mailings to the Michigan fruit industry, and at a peach/plum showcase co-hosted by the Michigan Plum Advisory Board and Michigan State University Extension on August 27, 2013.

The Michigan plum web site recorded 1,051 visitors during August 2013, with 2,239 page views. Content pages of most interest were: plum variety descriptions (523 views), types of plums (277 views), where to buy plums (257 views) and recipes (245 views).

Web page views per week ranged from approximately 217 in early June to a high of 628 in early September. Increases in web traffic correlated with the Michigan plum season which runs from mid-July to mid-September.

Weekly Michigan Plum Site Traffic Details – page views (source: Squarespace statistics)

Week of	Views	Unique visitors
Sep 1	628	285
Aug 25	538	242
Aug 18	390	211
Aug 11	502	263
Aug 4	519	223
Jul 28	323	150
Jul 21	348	206
Jul 14	289	141
Jul 7	207	125
Jun 30	355	104
Jun 23	196	110
Jun 16	296	115
Jun 9	217	143

Growers listing on the “Where to Find Michigan Plums” section of the web site were sent surveys in mid-September 2013 followed by direct calls if the surveys were unanswered to determine the impact of the Michigan Plum web site. Replies were received from seven of 18 growers. The questions and responses were as follows.

Statement	Response		
	Yes	No	Don't know
"I have been told by customers that they saw my business listed on the Michigan Plum web site"	4	1	2
"I have been told by new customers that they found my business on the Michigan Plum web site"	4	1	2
I have had increased phone call and/or visits because of my business listing on the Michigan Plum web site	5	1	2
I have had increased sales of plums due to my business listing on the Michigan Plum web site	3	1	2
I have visited the Michigan Plum web site.	6	1	2

In general, surveyed plum growers saw a positive benefit from the Michigan Plum web site. Suggestions by the growers were to link to other agriculture sites and to categorize the "Where to Find Michigan Plums" listings by wholesale or retail.

20,000 copies of the Michigan Plum Variety brochure have been printed, and as of September 1, 2013, approximately 3,300 of these have been distributed to growers, brokers, buyers to distribute to their plum customers, and to educational programs for school children, county fairs, and teachers doing ag projects. The goal is to continue to distribute the remainder over the next two years, at which time the bulletin will be due for revision.

BENEFICIARIES

Current and new Michigan plum growers benefit from the outcome of this project which is the education of the plum industry and consumers about new exceptional quality plum varieties well suited to the Michigan climate. The new website and brochure will help orient growers and consumers to types of plums, how they are used, and where they are grown and sold. According to a recent NASS survey, plums were grown on 185 Michigan farms. Farm markets that carry plums clearly benefit from this project. Although there is currently only one nursery in Michigan that produces plum trees for sale, there are at least three fruit tree sales brokers who operate in Michigan. These four companies will definitely benefit from increased sales of plum trees in Michigan.

LESSONS LEARNED

Our 2011 survey of Michigan plum growers revealed that over half had no growing or selling experiences with newer plum varieties such as Castleton, Bluebyrd, or NY9 that are better fresh market varieties. We will measure changes in grower awareness and planting of these newer varieties with a follow-up survey in a few years.

We learned that it is difficult to make contact with Michigan growers with smaller acreage of plums, but we are making headway. The Michigan Plum Advisory Board has historically had a largely processing orientation and less contact with smaller growers producing plums for the fresh market. We were pleased to discover numerous Michigan growers who are passionate about growing, eating, and selling great plums and see them as a future resource for helping to build the Michigan plum industry.

We experienced some setback in the progress of this project due to the departure of the primary plum specialist at Michigan State University Extension in the middle of this work. As a result, we were unable to develop the "Variety profile sheet for Michigan plums" and the "Harvesting

Fresh Market Plums” as stand-alone bulletins as given in our proposal. However, we did include much of this information into the plum website where it is easily accessed.

An informal survey was made in early September 2013 to help determine if Michigan growers were planning to plant more plums. We contacted head sales staff managers at Adams County Nursery (Tom Callahan) and Stark Bro Nursery (Shawn Bixby), two major suppliers of plum trees for Michigan. Both managers did not yet notice a significant increase in demand for new plum trees by Michigan growers. However, we now believe that the two year span of this project is insufficient time to see stimulation of new Michigan plum plantings, particularly for new varieties that may be in short supply from tree nurseries. It takes two to three years for nurseries to produce new trees. It is expected to take a few years for Michigan growers to learn about new plum varieties and order trees. Adams County Nursery is adding numerous new plum varieties from New York and Canada to their inventory in anticipation of grower interest.

CONTACT PERSON

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ADDITIONAL INFORMATION

The Michigan Plum Advisory Board and Michigan State University Extension will continue to use the new plum website and the new variety pamphlet to inform Michigan growers and consumers about good plum variety options. We plan to develop and distribute articles via the Michigan Plum website, and through University and commodity publications/web sites focusing on the best variety options for the various categories of plums.

The Michigan Plum Advisory Board and Michigan State University Extension are co-organizing an educational session at the December 2013 Michigan horticultural meetings focused on plum variety options.

We will continue to work with nurseries to explore and suggest new plum varieties for their catalogues. In some cases, we will need to encourage trial plantings of new varieties to see their suitability for Michigan climate and markets.

We plan to increase the website listing of Michigan businesses offering Michigan plums. We plan to cross-list this site with other Michigan agriculture web sites.

We plan to develop web based articles focusing on the gourmet qualities of certain plum varieties as a way to increase customer interest.

Please see the Michigan Plum Advisory Board website at [Michigan Plum Advisory Board - http://www.michiganplum.com/where-to-buy-michigan-plums](http://www.michiganplum.com/where-to-buy-michigan-plums)

The following pages show highlights of the Michigan Plum project including views of the new web site, web traffic statistics, the Michigan Plum Varieties brochure, and poster used to advertise the new website.



[Where to Buy Michigan Plums](#)[How to Select Plums](#)[Plum Variety Overview](#)[Types of Plums](#)[Harvest Seasons](#)[Plum Variety Descriptions](#)[Plum Facts](#)[Growing Plums in the Backyard](#)[Commercial Plum Production](#)

Plums Nutrition Facts ➔

RECIPES BY CATEGORY

[Appetizers](#)[Beverages](#)[Breakfast](#)[Desserts](#)[Entrees](#)[Preserves and Canning](#)[Sides](#)[Soups and Stews](#)[Vegan](#)

SEARCH BY KEYWORD

[Cake](#)[Cobbler](#)[Low Calorie](#)[Tarts](#)

🍷 [Entries in Desserts \(14\)](#)

GERMAN BLUE PLUM CAKE

Ingredients

¼ lb butter
2 eggs
½ teaspoon salt
1 teaspoon vanilla
¾ cup sugar
1 ¾ cup flour
1 teaspoon baking powder
¼ cup milk (or more)
2 ¾ to 3 lb purple plums
1 cup chopped nuts



Directions

Cream together butter and sugar. Mix well together the eggs, flour, salt, baking powder, vanilla, and milk. Grease a jelly roll pan and preheat oven to 375 F. Spread dough on pan. Halve, pit, and rinse plums. Put plum halves on dough with cut side up and touching each other. Sprinkle plums with sugar and cinnamon. Dot each plum with a tiny piece of butter. Sprinkle nuts over plums. Bake at 375 F for 30 minutes.

[PRINT RECIPE](#) | [SHARE RECIPE](#) | [EMAIL RECIPE](#)

Grandma's Polish Plum Pierogi



Ingredients:

For the dough:

2 eggs
¾ cup water +/-
2 cups of flour
1/2 t salt

For the filling:

~16 Ripe plums
~1 cup sugar
~1 tsp. cinnamon

Directions:

Dough: Mix up eggs into water and salt with fork. Pour into flour on working surface. Use fork to mix, cover and let rest for 20 minutes. Roll out dough. Use flour on board to help prevent sticking. Cut into circles (approx. 4" diameter)—use a cup or dessert saucer for pattern.

Filling: Peel and remove pits from plums. Fill cavity of plum with sugar and a touch of cinnamon. Dredge in cinnamon sugar (approx. 1 tsp. cinnamon per 1 cup sugar).

Place into dough circle. Lift dough and cover plum, using water to seal the dough edges. Boil dough pierogi in hot water 3-5 minutes. Remove and use butter or oil to dredge in, otherwise they will stick together.

Warm in fry pan with oil or butter and brown to taste. Serve as is or with whipped cream. Freeze excess individually in zip-lock bags.

Recipe submitted by Tom Kalina, K's Acres.



- Where to Buy Michigan Plums
- How to Select Plums
- Plum Variety Overview
- Types of Plums
- Harvest Season
- Plum Variety Descriptions
- Plum Facts
- Growing Plums in the Backyard
- Commercial Plum Production



RECIPES BY CATEGORY

- Appetizers
- Beverages
- Breakfast
- Deserts
- Entrees
- Preserves and Canning
- Sides
- Soups and Stews
- Vegan

Plum Variety Descriptions

JAPANESE PLUMS



Early Magic - The early magic ripens in mid-July. Fruit size is medium. This medium sized fruit is purplish red and covered with sexy bloom giving it a bluish cast. The flesh is amber-yellow, firm, juicy, sweet and very good tasting.

Early Golden - The early golden is one of the first plums of the season, ripening in the second part of July. Similar to shiro plum, it is small to medium in size, firmer than the shiro, mild tasting, sweet and does not stick to the pit. The early golden is an excellent choice to satisfy your early season sweet tooth.



Methley - One of the first out of the orchard in mid-July, this is well known variety that has been present on the market stands for a long time. This fruit is harvested with a green shadow, but ripens to a vibrant purple with a deep red flesh at market. This small round fruit is the perfect pop-able sweet treat on a hot July day.

Shiro - The shiro needs no introduction as it is the most well-known of the Japanese varieties. Be sure to handle this petite yellow plum with care as they bruise easily. Smooth and sweet, you will surely encounter the shiro at farmers markets in late July.



Santa Rosa - The Santa Rosa is a beautiful, large, red fruits with gold flesh. It is a sweet plum that is delicious when eaten fresh, cooked or canned. It is ready the first week of August.

Marking Delicious - This new variety is gaining acclaim for its great taste and ease of growing. It is disease resistant making it a very environmentally friendly option. Ripening in the second week of August, this deep red Japanese plum is a delicious summer treat.



Ozark Premier - The Ozark premier is a large, plump, roundish plum. The skin is red with a sexy bloom. Its firm flesh is yellow, fine grained, and juicy. The Ozark premier will appease your appetite with its sweet, great taste.

Michigan Plum Website Screen Shot 3: Visitors can scroll down through plum variety profiles for the major types of plums



- Where to Buy Michigan Plums
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- Growing Plums in the Backyard
- Commercial Plum Production



RECIPES BY CATEGORY

- Appetizers
- Beverages
- Breakfast
- Desserts
- Entrees
- Preserves and Canning
- Sides
- Soups and Stews
- Vegan

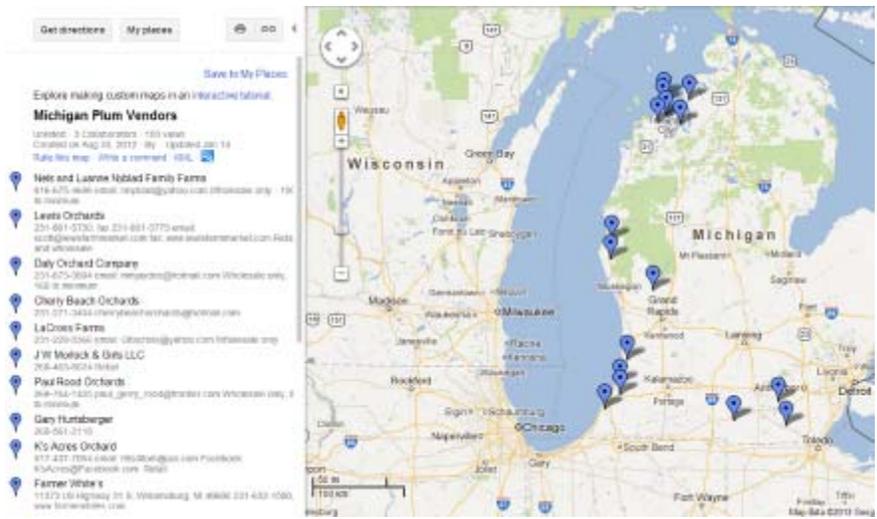
Harvest Seasons

Michigan plums of all shapes and sizes are coming your way this summer. Starting in mid-July with the sweet, festive Japanese varieties and moving through September with the classic European varieties, Michigan plums offer a plethora of exciting colors and flavors to mix up your summer diet. Get down to your local farmer market or fruit stand to stock up on what is in season and enjoy pure Michigan eating all summer long.

Variety	Type	Ripening Date	July				August				September						
			5	10	15	20	5	10	15	20	5	10	15	20	25		
Early Magic	J	8-Jul	●														
Early Golden	J	13-Jul		●	●												
Methley	J	20-Jul			●	●											
Shiro	J	26-Jul				●	●										
Vibrant	E	28-Jul					●	●									
Vanette	E	4-Aug						●	●								
Santa Rosa	J	5-Aug						●	●								
Starking Delicious	J	10-Aug							●	●							
Ozark Premier	J	12-Aug								●	●						
Burbank	J	15-Aug									●	●					
Redheart	J	18-Aug										●	●				
Rubyqueen	J	18-Aug											●	●			
Castleton	E	20-Aug												●	●		
NYS	E	20-Aug													●	●	
Fortune	J	22-Aug														●	●
Early Italian	E	25-Aug															●
Stanley	E	1-Sep															●
Lydecker	J	1-Sep															●
Simka	J	1-Sep															●
Valor	E	2-Sep															●
NY #	E	3-Sep															●
Bluefre	E	3-Sep															●
Long John	E	4-Sep															●
Autumn Sweet	E	5-Sep															●
Blue Damson	E	5-Sep															●
Italian	E	8-Sep															●
Talare Giant	E	8-Sep															●
Empress	E	14-Sep															●
Alderman	J	21-Sep															●

*Average harvest date for southern Michigan. Harvest dates in more northern regions can be a week (mid-Michigan) to two weeks later (northern lower peninsula of Michigan).
**J signifies Japanese varieties, E signifies European varieties

Michigan Plum Site Screen Shot: Plum harvest seasons

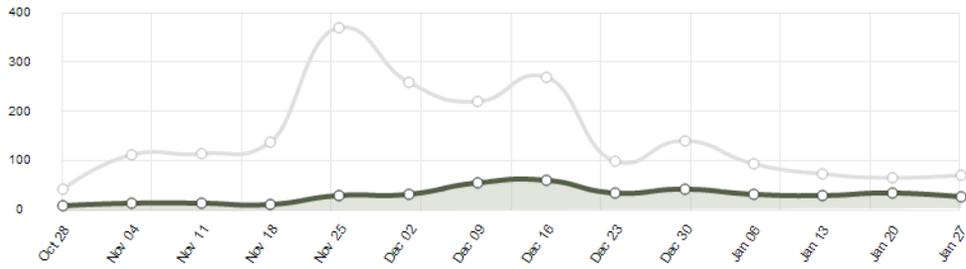


Michigan Plum Website Screen Shot 5: Visitors to the site can use embedded Google Maps feature to find Michigan



Michigan Plum Website Screen Shot 6: Dietary Guidelines as pertains to plums in the Healthy Living section.

viewing hourly daily **weekly** monthly



Traffic Summary	
Page Views	2,023
Page Views / Week (Avg)	150
Unique Visitors	378
Unique Visitors / Week (Avg)	27
Robot Hits	1,921
Robot Hits / Week (Avg)	140

Traffic Details			
	(Views)	(Unique)	(Robots)
Week of Jan 27	67	23	91
Week of Jan 20	63	31	260
Week of Jan 13	70	27	146
Week of Jan 6	90	28	117
Week of Dec 30	138	38	177
Week of Dec 23	95	32	183
Week of Dec 16	267	58	195
Week of Dec 9	218	51	160
Week of Dec 2	255	29	254

Michigan Plum Site: Web traffic (Page views – light line, and Unique Visitors – dark line) since official site launch in early December 2012. Numbers are expected to be low until the plum season approaches.

“Plum Varieties for Michigan” brochure overview. Brochure is a tri-fold, with information about plum harvest season, where to find plums, how to determine plum ripeness.

“Plum Varieties for Michigan” brochure detailed view 1.

Did you know?

Plums are an important part of Michigan's agricultural economy. Most Michigan plums are grown on family farms and sold locally.

For most people, buying plums in the market place or at farm markets, there are two major types of plums, European plums and Japanese plums.

The most common European plums (scientific name *Prunus domestica*) are elongated and blue, but other colors are available as well. In the USA, European plums are eaten fresh, as fresh slices in salads and desserts, and processed as prunes for baby food, baking, dried fruit, and fermented as alcoholic beverages, depending on the variety. Dried plums contain pectin, sorbitol, and resins which serve as a fat substitute in baking.

Japanese plums (scientific name *Prunus salicina*) and hybrids are primarily used as fresh market plums. Japanese plums range from round to heart-shaped, and are a range of colors. Japanese plums are best used for fresh consumption and generally not suitable for drying as they do not contain sufficient sugar (must be at least 18%) and skin thickness to make a satisfactory prune.





For more information, please contact:

Web:
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The Michigan Plum Advisory Board is a 501(c)(3) organization.

These educational materials were developed by the Michigan Plum Advisory Board and Michigan State University Extension and supported in part by the Michigan Department of Agriculture Specialty Crop Block Grant.

Plum Varieties in Michigan



Learn about the new varieties of plums available in Michigan!

Michigan

Plums

www.michiganplum.org

PROJECT TITLE
Michigan Asparagus Advisory Board – Seeking Expansion of IPM Tools - FINAL

PROJECT SUMMARY

Michigan is ranked second nationally (after California) in asparagus production. With an average of 10,700 acres harvested, Michigan produced approximately 168,000 cwt of asparagus at a value of almost \$13.9 million in 2010. These totals are strikingly lower than the previous three years. This decline in yield is attributed to increased diseases of asparagus and stressful growing conditions related to weather. Major asparagus-producing counties in Michigan, including Mason and Oceana in the northwest and Cass and Van Buren in the southwest, have been impacted by these factors. Asparagus is a perennial crop that should be in production for 20 or more years with proper pest management. Unlike annual crops where an epidemic one year will not necessarily influence yields in subsequent years, a pest infestation in asparagus that causes premature defoliation and reduced plant vigor may critically reduce expected subsequent yields. The primary pests of asparagus include foliar diseases and soilborne pathogens that are currently managed through the use of pesticides classified as B2 carcinogens or expensive fumigants.

Michigan asparagus growers have been suffering from both decreased yields as a result of increased disease pressure from foliar and soilborne pathogens, and lower demand of domestically produced asparagus as a consequence from other countries being favored by negotiated trade agreements. The cumulative effect of these two factors has made the growing of asparagus in Michigan less profitable and resulted in reduction of planted acreage and a smaller industry. Since trade policies are difficult to change, the goals of this project were to expand on previous research into diseases of asparagus and develop and implement novel pest management systems for Michigan growers. These programs will reduce reliance on pesticides classified as carcinogens by development of disease forecasters and identification of resistant cultivars. The objectives were: 1) Screen new reduced risk fungicides for both purple spot and rust disease control. 2) Test the TOM-CAST disease predictor with reduced risk fungicides or

other effective alternatives for purple spot control. 3) Develop a rust forecasting system similar to the TOM-CAST predictor used for purple spot. 4) Identify asparagus varieties that are resistant to both foliar and soilborne diseases. To benefit the industry, results from the studies will be shared with growers so they can implement the findings and increase their yields and extend the length of time asparagus fields remains productive.

PROJECT APPROACH

To provide growers with answers about new control programs for diseases, new long term asparagus research trials were established with industry help. The trials are located in the commercial growing area around Oceana County on both commercial and research farms. In order to generate fungicide efficacy data for future registration of fungicides on asparagus, researchers established a sixteen-treatment trial for the control of foliar rust and purple spot in a grower's asparagus field known to harbor both diseases. The roles of reduced risk fungicides were evaluated when using TOM-CAST forecaster program to control foliar disease. The TOM-CAST forecaster reduced the amount of sprays by four applications compared to a 10-day schedule while providing the same level of disease control. Data from field research with spore traps, weather equipment, and trap plants are being used to develop a disease forecasting program similar to TOM-CAST for control of rust disease. The industry helped establish a replicated cultivar trial on the Oceana asparagus research farm with 20-week-old transplants. The cultivar trial will be rated for foliar disease symptoms and tolerance to root diseases over the next few years. Lab studies of the same cultivars are being screened for soilborne disease tolerance.

GOALS AND OUTCOMES ACHIEVED

Objective 1. Develop foliar disease management strategies including disease forecasting systems.

a) Test currently unregistered products with an emphasis on reduced risk fungicides, newly registered, and products not yet registered for their activity against purple spot and rust. The field research studies provided efficacy and crop safety data on eight fungicides that are not currently registered for use on asparagus to currently registered fungicides. Currently registered fungicides Bravo (chlorothalonil) and Dithane/Penncozeb (mancozeb) are considered effective at controlling purple spot with only Folicur (tebuconazole) being effective on rust. Discovering the efficacy of other fungicides on these two foliar pathogens provides possible replacement and/or rotational products for the two fungicide standards being used by growers. Two different studies were conducted in growers' fields that tested the efficacy of Quadris (azoxystrobin), Endura (boscalid), Inspire (difenoconazole), Fontelis (penthiopyrad), Cabrio (pyraclostrobin), Quilt (azoxystrobin/propiconazole), Tilt (propiconazole), Flint (trifloxystrobin), Luna Experience (fluopyram/tebuconazole), and Inspire Super (difenoconazole/cyprodinil) against Bravo for purple spot control and Folicur for rust control. Chemical companies will use these types of data to support future registration of their products on asparagus. The hot dry weather of 2012 limited the amount of both purple spot and rust so that no statistical significant differences among treatments were observed. These studies will be repeated in 2013 in hopes that a normal amount of disease will develop.

b) Reduce reliance on foliar fungicides categorized as B2 carcinogens by establishing spray thresholds and using a disease forecaster with reduced risk fungicides or other effective alternatives for purple spot. Currently only fungicides containing chlorothalonil provide enough control of purple spot to be used in the TOM-CAST forecasting program. Efficacy of the fungicide Cabrio (pyraclostrobin), which is considered a reduced risk fungicide, was compared to Bravo (chlorothalonil) for use in the TOM-CAST forecasting system. Foliar fungicide applications were made every 10 or 14 days (calendar-based schedule) or when on-site weather equipment indicated that 15 disease severity values (DSVs) in TOM-CAST had been

reached. Purple spot severity in each plot was rated weekly to determine the amount of foliage covered with purple spot lesions. Because of low rainfall, significant disease was not observed until later in the growing season (August onward). All of the fungicide treatment programs resulted in lower disease severity than the untreated control. Bravo (chlorothalonil) treatments resulted in fewer lesions on fern than all of the other treatments, except Cabrio (pyraclostrobin) alternated with Bravo on a 10 day schedule. Other than the 14 day Cabrio alternated with Bravo treatment, when two applications of Cabrio were alternated with one application of Bravo, the number of lesions present on the fern was significantly greater than any of the other treatments. Using the TOM-CAST forecaster with any program required 4 less applications than the standard 10 day schedule while still providing purple spot control.

Twelve cultivars were planted for tolerance screenings to foliar blights. Determining the susceptibility of these cultivars will allow growers to decide which cultivars they will plant in the future and how extensive their spray programs will be for protection of the foliage. Growers could save at least 1-2 sprays if less susceptible cultivars are used in combination with standard spray programs. The growers and consultants are using new DSV thresholds to trigger applications of foliar fungicides. The old trigger value of 15 DSV has been stretched to 17 DSV for cultivars of Jersey Giant, Millennium, and Jersey Supreme. For a typical grower of 200 acres this reduction means 200-400 pounds less active ingredient of chlorothalonil will be applied to their fields each summer.

The grower and consultants meetings will start in April of 2013. Cultivar susceptibility data was presented to 94 grower, processor, crop consultant, and seed company personnel at the Great Lakes Expo meeting held in Grand Rapids on December 4th, 2012. Additional cultivar data was presented to 150 grower, processor, crop consultant, and seed company personnel at the Asparagus Day meeting held March 12th, 2013 in Oceana County. Growers and seed company's representatives at the Asparagus Day meeting helped select the cultivars to be tested in 2013.

Two main farms in Oceana County have started to implement the reduced spray applications based on their currently grown cultivars. These two farms represent approximately 900 acres of asparagus (8% of 2012 production) in Oceana and Mason Counties. These farms have also reduced the amount of chlorothalonil active ingredient on their fields by 10% (1 lb/ai to 0.9 lb/ai) on fields that contain cultivars that are tolerant to rust or purple spot.

At this time the results from the trials supported by the asparagus SCBG have been presented to 94 members of the industry at the Great Lakes Expo and 150 members at the 2013 Asparagus Day. Two farms (900 acres) have started to implement results into their production practices by stretching spray intervals and reducing the amount of active ingredient that is used for each application.

c) Develop a disease forecasting program to time fungicide sprays for control of rust. Currently, there is no disease forecaster available for asparagus rust. The first step in development of a forecaster is to understand how environmental conditions influence infection of asparagus and disease progress. Some cultivars of asparagus are less susceptible to rust or "slow-rusting." *Puccinia asparagi*, the fungus that causes rust, produces several types of spores over the course of the growing season: basidiospores, aeciospores, urediniospores, and teliospores. A study was performed in an unpicked 'Millennium' field at the Asparagus Research Farm in Hart, MI. Airborne urediniospore concentrations and environmental conditions (leaf wetness, relative humidity, temperature, rainfall, solar irradiance, and wind

speed) were monitored on-site throughout the growing season using a spore trap and weather equipment. In addition, from 19 June until 28 August, ten two-month-old potted plants each of 'Millennium' and 'Jersey Giant' asparagus were placed in the field for one week to determine field conditions conducive for infection. Over the course of the growing season, eleven sets of trap plants were placed in the field for one week. These plants were then moved to the greenhouse and checked for rust lesions two weeks later.

Few airborne urediniospores were trapped overall (≤ 4 urediniospores/day) and only low levels of disease was observed in the field. Since the field was unpicked and unsprayed, the lack of a severe epidemic was likely due to the hot and dry weather experienced last summer. In general, 'Millennium' trap plants were more susceptible than 'Jersey Giant' trap plants. No disease was seen on trap plants exposed in June, but disease was observed in July and August. Disease on trap plants was associated with higher levels of airborne urediniospores and lower morning (6 to 9 AM) levels of solar irradiance. In addition, rainfall may play a role in disease development; with higher amounts of rainfall in the morning hours (6 to 9 AM) favoring disease, but this relationship was not as clear. Future growth chamber studies will precisely characterize the relationships between weather, urediniospore concentrations, and disease development. This information may be combined with field results to determine conditions favorable for *P. asparagi* infection of asparagus fern and be used to develop the first version of a rust forecaster.

Objective 2. Evaluate varieties and progenies for susceptibility to diseases including rust, purple spot, and Fusarium and Phytophthora crown rots. The establishment of the asparagus variety trial on the industry research farm will be used to determine the tolerance of 12 different cultivars to both foliar and soilborne diseases. The amount of tolerance will be related to yield and longevity of each cultivar in commercial plantings. Foliar disease ratings will begin in the summer of 2013. Lab studies of the same cultivars for soilborne tolerance are ongoing in laboratory studies. Currently none of the cultivars being screened appear to be resistant to Fusarium infections. Growers will use this information to select which varieties will be used for future plantings.

BENEFICIARIES

Commercial asparagus growers are the primary beneficiaries from this funded research project. Since the asparagus industry relies on three fungicides for managing the two main foliar pathogens, pathogen resistance to existing chemistries can become an issue. Testing new active ingredients will give the industry more options for disease control. New chemistries can also be added to spray programs to limit disease resistance development or increase control of the pathogens. Conducting the trials on grower farms allows for quicker adaptation of new products as their performance has been demonstrated under commercial growing conditions. If foliar diseases are not controlled, yields of defoliated fields can be significantly decreased for the remaining life of the production field.

Currently the use of the TOM-CAST forecasting program for the control of purple spot relies on applications of fungicides containing chlorothalonil which provides enough residual control of the disease to last between the spray intervals forecasted by the predictor. These intervals can be as long as 21 days between applications during periods of dry weather. Chlorothalonil is listed as B2 carcinogen by the EPA and growers have requested that we test newly registered fungicides for efficacy when using the forecasting system in the event that the use of chlorothalonil is restricted or revoked. The strobilurin class of fungicides is considered reduced risk by the EPA and has shown some efficacy on purple spot in the research studies. The continued use of the TOM-CAST forecaster is important to the asparagus industry as it can save between 2 to 4 fungicide applications each year, which can result of a cost savings of \$20-\$80/acre for the growers.

With the proven success and cost savings of using TOM-CAST for purple spot control,

growers are now hoping that a forecasting program can be developed to help limit the amount of sprays needed to control foliar rust. Past research has shown that the TOM-CAST forecaster is not effective in issuing spray advisories for asparagus rust. Funded research into the rust forecaster has allowed for weather collection, spore trapping, and rust infection potential data to be collected. These data are the first step in developing a mathematical model to forecast when weather is favorable for rust infections or spore releases that will be used to schedule fungicide applications.

With help from the asparagus industry the first variety trial was established to determine cultivar tolerance to foliar and soilborne pathogens. The repeated observations of disease susceptibility potential of each cultivar will help generate a database on how these cultivars will perform under Michigan disease conditions. Growers can use yield and disease tolerance ratings to select which varieties they will plant for future field establishment.

LESSONS LEARNED

The lack of effective fungicides for the control of purple spot and rust on asparagus is a major concern for the industry. The shortage of registered fungicides leaves the industry vulnerable if any fungicide uses are cancelled on asparagus. Chlorothalonil fungicides allow for a reduction of spray applications while still maintaining purple spot control, thus for the immediate future, use of the TOM-CAST forecaster will rely on fungicides containing chlorothalonil to control purple spot during the extended spray intervals. Some modifications to the TOM-CAST program might allow use of other chemistries via shorter intervals between spray advisories.

Rust spores appear to need cloudy weather conditions to infect asparagus fern. This is one parameter that can be used as a starting point to program a rust forecasting model. As the spore trap and weather data base is expanded, more correlations between weather and spore release and infection may be developed. The inclusion of trap plant data has increased the understanding of the weather conditions needed to promote infection. This method of research will continue to be a part of the rust forecasting development program.

One unexpected outcome of the project resulted in the discovery of new fungicides that appear to be significantly effective on controlling soilborne diseases. This information was a result of increased work on soil-applied fungicides on other vegetable crops and led to additional work on asparagus trials with these fungicide products. The efficacy data from Michigan research trials will be used to support registration for use on asparagus when they receive a federal label.

CONTACT PERSON

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ADDITIONAL INFORMATION

Publications

Granke, L.L., and Hausbeck, M.K. 2012. Relationships between airborne *Pleospora herbarum* and *Alternaria* sp. spores in no-till asparagus fields. *Acta Horticulturae* 950:285-292.

Rodriguez-Salamanca, L.M., Foster, J.M., and Hausbeck, M.K. 2012. Greenhouse and field herbicide evaluation on asparagus plants. *Acta Horticulturae* 950:101-108.

Crous, P.W., Summerell, B.A., Shivas, R.G., Burgess, T.I., Decock, C.A., Dreyer, L.L., Granke, L.L., Guest, D.I., Hardey, G.E.St.J., Hausbeck, M.K., Huberli, D., Jung, T., Koukol, O., Lennox, C.L., Liew, E.C.Y., Lombard, L., McTaggart, A.R., Pryke, J.S., Roets, F., Saude, C., Shuttleworth, L.A., Stukely, M.J.C., Vanky, K., Webster, B.J., Windstam, S.T., and Groenewald, J.Z. 2012. *Phytophthora asparagi*. *Fungal Plant description sheets*: 107-127. *Persoonia* 28:138-182. <http://dx.doi.org/10.3767/003158512X652633>. 60

Granke, L., and Hausbeck, M.K. 2012. Asparagus disease update. Pages 10-14 in: Asparagus Session Summaries, Great Lakes Fruit, Vegetable and Farm Market Expo. Online.

Hausbeck, M.K., Granke, L.L., and Cortright, B.D. 2011. Asparagus disease update. Pages 2-4 in: Asparagus Session Summaries, Great Lakes Fruit, Vegetable and Farm Market Expo. Online.

Outreach / Presentations

2012 Integrated Pest Management: Asparagus epidemiology, carrot variety trial, cucurbit downy mildew and *Phytophthora*, and onion diseases research, 2012 Decision Makers EPA Tour, 17-18 Jul, Hart, Pentwater and Grant MI (30 attendees)(9 asparagus farmers).

'Asparagus disease update,' L. Granke and M. Hausbeck, Asparagus Session, Great Lakes Fruit, Vegetable and Farm Market Expo, Grand Rapids, Dec 2012. (94 attendees)

'Asparagus disease research and update,' L.L. Granke, M.K. Hausbeck, and B. Cortright, Oceana Asparagus Day, Hart, Mar 2012.

'Asparagus disease research and update,' M. Hausbeck, L. Granke and B. Cortright, Asparagus Commodity Meeting, East Lansing, Jan 2013.

'Asparagus disease research and update,' M. Hausbeck, L. Granke and B. Cortright, Asparagus Session, Great Lakes Fruit, Vegetable and Farm Market Expo, Grand Rapids, Dec 2011.

Planned

'Asparagus disease research and update,' L.L. Granke, M.K. Hausbeck, and B. Cortright, Oceana Asparagus Day, Hart, Mar 2013.

Webpage

<http://veggies.msu.edu/ResearchAsparagus.html>

[2013 Oceana Asparagus Day: same week, different day - Oceana's Herald Journal: Archives](#)

[Great Lakes EXPO Educational Program http://www.glexpo.com/program.php?id=1](http://www.glexpo.com/program.php?id=1)

PROJECT TITLE

Michigan Bean Commission – Assessment of Narrow Row Technology - FINAL

PROJECT SUMMARY

This project will assess the potential for adoption and use of 'narrow row technology' by Michigan dry bean growers. This innovative cropping system is essential for growers to be competitive with other crops such as soybeans and corn and enhance the commercial viability and sustainability of this important sector of Michigan's diverse agricultural base. 'Narrow row technology provides numerous economic and agronomic advantages for production of dry beans. The traditional dry bean cropping system is contrasted with 'narrow row technology in the following means: 1. Traditional cropping requires many more field passes to achieve proper tillage while 'narrow row technology' employs fewer operations from planting to harvest. 2. Traditional harvesting requires multiple field passes to first pull and window plants for field drying followed by a subsequent pass with a combine for thrashing. This procedure exposes beans to inclement weather and increased levels of stones, which are raised when the plants are uprooted. 3. Direct harvesting requires the use of plant desiccants to defoliate the plant

prior to harvest to enable seed and plant dry down. Most of the desiccants have limitations for use in dry beans and new desiccants must be found to eliminate rotation restrictions, residue contamination and extremely high toxicity problems. 4. Traditional cropping allows dry beans to be lodged and close to the ground. There is a need to develop dry bean varieties to stand erect with elevated pods to aid in direct harvesting operations. This project will enhance previously completed work in 2010 and 2011 with one more year of research data.

PROJECT APPROACH

Our approach has grower involvement in planning and setting research priorities. A Narrow Row Research Priority meeting was held in March to review 2011 results and plan the 2012 growing season. Greg Varner conducted six small plot trials at the Saginaw Valley Research and Extension Center comparing 15, 20 and 30 inch rows on navy, black, pinto and small red beans. Small plot trials were also conducted on black and small red bean populations. He also conducted four grower strip trials on navy and black varieties in the major dry bean counties of Michigan. The white mold fungicide trial was conducted at the Montcalm Research farm where adequate irrigation provides excellent white mold disease expression. A second white mold trial was conducted in Eastern Huron County. Growers and a bean elevator from this area reported excellent dry bean growth and felt white mold would infect their dry beans. A white mold Contans trial was initiated in Tuscola County. Canning trials were conducted at the Michigan State University Food Science Pilot Canning Plant. 260 canning samples were evaluated using dry bean canners, shippers, and growers. University faculty, graduate students and technicians also rated the canning trials. Dr. Christy Sprague's research consisted of new desiccants in commercial dry bean production systems conducted at the Saginaw Valley REC. Dr. James Kelly conducted research on new dry bean varieties at the Saginaw Valley REC and Montcalm research farms. Dry bean growers participated in the tours at research sites. Information on research results were put up on websites, compiled for publication and disseminated at grower meetings and tours.

GOALS AND OUTCOMES ACHIEVED

Field Plot Trials-Row Width and Plant Populations in Dry Beans

Gregory Varner produced yield, and plant height results from six row width and population trials conducted at the Saginaw Valley Research and Extension Center (SVREC) north of Frankenmuth, Michigan. The Merlot small red row width trial at SVREC showed significant difference in yields between both 15 and 20 inch when compared to the 30 inch row width. The 30 inch row width spacing showed the tallest height followed by the 20 inch spacing over the 15 inch rows. This height difference has been consistent in all three years of testing Merlot. Lodging was constant with all the row widths. 15 and 20 inch widths tend to show plants supporting one another as they lodge. Three year, four location averages are Merlot-15=24.8, Merlot-20=25.0 and Merlot-30=22.1 cwt. The Eldorado pinto row width trial did not show a significant yield increase to narrow rows. The 15 and 20 inch rows did out yield the 30 row spacing by 3 and 2 cwt respectfully. The 30 inch row width spacing showed the tallest height followed by the 20 inch spacing over the 15 inch rows.

Vista and Medalist navy beans in 30 inch rows were taller than the 20 and 15 inch rows. Vista planted in the 15 and 20 inch row spacing had significantly higher yields than the Vista and Medalist planted in 30 inch rows and the Medalist planted in 15 and 20 inch rows. Medalist planted in 15 inch row spacing had significantly higher yields than Medalist planted in 20 and 30 inch rows. Vista significantly out yielded Medalist when averaged over the three row widths. The Medalist navy variety has had poor yields at the SVREC site over the last three years. Dr. James Kelly's navy trials have shown similar poor yields of Medalist navy at the SVREC site. Two year, three location averages are Vista-15=24.7, Medalist-15=25.2, Vista-20=24.6, Medalist-20=25.0, Vista-30=24.0 and Medalist-30=22.8 cwt.

Shania and Zorro black beans planted in 15 and 20 inch rows and Zorro planted in 30 inch rows were not significantly different in yield. Zorro planted in 15, 20 and 30 inch rows yielded significantly higher than the Shania in 30 inch row spacing. Shania's yields were not significant different over the 15, 20 and 30 inch row widths. The 30 inch row widths were taller than the 20 and 15 inch rows. Zorro out yielded Shania by 1.9 cwt when averaged across all row widths and this difference was not significant. Two year, three location averages are Zorro-15=29.7, Shania-15=27.5, Zorro-20=26.1, Shania-20=25.2, Zorro-30=25.7 and Shania-30=24.0 cwt. Zorro black beans planted in ten populations ranging from 102,786 to 143,534 showed significant yield increases between populations, but not between the 15 inch and 20 inch row spacing. The higher plant populations were higher in yield than the medium to low plant populations. This black bean population trial achieved very low LSD and C.V. Values explaining these very close differences. This trial differs from 2011 and 2010 when no significant difference in yield was observed over all populations. Average plant height was higher in the 20 inch rows. Dry beans generally compensate for varying populations by adding more growth and pods per plant to produce an optimum yield. It would be expected to lose 10 - 15 % from the planting population to the harvest population.

Merlot small red beans at the SVREC planted in six populations ranging from 94,378 to 118,465 showed no significant yield increase between populations and between the 15 inch and 20 inch row spacing. Plant height was very similar in both the 15 and 20 inch rows.

All fungicide treatments used to control white mold disease showed yield increases over the untreated check on Merlot small red beans, conducted at the Montcalm Research Farm in Entrican, Michigan. The fungicide treatments of Omega (two applications) at the 8 oz. rate, Propulse at the 8 and 10 oz rate of one and two applications, and Approach (one application) at the 9 oz rate yielded significantly higher than the untreated check. Propulse fungicide produced by Bayer Crop Science did receive a label for use in dry beans in 2012. The second fungicide trial conducted in Eastern Huron County showed all fungicide treatments except Proline out yielding the untreated check. The fungicide treatments Endura (two applications) at the 8 oz rate, Propulse at the 8 oz rate (one application) and Propulse at 8 and 10 oz rates with two applications yielded significantly higher than the untreated check. Proline actually yielded less than the untreated check. Omega and Propulse have been two new fungicides identified for Michigan growers, for use in dry bean white mold control. We have achieved our goal to identify and have available, two new fungicides for Michigan growers to use on their farms.

Grower Strip Trials

Two navy bean strip trials were grown at the Voelker farm in Pigeon and the Schindler farm in Auburn. The Voelker navy bean strip trial ranged in yields of 28.0-33.3 cwt per acre. Merlin navy had the highest yield in this trial and T9905 and COOP 06063 were tied for second. This trial seemed to favor the midseason maturing beans. Both the full maturing Medalist and Vista had the lowest yields. The Schindler trial ranged between 17.0-22.8 cwt per acre. Medalist had the highest yield in the Schindler navy bean strip trial. Indi navy was the second highest. This trial received over 5 inches of rain on August 10. This exceptional water saturation of the soil profile hurt the dry beans across all varieties. The trial had plants dying an early death in between the tile lines. Seed size counts were 15-20 % smaller seed size than normal. Plant populations varied between the navy varieties in both locations. This variation difference was likely caused by seed size differences. Smaller seed size generally will plant thicker because of more doubles being planted from the seed plate. Medalist and Merlin have been the best two navy varieties. Three year, six location averages are Medalist-29.2, Merlin-28.3, Vista-27.0, T9905-26.9, and Indi-25.8 cwt.

The Stoutenburg black bean strip trial in Sandusky ranged in yields of 25.6-27.7 cwt per acre. Zorro had the highest yield with Loreto being a close second. This trial experienced very dry weather in July and recovered during the August pod set. The Lakke Ewald black bean trial in

Unionville ranged between 20.0-26.0 cwt per acre. Zorro had the highest yield, out yielding all the other black beans by 4.6-6 cwt per acre. Generally, Zorro will not significantly out yield other standard black bean varieties of Shania, Black Velvet and Loreto. This trial also received too much rainfall on August 10 and may explain Zorro doing extremely well compared to the other black bean varieties. Three year, six location averages are Zorro-27.3, Black Velvet-25.9, Shania-25.6 and Loreto-25.3 cwt.

Dry bean samples from the four grower strip trials were processed at the Michigan State University Food Science Pilot Canning Plant. Canned product was opened and evaluated. All the navy and black beans received average and above for canning quality. Canning quality ratings used a 1-7 scale with 7 being perfect appearance and 2 and 1 being poor appearance. Zorro black bean have been identified over the past three years of testing to be the premier black bean in Michigan. In the past three years, Zorro has gone from a new release to a 60% market share of black beans grown in Michigan. We have met our goal to identify new black bean varieties for Michigan growers. A new black bean from Dr. Jim Kelly's program, B10244 has been identified to be higher yielding than Zorro and show superior black color retention in the canning process. This new black line is scheduled to be released in 2013.

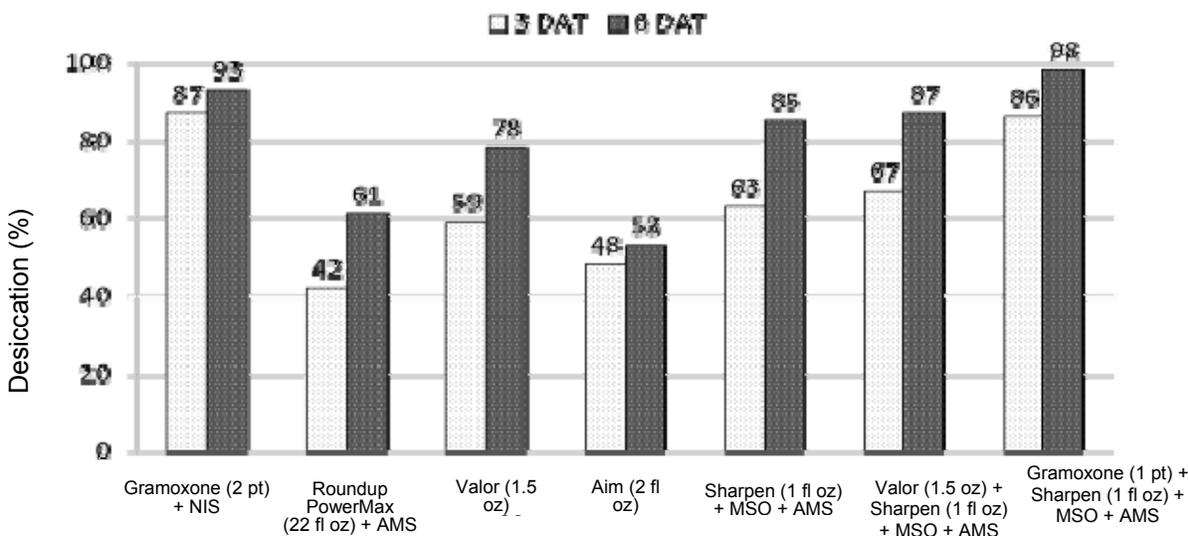
A strip trial was also planned to evaluate a biological control agent, *Coniothyrium minitans* (Contans) that shows promise in managing white mold in various crops. Contans was applied in Tuscola County at planting. Fungicide sprays were planned for late July, but the trial site was abandoned due to hot and dry conditions. A grower in Huron County also used Contans. It was also dry toward the end of the growing season and little to no white mold was present in the field. With no white mold disease, the growers did not want to time to do yield checks. Contans has been very hard to test in Michigan the last two years. Some growers are using Contans yearly and seem to like it as a standard practice of reducing the white mold sclerotia.

**Evaluation of pre-harvest desiccants in dry edible beans
(Saginaw Valley Research and Extension Center – 2012)**

Christy Sprague and Gary Powell, Michigan State University

Location: Richville (SVREC)	Tillage: Conventional
Planting Date: June 13, 2012	Variety: 'Zorro' black beans
Preharvest Application Date: Sept. 5, 2012	Row width: 20-inch
Soil Type: Clay loam	Replicated: 4 times

Figure 1. Preharvest treatment effects on dry bean desiccation 3 and 6 days after treatment (DAT).



Summary: This study was conducted to examine various preharvest treatments for dry edible bean desiccation. At the 3 DAT evaluation, Gramoxone alone and tank-mixed with Sharpen provided significantly higher ($p \leq 0.05$) dry bean desiccation than any of the other treatments. This was in contrast to results from 2011 where Valor (1.5 oz/A) + MSO and Sharpen (1 fl oz/A) + MSO + AMS provided the greatest desiccation at this timing. By 6 DAT, the Gramoxone treatments still provided the greatest dry bean desiccation (>90%), however Valor, Sharpen and the combination of the two provided greater than 75% dry bean desiccation. All of these treatments provided greater than 90% desiccation in 2011. Differences in moisture and temperature between the two years at the time of desiccation may help explain the differences in the speed of desiccation between the two years. This year conditions were cooler and wetter at the time of desiccation. By 14 DAT all treatments with the exception of Aim (2 fl oz) + MSO provided 99% dry bean desiccation. From these results and from those of previous years there are several effective desiccation products. However, each of these products has specific precautions and limitations that need to be considered. Information on these restrictions and how to best use these products can be found in Chapter 5 of the 2013 MSU Weed Control Guide for Field Crops (E-434). This research was supported by various companies and Michigan Dry Bean Commission funding from the Michigan Department of Agriculture Specialty Crops Grant. The goal of two new desiccants for Michigan dry bean growers has been achieved with Valor and Sharpen. Growers have toured Dr. Sprague's desiccant trial and observed firsthand, the value of these new products.

Title: Development and Maintenance of High-Yielding, Disease Resistant, Processor Quality Dry Bean Varieties suitable for Direct Harvest in Michigan

Principal Investigator: James D. Kelly and Evan Wright, Plant, Soil and Microbial Sciences, Michigan State University.

Activities, Accomplishments, Impacts: The bean breeding program harvested 3,900 yield trial plots (24 tests) in 2012 and 1,977 single plant selections were made in the early generation nurseries. Yield trials at SVREC (Richville) included 56-entry standard navy test; two 36-entry standard black tests; 80-entry prelim navy tests; 42-entry prelim black test; 36-entry standard GN; 36-entry standard pinto test; 30-entry standard red/pink test; 16-entry prelim GN test; 90-entry prelim red/pink test; 16-entry FM test; 16-entry yield gain test; 20-entry yield gain pinto test; two 96-entry drought trials and 42-entry Co-op and regional test that includes pinto, GN, red and pinks. At Montcalm 64-entry bush cranberry test; 56-entry kidney test; 56-entry preliminary kidney test; 5-entry mayacoba test; 64-entry white mold test; 130-entry nitrogen fixation (BNF) test on campus; and two 36-entry certified organic trials in Tuscola county. All trials were direct harvested except for kidney, cranberry, drought, BNF and white mold trials that were rod pulled to measure plant biomass. Dry weather early in the season followed by ample rainfall delayed maturity at Richville but yields were above average. Plots at Montcalm had similar rainfall pattern but the stress was offset with supplemental irrigation and excellent yields were recorded in the kidney and cranberry trials. Screening for resistance to common bacterial blight (CBB) was very effective in these nurseries. White mold infection developed well in 2012 and genotypic differences were observed. Yield in cranberry beans approached 40 cwt and many lines with resistance to CBB were identified in both kidney and cranberry nurseries. Rust is becoming an increasing threat to navy, black and small red bean producers in Michigan, and we have identified resistance to race 22:2 in new navy, black and small red bean lines.

Progress in black bean breeding: Zorro performed very well in statewide and strip trials in 2012, but lacks adequate disease resistance. CBB, rust and anthracnose resistance is currently being integrated into the Zorro genetic background. An initial western seed increase was made of a new black line B10244 that has performed well (30.9 cwt/acre) over 10 locations in 3-seasons compared to Zorro (29.1 cwt/acre). B10244 possesses erect architecture, good dry down, anthracnose resistance and excellent canning quality and color retention.

County/Counties	Number in Narrow Rows/Direct Harvest	Number Direct Harvesting
Bay, Arenac, N. Michigan	17	19
Gratiot, Montcalm	7	9
Huron	18	19
Isabella, Midland	6	9
Saginaw, Shiawassee	8	10
Sanilac, Tuscola	21	23
Total	77	89

Progress in navy bean breeding: A new navy line N11283 topped yield trails ahead of Merlin and Medalist in 2012. In addition to high-yield, excellent upright architecture, good dry-down and favorable canning quality the line appears to process CBB resistance. Additional testing needs to be conducted to verify performance. Many new lines with anthracnose and rust resistance were evaluated and canning quality still needs to be assessed in these new lines.

Progress in pinto bean breeding: P07863 pinto was released as Eldorado and it continues to dominate yield trials in Michigan and it significantly out yielded La Paz, Lariat and Santa Fe in 2012. It has outstanding yield potential, erect architecture, white mold tolerance, full season maturity-plants stay green late but advance to harvest maturity in 7 days, and good canning quality.

Progress in GN bean breeding: The program is considering the release of G08254 that has consistently out yielded Matterhorn by 3-cwt over 5-years and 20 test locations. It does not display the problem of fish mouth under drought stress and possesses improved seed quality. Seed quality is a major selection criterion in this class and other high yielding lines are being selected for improved seed quality. A group of upright lines in Tebo seed class are being tested as the bush Tebo types are not performing well under drier more stressful conditions.

Progress in small red/pink bean breeding: The new pink line S08418 released as Rosetta showed excellent performance and dry down in 2012. It possesses virus resistance, erect architecture, has good seed color, and does not exhibit the stem breakage observed in Sedona. In general pink beans showed better overall dry down than the small red seed types. In 2012, Merlot underperformed as in 2011, exhibited stay green trait at maturity and does not tolerate stress well. A group of 90 new lines were evaluated in 2012. Some of the lines out yielded Merlot by 10 cwt, were erect and dried down well and will be evaluated for canning quality and disease resistance.

Progress in kidney/cranberry bean breeding: The new white kidney K08961 released as Snowdon, yielded well and matured 7d earlier than Beluga in 2012. The program trialed over 100 kidney beans and 64 cranberry bean lines in 2012 and top yields ranged from 35-39 cwt/a. A number of red kidney lines with CBB resistance were identified and need further testing. New high-yielding early-season cranberry bean lines were identified, many with resistance to CBB (figure 1). These lines will continue to be advanced and tested by MSU, but all future cranberry breeding will be conducted by USDA-ARS group at East Lansing.

Survey of growers at state dry bean day, county dry bean meetings, county dry bean tours and reporting from people in the Michigan dry bean industry has shown an increased use of narrow row technology. Specific new grower numbers by county are:

The target of seventy-five new growers was achieved. If we look at the 89 total new growers direct harvesting, there are 12 additional growers in 28-30 inch rows who will change eventually. These growers are saying they are buying tractors with narrow tires. When they buy their new narrow row planter, they will be able to make the narrow row transition.

The dry bean industry in Michigan estimates 75-80% of all dry beans are being direct harvested. Dry beans direct harvested in narrow rows are estimated to be 70%.

BENEFICIARIES

Direct beneficiaries of the project activities were the 1300 dry bean growers in Michigan who participated in some of the various activities of the project. This research project will also indirectly benefit other dry bean growers in the United States. Attendance numbers for each of the Michigan events are listed below:

Event	Date	Attendance
Winter County Dry Bean Days 5	January, 2012	224
State Dry Bean Day	February 18, 2012	191
Planning Meeting	March 20, 2012	16
Bean and Beet Field Day-SVREC	August 21, 2012	194
County Dry Bean Field Tours 6	August, 2012	189
Canning Evaluation-MSU	January 14, 2013	39

LESSONS LEARNED

The need to have two to three years to do research on dry beans is critical. The 2010 season of drought conditions was very hard to achieve goals with poor harvest data. Growers tend to not trust one year results of research in dry beans. We have identified the two best navy beans, one best black bean, two more fungicides and two new desiccants for Michigan growers. Growers tend to grasp quickly to these new products and management changes when they see the increased profit potential and less time involved. Activities have raised the overall knowledge of narrow row production systems in dry beans. There is a need to get more growers to meetings, field tours and planning sessions. Growers value their time and sometimes they won't feel they will learn enough to go to a half-day meeting. The need to do surveys and establish good accurate baseline data is an area we have to improve on. We have tended to use industry estimates of 75% of growers are now direct harvesting narrow row beans. Three to four years ago we used 40%. We feel we are close, but until we do a good survey, it is an estimate. We have tended to not put much emphasis on economic differences. Growers in narrow rows, never go back to the old system. The time management of growers today can change decisions on growing dry beans. Dry beans will not be raised if additional hours per acre are required. Getting our goal achieved for Contans fell short. Weather had much to do with this, but this has to be a bigger priority. The biological work can be very difficult when conditions fail to be adequate for control of a pest. We plan to continue this work.

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ADDITIONAL INFORMATION

Presentation of results to Michigan growers and agri-business representatives:

- 1) Saginaw Valley Research and Extension Center Field Day. August 21, 2012. Richville, MI. Presentation on dry bean row widths and plant populations.
- 2) Bay, Gratiot, Huron, Montcalm, Sanilac and Tuscola County Dry Bean Tours. August 20-29, 2012. Showed 189 dry bean growers commercial and experimental dry bean cultivars planted in 20 inch rows.
- 3) Michigan Dry Bean Variety Trials and Canning Trials and 2012 Dry Bean Narrow Row Research Report posted online at www.agbioresearch.msu.edu/saginawvalley/index.html. The

Research Report is also posted on the Michigan Bean Commission website at www.michiganbean.org. <http://www.michiganbean.org/assets/ResearchPDFs/2012-Narrow-Row-Research-Report.pdf>

4) Published and distributed 1000 copies of the 2012 Dry Bean Narrow Row Research Report. These reports will be handed out at dry bean elevators and at the 2013 County Dry Bean Meetings.

5) PowerPoint Presentation on Narrow Row Grower Strip Trials and Small Plot Trials at 2013 County Dry Bean Meetings.

6) State Dry Bean Day in February, 2012. Dissemination of Narrow Row Research Reports and Presentation on 2011 Narrow Row Production Practices.

7) Michigan Dry Bean Commission Newsletter. Approximately 2400 circulation. January 2013 Results of the two navy bean strip trials. Can be found at www.michiganbean.org.

<u>Variety</u>	<u>Volker</u>	<u>Schindler</u>
VISTA	3.4	3.5
MEDALIST	4.4	5.0
T9905	3.8	3.3
MERLIN	3.6	3.8
COOP 06063	3.1	3.6
INDI	3.0	4.3

<u>Variety</u>	<u>Stoutenburg</u>	<u>Lakke/Ewald</u>
ZORRO	4.1	3.6
SHANIA	3.6	3.1
LORETO	3.3	3.3
BLACK VELVET		3.4
COOP BL06252	2.8	3.0
COOP BL04352	3.0	

7=Excellent
 5-6=Above Average
 3-4=Average
 2=Poor
 1=Unacceptable

PROJECT TITLE

MSU – Department of Horticulture – Improving Fruit Quality in Concord Grapevines - FINAL

PROJECT SUMMARY

Concord is the most widely cultivated grape variety in Michigan, where it accounts for 60% of the total area and 80% of production, respectively. Michigan juice grape growers, National Grape Coop and Welch's have an increasing interest in producing higher quality grapes and recent discoveries of significant quantities of antioxidant in red grapes helped the growing image of juice grapes as healthful food in the US market. Unfortunately, information on antioxidant content of grapes grown in Michigan was not available before this project. Therefore, the focus of this proposal was to investigate the effects of temperature, light and yield on fruit antioxidant capacity and accumulation of polyphenols. The specific objectives were to evaluate the effect of

canopy management techniques on basic fruit chemistry composition, total phenolics, total anthocyanins and fruit antioxidant capacity. The development of this project is helping growers to better understand practical vineyard strategies that have a great impact on fruit ripening and quality to target the Welch's Mission: improving fruit polyphenols, anthocyanin and nutraceutical compounds such as resveratrol.

The juice grape industry in Michigan in its effort to produce quality products is often limited by a growing season that is often too short, leading to incomplete ripening of the fruit, especially when vines are (a) over-cropped and (b) vine canopy management is not performed adequately or timely. In Michigan, vine growth starts late in spring, while early frosts (in September) impose a premature arrest of photosynthesis hindering fruit ripening. The specific objectives of this study are to analyze the effect of canopy management techniques (e.g. shoot positioning) on (1) basic fruit composition, (2) total phenolics, total anthocyanins, antioxidant capacity, and (3) total resveratrol content (trans- and cis-isomers and their glycosides) in berries for three growing years in Michigan. The focus of this proposal is to investigate the effect of (a) temperature, (b) light and (c) cluster thinning (crop control) on total fruit antioxidant in Concord vines around the veraison phenological stage, the first signal of the on-set of berry maturation.

PROJECT APPROACH

Research was carried out in 2011 and 2012 at a grower collaborator site (Dongvillo vineyards, Benton Harbor, MI) and at the Horticulture Teaching and Research Station (East Lansing, MI). Three treatments were investigated on vine cropped at 7-9 ton/acre as suggested by the National Grape Co-op: sunlight exposure categories were assigned to clusters: (1) full exposure, (2) moderate and (3) shaded. Photosynthetically active radiation (PAR) incident to each cluster was measured weekly with a handheld Li-Cor LI-189 quantum sensor (Li-Cor, Inc., Lincoln, NE).

Cluster temperature was monitored daily using temperature sensors inserted in the center of the cluster and data collected from fruit-set to harvest by a datalogger. In the interest of demonstrating the effect of different viticultural treatments on the antioxidant capacity of Concord grapes, we determined in collaboration with Dr Loescher and Dr Beaudry that the appropriate method for our investigation. We utilized the "Modified ABTS assay" as specifically designed by Ozgen (2006). The Modified ABTS assay measures Trolox Equivalent Antioxidant Capacity (TEAC) by reacting samples with a prepared solution of ABTS and measuring the absorbance values at 734nm on a UV-Vis Absorption Spectrometer. Those values are then juxtaposed against the standard curve of the same prepared ABTS solution with varying concentrations of Trolox and solved for equivalent antioxidant capacity.

This project was financially supported also by National Grape Cooperative (Terry Holloway), Welch's juice grape growers. Our collaborators, Dongvillo vineyard, committed a 1-acre plot of Concord grapes of his 200 acres farm, while Michigan State University (Drs Loescher and Beaudry) were pivotal in the fruit chemistry analyses during g 2011 and 2012.

GOALS AND OUTCOMES ACHIEVED

The goal of this research was to provide vineyard management strategies that can hasten fruit development and maturation for improved and more consistent high quality juice grape production in a highly variable climate. We strongly believe that this project provided answers and significant benefits to our 320 Concord and Niagara juice grape growers in Michigan. All the data we collected during the 2011 and 2012 experimental seasons were shared with our growers and a summary of the project was provided to the National Grape Cooperative Welch's

(Terry Holloway) in early February 2013. The National Grape Cooperative is currently disseminating our research with the m 320 Concord and Niagara juice grape growers in Michigan. The answers we provided to the growers are: 1) new vineyard management strategies we suggested in this project and not performed yet by our growers are able to improve fruit maturation and more consistent high quality of the juice and 2) in particular shoot positioning performed during the growing season before veraison is able to increase a) sugar accumulation, b) color and c) antioxidant capacity of Concord fruit.

Information obtained in this project was shared with growers and extension personnel at our annual extension meetings, such as the 2011 Great Lakes Expo, 2011 Viticulture Day, 2011. We will continue to share information at future in-season meetings. Information will also be distributed via extension publication (Michigan Grape and Wine Newsletter).

The focus of the first two-years of research was to investigate the effect of (a) temperature, (b) light and (c) cluster thinning (crop control) on quality and antioxidant capacity and accumulation of specific polyphenolics (resveratrol) in Concord berries. The specific objectives of this study were to analyze the effect of canopy management techniques on (1) basic fruit composition, (2) total phenolics, total anthocyanins and total fruit antioxidant capacity in berries for two growing years in Michigan. Shaded fruit at harvest had lower sugar accumulation than the sun exposed clusters ($\approx 6\%$). This difference was also reflected in higher pH and lower acidity. Those fruit parameters indicate a reduced or slower fruit maturation of the clusters in the shade. Increasing cluster exposure and light interception increased level of sugar accumulation of the fruit, significantly higher of about 3%. Importantly, in two consecutive years, the impact of cluster exposure, increased the TEAC (Total antioxidant capacity of the fruit) up to 20% in relation to fruit shaded in the interior part of the canopy. Interestingly, the time of cluster exposure did not impact the fruit quality as did the sun exposure level, suggesting the relative sensitivity of *Labrusca* to canopy microclimate changes and its importance for reaching high quality fruit standards. We believe that this two-year project is helping the growers to better understand practical vineyard strategies that have a great impact on fruit ripening and quality to target the Welch's Mission. It provided detailed information to optimize crop and vine management during the season to improve fruit polyphenols anthocyanin and nutraceuticals compounds such as resveratrol. The important vineyard management strategy developed by this project is a new canopy management of the canopy called shoot positioning and currently not adopted by juice grape growers. This new canopy management improved fruit quality, but most importantly is opening a new research direction because has the potential to be fully mechanized.

A survey was developed at the end of the first year of the project. Preliminary results were presented at the 2011 Grand Rapids Fruit and Vegetable Expo (December). A survey was distributed during the event and results showed that: 90% of the growers were willing to implement canopy management strategies if proved by the project that they are efficient and, 15% were willing to offer their vineyard for research work. Data were shared at two major events in Michigan (2012 Fruit and Vegetable Expo in Grand Rapids and 2013 Southwest Fruit Horticultural Days). 21 and 83 juice grape growers participated to the events, respectively. A survey was conducted after the 2013 meeting. Several growers are planning to implement our suggested vineyard practices in the 2013 growing season (see summary of the survey results below).

In February 2013 survey was distributed to our juice grape growers attending the annual Southwest Fruit Horticultural Days in Benton Harbor. Of the 83 juice grape growers, 49

returned the survey completed (59%). Here a summary of the survey. Survey was prepared with open or point (1 to 4) answer, where 4 = Strongly agree, 3 = Agree, 2 = Disagree and 1 = not applicable. Numerical values are reported for the most important questions of the survey.

The survey distributed at the annual Southwest Fruit Horticultural Days in Benton Harbor to 83 juice grape growers (49 returned the survey completed 59%) utilized a scale from 1 to 4 for the answers leaving also the space for comments. Point (1 to 4) mean: 4 = Strongly agree, 3 = Agree, 2 = Disagree and 1 = not applicable. So a result of 2.2 means that the 54% (returned survey) of the growers at the question “I am planning to implement this research in my operation” answered with a numerical value of 2.2 (being 2 = disagree). As requested by the reviewers, here the percentages: 1 =35%, 2 =24%, 3= 22% and 4=19%. The higher percentage of 1 (35%) was explained with the lack (and high cost) of mechanical shoot positioning equipment in MI juice grape growers operations. However, 3+4 (22+19=41%) are planning to apply the results of our research. The logical following question was “if not why” and the most common answer (71%) as reported in the table was “increasing cost of production”.
 4 = Strongly agree, 3 = Agree, 2 = Disagree and 1 = not applicable

Question	Answer
I was satisfied with the quality of the research reported	3.1
I was satisfied with the amount of new research information reported	3.4
The level of technical information was important for my enterprise	2.8
I am planning to implement this research in my operation	2.2
If not why	
<i>Increasing cost of production (71%)</i>	
The research will help the juice grape industry in Michigan	2.7
If not, why	
<i>Increasing cost of production (40%)</i>	

BENEFICIARIES

The juice grape industry is currently facing a declining profitability. Production costs are increasing on a per acre basis and increasing production (yield/acre) to reduce production costs is a challenge that cannot be solved in the short term. Profit for Michigan growers can be increased only producing high-quality, premium-price grapes. Juice grape growers in Michigan will achieve a new level of economic growth over the next few years implementing our suggested management strategies and production practices investigated in this project, fine-tuned to reach the most economic success for their operations.

Our MSU Grape Team field days or extension meetings were attended by an average of 40-60 juice grape growers. Those growers represented more than 60% of the total acreage of juice grape vineyards. Our research will be implemented by 12 growers during the 2013 season and the data the produced was shared with National Grape Coop, and they will be used for programming the vineyard management strategies of all the members of the Coop for the 2013 growing season.

LESSONS LEARNED

The strategy of our research was consistent with the problem of the Michigan juice grape industry. Our goal was to set coordinated practices able to achieve a better control of fruit maturation while improving quality (namely fruit polyphenols, anthocyanin and nutraceuticals such as resveratrol). We proved that it is possible to improve fruit quality in Concord grapes, by introducing alternative vineyard practices that improve fruit exposure during the growing season.

Unfortunately, our practices are increasing cost of production and the juice grape industry in USA is currently experiencing an oversupply of Concord grapes and consequently the price of juice grapes has been declining steadily from the mid 1970's (in the last decade the price dropped from \$280 a ton in 2001, to \$170 a ton last year). Cost of production is estimated at \$220 a ton, and currently grape prices are below the break-even point for several in Michigan. These numbers suggest that the future of the juice grape industry in Michigan will be probably linked to (1) consolidation of farms in more efficient enterprises, (2) elimination of acreage of marginal productivity and above all (3) production of higher quality fruit to increase market opportunities and profit for Welch's and National Grape Coop growers. Price of grapes for juice production is based on yield and concentration of soluble solids (Brix), namely sugars (Bates and Morris, 2009). A premium is paid for grapes with more than 16% Brix, whereas the price of grapes with less than 14% Brix does not justify the harvesting cost. We gave tools to growers to improve the quality of the fruit, and we are hoping that color and antioxidant capacity of the fruit flavor will be important for quality grape production and they will be directly related to grape premium price in the near future.

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ADDITIONAL INFORMATION

Presentation and publications related to the project:

1. Sabbatini P., 2010. Early season Concord grape development. SW Michigan Horticultural days, February 3-4. <http://www.grapes.msu.edu/pdf/2011%20SWHORTprogram-final%20draft.pdf>

1 Bates T. and J. Morris. *Mechanical cane pruning and crop adjustment decreases labor cost and maintains fruit quality in New York Concord grape production*. Hortechology, 19 (2); pp 247-253. [Mechanical Cane Pruning and Crop Adjustment Decreases Labor Costs and Maintains Fruit Quality in New York 'Concord' Grape Production](#)

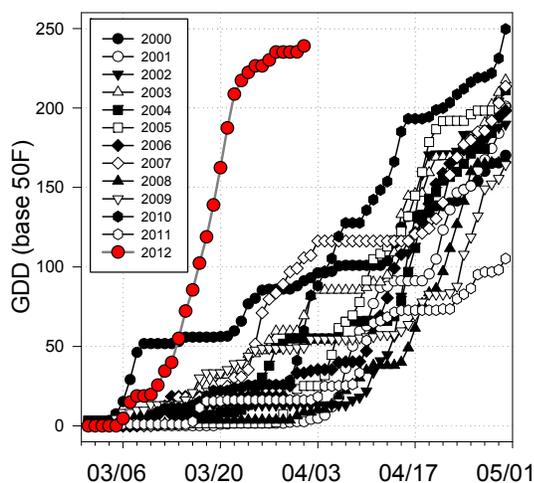
2. Sabbatini P, Tozzini L and Murad P., 2011. Relationship between yield and fruit quality in Concord vines. SW Michigan Horticultural days. Lake Michigan College, Mendel Center, Benton Harbor, MI, February 4-5.

3. Sabbatini P. 2011. Increasing fruit quality and antioxidant capacity of Concord fruit. Great Lakes Fruit, Vegetable and Farm Market EXPO, Grand Rapids, MI, December 6-8.

4. Sabbatini P., 2011. MSU studies the health benefits of concord grapes. Growers News, Vol 50, n.11: pp 33-34.

5. Sabbatini P 2013. Impact of light and temperature on fruit quality of Concord grapevines. SW Michigan Horticultural days. Lake Michigan College, Mendel Center, Benton Harbor, MI, February 6-7.

Vines were selected for three treatments of yield reduction (0, 10 and 30% of the cropping potential of the year) in three levels of crop load (C0, C10 and C30) in a randomized block design with three replicate blocks and six vines plots per treatment block combination. The project was presented at the Great Lakes Expo (2011) at the Southwest



Horticultural Days (2012), goals and objectives were shared with our juice grape growers in Michigan.

Fig. 1. (Prior page) Growing degree days (GDD) calculated with base 50 F from March 1st (2000-2012). 2012 reached (red dot) the same level of GDD four weeks early than the average of the last 10 years. National Grape Cooperative called bud break on the 21 of March, 29 days ahead of normal. Chances of a crop are less than twenty five percent looking at early bud break years going back to 1950. 2010 and 2005 were the warmest springs of the last 10 years; unfortunately the early springs were also frost years for the Michigan grape growers.



Picture 1. Phonological stage of experimental Concord vines at Dongvillo farm (Scottsdale, MI). Bob Dongvillo, owner of the farm, does not recall in his experience (40-years) an early bud-break and a warm March as experienced in 2012. Vine phenology was very advanced (the same stage we are usually in the first week of May). The photo was taken on March 21, 2012.

PROJECT TITLE

Cherry Marketing Institute – A Scientific Look at the Power of Tart Cherries - FINAL

PROJECT SUMMARY

The Red Report is a new look at the power of tart cherries, from a scientific perspective, including more than 50 studies specifically on the health benefits of tart cherries. Since launching The Cherry Nutrition Report in 2007, CMI has funded and promoted 10 new studies, with 13 in the pipeline (nine from University of Michigan), which have directed the evolution of the program, specifically the unique muscle recovery benefit of cherries.

Weber Shandwick public relations, CMI's agency of record since 2006, managed the project, which was overseen by Jeff Manning, Chief Marketing Officer of CMI.

Short Term Goal:

The objective of the project was to make tart cherries more competitive in the Super Fruit category by increasing awareness of cherries' unique recovery advantage and bundle of researched health benefits – ensuring the program messages continue to support the science-based benefits of cherries.

Long Term Goal:

In the long term, this awareness will translate to improved perceptions, increased usage and ultimately increased demand for the crop – crucial for Michigan which produces approximately 75 percent of the U.S annual tart cherry crop.

PROJECT APPROACH

A summary of activities performed to support the production and promotion of The Red Report included:

- **Created and Produced The Red Report: The Science Behind Tart Cherries**

- From October 2011-Jan. 2012, the Weber Shandwick team researched, outlined, drafted and fully produced the new 15-page Report. Technical review of The Report was provided by E. Mitchell Seymour, PhD, University of Michigan.
- **Updated [Cherries. America's "Super Fruit."](http://www.choosecherries.com/) <http://www.choosecherries.com/> to Reflect Language in The Red Report**
 - In January 2012, Weber Shandwick updated the Health & Nutrition section of www.ChooseCherries.com to reflect the current messaging and science in The Red Report, to ensure all elements of CMI's marketing program are fully integrated. The Report was also posted to www.Intranet.ChooseCherries.com to give the tart cherry industry a first look at The Report.
- **Launched The Red Report During "The Ultimate Red Month" (National Cherry Month, American Heart Month and Valentine's Day) via The Following Efforts:**
 - New York City Media Blitz – Feb. 8-9, 2012
 - Satellite Media Tour with spokesperson and longtime cherry advocate Dr. Wendy Bazilian
 - Conducted **25 satellite interviews** with local TV and radio stations, as well as top websites including TheFoodNetwork.com and MealMakeoverMoms.com. Messaging focused around The Red Report, health benefits and product usage. Drove to www.choosecherries.com to download The Red Report.
 - Face-to-Face Meetings with **SEVEN** major health, fitness and women's interest publications
 - Brought The Red Report and product applications to a total of 11 editors.
 - Pending placements in *Health* and *Family Circle* magazines!
 - Influencer Mailings
 - Distributed hard copy mailers including The Red Report and product samples to 200+ key media and RD influencers across the country including:
 - Food/Health editors at top 50 newspapers and in target B2B markets for cherries
 - Health/Fitness/Food editors at key long lead magazines that we weren't able to meet with LIVE on Feb. 8-9
 - Weber Shandwick registered dietitian network, comprised of nearly 150 media-facing and most recognized dietitians across the country, with at least 20 residing in Michigan
- Reached 500+ sports dietitians at the SCAN conference (April 19, 2012) focused on cherries' recovery message, including a dedicated session on tart cherries' recovery benefits and insertion of The Red Report and dried cherry samples (from Michigan processor Cherry Central) in the registration bags of all 500+ attendees.

GOALS AND OUTCOMES ACHIEVED

To Date, Our Efforts Have Generated the Following Results:

- Expected Measurable Outcome: Combined Distribution and Downloads of The Red Report
 - We've currently distributed more than 2,200 hard copies of The Red Report, and more than 1,000 media, influencer, trade and B2B contacts have received electronic versions of The Red Report.
 - Per our web tracking analysis, there have also been more than 12,000 downloads of The Red Report at choosecherries.com. Our goal for the year was 5,000, and we have successfully doubled that goal.

- Expected Measurable Outcome: Targeted Media Placements Mentioning the Research Behind Cherries' Potential Health Benefits
 - To date, dedicated media outreach surrounding The Red Report and cherries' powerful health benefits has generated nearly 63 million media impressions, with an average of 88 percent of coverage mentioning a specific health benefit.
 - Our target for the full year is 75-80 percent of health-benefit specific coverage, so we're well on our way to exceeding that goal.
- Expected Measurable Outcome: Total Number of Influencers/Dietitians Reached
 - To date, we've reached more than 800 influencers through outreach to our registered dietitian network (200+ dietitians), 100+ media-facing dietitians who contribute regularly to a variety of media, plus 500+ dietitians at SCAN. We've exceeded our goal of reaching 650+ influencers.

BENEFICIARIES

The primary beneficiaries of the project are tart cherry producers and processors across the country, with a laser focus on Michigan. For perspective, Michigan has 540 of the 680 tart cherry producers nationally and 22 of the 39 processors nationally, so it's our goal to increase/sustain awareness and demand for Michigan tart cherries.

LESSONS LEARNED

- Developing The Red Report was a key way to continue to communicate the science-based benefits of tart cherries both effectively and efficiently, showcasing how tart cherries are truly today's hottest RED Super Fruit.
- Continuing to reach out to the influencer community – i.e. (sports) dietitians – is a strategic way to influence key media opportunities on a national level. For example, sports dietitian Nancy Clark recently included tart cherries in a *New York Times* article noting she was impressed with the recovery science presented at the SCAN conference.

CONTACT PERSON

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ADDITIONAL INFORMATION

[Cherry Media Coveragehttp://www.choosecherries.com/news/mediaCoverage.aspx](http://www.choosecherries.com/news/mediaCoverage.aspx)
<http://www.choosecherries.com/Uploads/Documents/8588730433382534558.pdf>

PROJECT TITLE

MSU Entomology – Reducing the Impact of Brown Marmorated Stink Bug - FINAL

PROJECT SUMMARY

The Brown Marmorated Stink Bug (BMSB) was recently detected in Michigan and poses a significant threat to specialty crops, particularly fruit crops. Michigan is a major producer of fruit, valued at \$380 million annually. Many Mid-Atlantic growers have experienced a minimum of 25% crop damage with up to complete crop loss due solely to this invasive pest. If BMSB becomes established in MI and no management programs are developed, we estimate a minimum of \$92 million in direct losses of sales for fruit growers. Our major project goal was to prevent the loss of fruit IPM programs due to widespread infestations of BMSB. We surveyed key “at-risk” crops including apples, peaches, cherry, grapes and blueberries to identify the

presence of BMSB throughout the state. This surveillance program identified key “invasion fronts” where management programs could be enacted. Our second objective was to identify effective control treatments for MI tree fruit that fit into IPM programs. The final objective was to communicate results to Michigan growers, commodity groups, MDA personnel, and MSU extension educators. Taking a pro-active approach to detection and management helped slow the spread and impact of this pest. While our activities were specific to Michigan we were also part of larger multi-state effort on management of BMSB in numerous crops that will magnify the overall impact of our efforts.

PROJECT APPROACH

Funding for the project was not received until September, thus we took a very strategic approach to our 2011 late-season monitoring program. We deployed attractant-baited traps at sites where suspected BMSB damage was reported by growers or consultants. In addition, beating tray and sweep net sampling for BMSB, as well as inspection of damaged fruit was undertaken. In all cases no BMSB were found and the damage in apple was most likely Bitter Pit. Our sampling enabled growers to not treat with insecticides for BMSB. Three BMSB adults were collected in sweep net or beating tray samples in habitats other than fruit crops in Monroe and Lenawee counties in southeast Michigan. Homeowners in urban sites in Genesee, Ingham, Wayne and Washtenaw counties also collected single specimens that were confirmed as BMSB.

A total of 26 Blacklight traps were deployed in 2012, spread across Michigan’s five apple production regions. Attractant-baited traps also were deployed near processing plants and at sites where suspected BMSB damage was reported in 2011. Traps were inspected biweekly through October. Trapping was supplemented with beating tray and sweep net samples. A total of three BMSB were captured in light traps, all in Berrien County. Captures were made during the weeks of 8/5, 8/12 and 8/26. Two of the BMSB came from the same farm near Stevensville and the other was collected in southwest Berrien County near Niles. No BMSB were recovered from light traps deployed in Kent, Ottawa, Newago, and Monroe counties, or from attractant-baited traps. Additional finds in the state in 2012 were made in urban sites in Oakland and Oceana counties. A cluster of 30+ individuals was detected on the wall of a house in Ingham County. Individual BMSB have now been detected in eight MI counties (see map). A BMSB colony was established in a tightly controlled rearing facility at MSU. Developing potential controls entailed exposing lab-reared individuals to insecticides using a field-based bioassay. BMSB is a highly mobile pest, thus we opted in 2011 to look at mortality of adults after insecticide application to test residual effects. Apple trees at the MSU Trevor Nichols Research Center (TNRC) were treated at the label rate with bifenthrin, lannate, thiacloprid, or novaluron. Shoots were collected post-treatment (1 and 7 days), brought back to the lab and placed in water-soaked OASIS ssoral foam in clear plastic containers with lids. The foam was covered with sealing wax to preserve the integrity of the fruit and foliage. Adults (n=5) were placed in the containers and mortality assessed 1 and 3 days after exposure. Lannate provide about 60% control for stinkbugs contacting 1-day old residues, but 7-day residues had no impact. This is surprising as Lannate is one of the materials of choice for eastern fruit growers combating BMSB. Bifenthrin was the only highly effective material, and the residual effect was long-lived. This compound is currently not registered for use in apple, but section 18 efforts have been initiated.

Two field-based bioassays were conducted on lab-reared BMSB nymphs in 2012. In the first assay, apple trees at the TNRC were treated at the label rate with bifenthrin, lannate, azinphosmethyl, diflubenzuron, or novaluron. In assay two, apple trees were treated at the label rate with emamectin benzoate, thiamethoxam, flonicamid, pyrethrin, or azadirachtin plus

pyrethrin. One day after treatment, the number of live BMSB nymphs exposed to treated shoots over the 2 day period indicated a significantly lower number of BMSB nymphs exposed to Bifenture, Lannate, and Guthion compared to the control. Drought conditions likely reduced the desirability of foliage for nymphal feeding, thus limiting BMSB ingestive exposure to compounds like Rimon and Dimilin. This work provided a foundation for adding BMSB control options to the Michigan Fruit Management Guide, E154.

GOALS AND OUTCOMES ACHIEVED

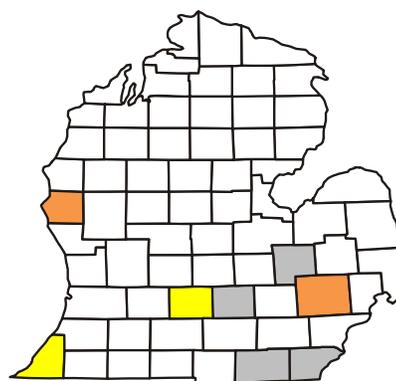
Activities completed: BMSB monitoring took place in the Southeast, Southwest, West-central and Fruit Ridge fruit production regions. A total of 26 Blacklight traps were deployed. This was supplemented with direct observations and sweep net sampling. Identifying effective controls was accomplished by conducting field-based bioassays. Some effective compounds were identified. Control options for BMSB were added to the Michigan Fruit Management Guide, E154.

Progress toward achieving outcomes: Few BMSB were detected in our intensive sampling efforts, thus no insecticide sprays were warranted. This allowed growers to preserve extant tree fruit IPM programs and maintain environmental, consumer and worker safety. No BMSB injury to fruit crops occurred.

Goals vs actual accomplishments: We accomplished all three established goals: 1) determining the distribution of BMSB in primary MI fruit growing regions, 2) determining effective control treatments, and 3) communicating results to Michigan growers, commodity groups, MDA personnel and MSU extension.

Baseline data to convey completion of achieving outcomes: The confirmed distribution of BMSB prior to the project was in two counties (Berrien and Eaton). It is now confirmed in six additional counties, Genesee, Monroe, Lenawee, Ingham, Oakland and Oceana (Figure- next page).

Brown Marmorated Stinkbug (BMSB) distribution in MI based on APHIS confirmed samples, BMSB first detected in 2010 (yellow), 2011 (gray), or 2012 (orange).



BENEFICIARIES

Our findings were published in a timely manner:

Nielsen, A. M. Grieshop and L. Gut. 2012. Brown marmorated stinkbug. In Wise, J., L. J., Gut, R. Isaacs, A. M. C. Schilder, B. Zandstra, E. Hanson & B. Shane, eds. Michigan Fruit Management Guide. MSU Extension Bulletin E-154, pp. 63-64.

Haas, M. A. Nielsen, M. Grieshop and L. Gut. 2011. Report on brown marmorated stink bug task force meeting in Pennsylvania. MSU Extension News for Agric. June 28.

- Nielsen, A. M. Grieshop and L. Gut. 2011. IPM and mating disruption in the age of brown marmorated stink. MSU Extension News for Agric. May 31.
- Rothwell, N. and L. Gut. 2011. How to identify a brown marmorated stinkbug. MSU Extension News for Agric. May 26.
- Dec 2012. Michigan State Horticultural Society. Grand Rapids, MI. Poster: *Identifying Michigan stinkbugs similar to BMSB.*
- Dec 2012. Michigan State Horticultural Society. Grand Rapids, MI. Poster: *Invasive species monitoring in tree fruit: Results from 2012.*
- Dec 2011. Michigan State Horticultural Society. Grand Rapids, MI. Poster: *Status of monitoring for the brown marmorated stinkbug in Michigan.*

Our findings were presented to grower and industry groups at the following major MI grower meetings:

- Dec 2011 – The Great Lakes Fruit, Vegetable, and Farm Market (GLFVFM) Expo, Grand Rapids MI (1200 attended the presentation)
- Feb 2012 – Southwest Michigan Horticultural days, Benton Harbor MI (80 attended the presentation)
- Feb 2012 – West Central Michigan Tree Fruit Meeting, Hart MI (120 attended the presentation)
- March 2012 – Southeast Michigan Spring Tree Fruit Meeting, Flint MI (100 attended the presentation)
- Dec 2012 – The Great Lakes Fruit, Vegetable, and Farm Market (GLFVFM) Expo Grand Rapids MI (1200 attended the presentation).

Meeting attendees and readers of the publication included MI apple, cherry, peach and blueberry growers, other industry stakeholders, MSU Extension Educators, and MDA personnel. Organizations supportive of the project and benefiting from the outcomes include the: Michigan Apple Research Committee, Cherry Research Committee, Michigan Peach Sponsors, Horticultural Society, Michigan Blueberry Growers Association, MBG Marketing, and Michigan Agricultural Cooperative Marketing Association (MACMA).

LESSONS LEARNED

A major lesson learned is that early detection of BMSB is difficult. Very few individuals were caught in blacklight traps, although this is considered the best means of initial detection. There is a critical need for a BMSB attractant that can be used in combination with an effective trap. On the positive side, despite not having an established BMSB population in the state, we were able to gather valuable information on potential controls using a field-based bioassay and colony insects.

CONTACT PERSON

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ADDITIONAL INFORMATION

[Brown Marmorated Stink Bug | Integrated Pest Management Program](http://www.ipm.msu.edu/integrated_pest_management_program)
http://www.ipm.msu.edu/invasive_species/brown_marmorated_stink_bug

<http://www.treefruit.msu.edu/favicon.ico>

PROJECT TITLE

Michigan Farm Bureau – Update Fruit Inventory Data for Michigan – FINAL

PROJECT SUMMARY

The initial purpose of this project was to conduct a fruit inventory survey. As provided for in the project, the survey was conducted and data is being published by the NASS Michigan Field Office. The basic need for this project is for the collection and distribution of reliable and timely data from the Fruit Tree Survey so that the industry – growers, input suppliers, handlers and industry organizations – can best make informed business decisions. Fruit is produced on a perennial tree, vine or bush. The cost of planting perennial fruit crops is rather costly to growers and considerable time and expense is required before production and revenue is achieved. For this reason, growers need to plant the right crop, the right variety and the right rootstock utilizing the right production system. Growers will use data from the Fruit Inventory Survey so that they can make informed planting and/or removal decisions. Input suppliers will use data from the Fruit Tree Survey to help determine what supplies growers will require. Fruit handlers will use the data from the Fruit Tree Survey to plan marketing strategies based on what and how growers have planted. Industry organizations and policymakers will use the data from the Fruit Tree Survey to help plot industry-wide activities and to respond to policy issues.

Making informed decisions, based on real world data, collected by a trustworthy impartial third party (NASS Michigan Field Office), is a critical factor to maintaining and improving the competitiveness of Michigan's dynamic fruit industry. The Michigan fruit industry is both large and diverse. As a large national producer of fruit, it is critical that the Michigan industry stay ahead of the curve compared to other respective production areas. Due to our considerable diversity of production and marketing outlets, it was important that this survey be broadly based and comprehensive in nature. While publication of the entire survey has not yet been fully completed, industry groups and individuals have already begun using the preliminary data.

The last compilation of comprehensive inventory data was completed in 2006. While still important from a historical standpoint, data from the 2006 survey is now too old for practical and reliable use in 2012. Some inventory data is also available from USDA's 2007 Census of Agriculture. Data from the Census provides a useful tool, but provides no information about plantings and removals by year, varieties, rootstocks, production systems or other critical needs as were obtained in the 2011 Fruit Inventory Survey.

The 2011-12 Fruit Inventory Survey project does not build on any earlier SCBGP or SCBGP-FB. However, since this project is being completed over two fiscal years, the second year of the project will build on the 2011-12 Fruit Inventory Survey.

PROJECT APPROACH

Beginning in mid-May 2011, project partners began work on the project with the USDA-NASS Michigan Field Office. Throughout the summer of 2011, commodity groups worked with NASS to enhance and update the NASS mailing list and to develop the survey questionnaire. A final list of 2,386 growers was developed through this partnership. Prior to distribution of the questionnaire allied partners began communicating with the grower community through newsletters, news articles and other forms of grower information regarding the purpose and importance of the survey.

The questionnaire was sent to all 2,386 growers in early October 2011.

The survey questionnaire included previously reported data from the 2006 survey to aid respondents in efficient completion of the survey; a cover letter; and industry endorsement to help maximize response.

For large and significantly influential operations to the States fruit acreage, the cover letter was tailored to indicate an interviewer would be contacting them to schedule a face-to-face interview. This process enhanced the quality of the data and eased the respondent burden on these large producers. NASS held a statewide training school for 40 interviewers who worked on this project.

Producers who were asked to complete the survey by mail were given until October 31 to send it into the NASS-Michigan Field Office. A total of 600 returned their forms by mail. Non-respondents were then contacted by telephone to aid in completion of the survey. A total of 12 telephone interviewers were utilized from the East Lansing NASS-Michigan field office. All of these interviewers were trained prior to the commencement of this phase of data collection. Telephone data collection continued through the end of December. An additional 1,023 surveys were completed during this follow-up phase.

As an incentive to producers to complete and return their survey, a drawing for a large flat-screen TV was held at the Fruit and Vegetable Expo in Grand Rapids on December 7 of all producers who had completed their survey by early December. This drawing prize was donated by one of the project partners, the Michigan State Horticultural Society. The TV give-a-way at the 2011 Fruit and Vegetable Expo helped build grower motivation and provided a way to highlight the survey at the largest grower event of the year for fruit growers

Finally, any survey which was not returned by mail and remained inaccessible after the telephone follow-up was sent to the previously trained field interviewer staff. These interviewers continued to follow-up on these respondents until April 7, 2012. An additional 669 surveys were completed via face-to-face interview.

A final overall usable response rate of 82 percent was obtained through the data collection process. This covers 78 percent of the fruit acreage in the State.

Beginning in early 2012, NASS-Michigan Field Office state funded employees began to edit, key, and analyze the data from the completed questionnaires. The data entry and initial analysis was completed by May 1, 2012.

NASS utilized the remainder of the 2011-12 fiscal year and will continue the beginning of 2012-13 fiscal year to continue data analysis, summarization, and preparation of commodity specific reports. Reports will be released through a phased approach as each commodity is finalized. This staged approach to data release allows for the most efficient utilization of NASS personnel and helps reduce overall project costs. These efforts would continue into FY 2013, subject to phase II funding approval.

To date, Michigan Fruit Inventory data has been released on the NASS Michigan Field Office website for sweet cherries, tart cherries, blueberries, grapes, apples, pears, plums, nectarines, peaches and neglected orchards. Data is still being analyzed and finalized for brambles, strawberries and all fruit. This individual commodity report may be found at: [http://www.nass.usda.gov/Statistics by State/Michigan/Publications/Michigan Rotational Surveys/mi_fruit12/fruitrot.pdf](http://www.nass.usda.gov/Statistics%20by%20State/Michigan/Publications/Michigan%20Rotational%20Surveys/mi_fruit12/fruitrot.pdf).

GOALS AND OUTCOMES ACHIEVED

A key activity was to involve the project partners (commodity groups, Michigan State University, MSU Extension and fruit handlers) with the NASS Michigan Field Office to plan the development and to conduct the survey. A planning meeting with partners and NASS officials discussed the project goals, activities and timelines. Individual partner groups then worked directly with NASS regarding commodity specific activities, including survey questions and mail lists. This coordinated effort caused the respective commodity sectors to achieve significant buy-in to the overall project, thus building on project success in terms of survey relevance and utilization. Commodity groups also communicated to growers through direct communications and/or through industry wide media channels regarding the upcoming survey and the importance of growers providing their timely and accurate response to the survey. Pre survey supporting articles were placed in both the Michigan Farm News and the Fruit Growers News. These two publications cover nearly 100 percent of the grower community. Joint press releases were prepared and distributed by Michigan Farm Bureau and the Michigan Department of Agriculture & Rural Development. These activities help build an understanding in the grower community about the importance of the upcoming survey. NASS worked to simplify the reporting process by providing growers with a copy of their report from the last survey conducted in 2006. The survey was conducted in the late fall and winter when growers generally have time to respond to surveys like the Fruit Inventory. NASS also sent each grower a copy of the data they reported in 2006 which helped reduce the reporting burden, and thus improved both response time and accuracy of data.

The successful planning, conducting and final release of the survey data is just the beginning of this project. To be truly successful the data provided by the survey must be utilized by growers, handlers, input suppliers, commodity groups, researchers, policymakers and others in the fruit industry to make informed and educated decisions. While much of the outcomes from the use of this data will be on a very long term basis, the project will record and summarize how the data is actually utilized. This project will track “hits” on the NASS Michigan Field Office website. Although a full report of this analysis will be provided in the final report for the 2012-13 Specialty Crop Block Grant.

Regarding - A 10 percent increase in the number of download “hits” and “unique users” from the 2006 Fruit Inventory: -Michigan Farm Bureau will collect data from the NASS Michigan Field Office and will report regarding the number of monthly hits there have been on the 2011 fruit tree survey; how many unique users. Since NASS was not able to track “unique users”, and we were not able to obtain “hit” data from the 2006 survey, we do not have a baseline from prior surveys. However, according to the NASS Michigan Field Office a total of 1440 hits were recorded during the June 2012 through October, 2013 period. The monthly average for this seventeen month period was 85 hits per month. The largest number of monthly hits was recorded in November 2012 with 161 hits, and the smallest number of 40 hits was reported in October 2013. The pattern of hits appears to show that use declines slightly during the busy fall harvest season and then expands in the winter-early spring when grower and the industry are making various planting decisions.

At least ninety percent of the participants in the fruit industry (growers, input suppliers, handlers, commodity groups, etc.) will have downloaded the data at least once from the website and/or will be exposed to the data from the survey at least once via a meeting and/or industry communications.

We are unable to completely verify accomplishment of this goal, but we believe that this goal was accomplished. Each project partner was asked to record and report their efforts to

communicate the results of the data and the availability of the data. Each partner reported that they did, in fact, disseminate information about the fruit inventory data to the sector of the industry that they represent, which in turn represents the entire fruit industry. Many of the partners also report that they or others utilized data from the survey in numerous presentations at fruit industry meetings and conferences, such as the Great Lakes Expo, Northwest Orchard and Vineyards Conference or at the Southwest Grower Program. In addition, articles in various industry publications, in particular the **Fruit Growers News** and the **Michigan Farm News**, provided coverage to virtually the entire grower community. The **Fruit Growers News** has a subscriber list in Michigan of 2985 and the **Michigan Farm News** is sent to 2020 fruit growers in Michigan. While most growers receive both publications, we believe that information about the fruit inventory data contained in these two publications more than accomplished the 90 percent goal.

All partner groups (100%) reported that they did download and utilize data from the survey. Each partner reported that they utilized the data in various ways, including use in policy-based decision-making and to develop informational material which was disseminated to the growers in their industry sector and to other fruit industry representatives.

Through August 1, 2013, there were 1261 downloads of the information from the NASS Michigan Field Office website. We estimate that approximately 40 percent of the industry universe (growers, handlers, input suppliers, commodity groups, media and policy makers) have accessed the data from the NASS website at least once.

[http://www.nass.usda.gov/Statistics by State/Michigan/Publications/Michigan Rotational Surveys/mi_fruit12/fruitrot.pdf](http://www.nass.usda.gov/Statistics%20by%20State/Michigan/Publications/Michigan%20Rotational%20Surveys/mi_fruit12/fruitrot.pdf)

During the 2012-13 meeting season, the partners had already planned numerous opportunities for presentation and utilization of the survey data. Here is just a sample of utilization efforts reported by partner groups to date:

- The apple industry has utilized the data to respond to the EPA regarding the use of the insecticide AZM. The apple industry has also used the data to work with the USDA Risk Management Agency on improvements to apple crop insurance programs. Both the Michigan Apple Committee and the MACMA Processing Apple Growers have presented and discussed the data with their respective boards/committees. MACMA Apple Growers report that individual apple handlers have used the data to plan future buying decisions and to plan apple product variety blends.
- The tart and sweet cherry industries have utilized the data to respond to the EPA regarding the use of the insecticide AZM. The cherry industry has also used the data to work with the USDA Risk Management Agency on improvements to the sweet cherry crop insurance program, and to help develop support for a tart cherry policy. The cherry industry also utilized the data in the development of an ad hoc fruit crop disaster loan program. Cherry Marketing Institute has provided all Michigan cherry growers with a copy of the survey results. CherrCo has made plans to discuss the survey data results with their processor members.
- The Michigan State Horticultural Society and Michigan Farm Bureau utilized data from several sections of the survey as background on comment on the phase out of the insecticide AZM. MFB will publish an article about the survey results after all the data has been released by NASS. A similar article about the survey and data will also appear in an upcoming edition of the Fruit Growers News.

- The Michigan Grape and Wine Council posted an analysis of the survey and link to the survey results on their website. [Michigan Wines : About : Fast Facts: http://www.michiganwines.com/page.php?menu_id=19](http://www.michiganwines.com/page.php?menu_id=19)
- The blueberry industry along with MSU Extension and Michigan Farm Bureau has utilized the data in wetland preservation discussions with the Michigan Department of Environmental Quality.
- NASS Michigan Field Office had a booth at the Great Lakes Fruit and Vegetable Expo in Grand Rapids on December 4-6. The Expo is the largest event of its kind in the region and is attended by 2500 fruit/vegetable/greenhouse producers from across Michigan and Midwest/Great Lakes region. NASS provided copies of Fruit Inventory Survey press releases, and promoted access to the report through the NASS website. Limited copies of the completed fruit sections of the report will be made available to attendees.

BENEFICIARIES

- Growers – Michigan has approximately 3500 fruit growers who annually generate nearly \$400 million in fruit crop sales. Michigan has about 110,000 acres of fruit crops. The MSU Product Center estimates the direct economic impact of fruit production in the state is \$337.9 million. The total economic activity including backward linked industries related to fruit production is \$758.4 million. Growers will use the survey data to help make plant decisions regarding varieties, rootstocks and planting systems. Michigan growers plant 2500 to 3500 acres of fruit per year. With land values averaging \$5000 per acre and fruit site planting and development cost averaging an additional \$5000 per acre the annual investment in new plantings is \$30 million based on the planting of 3000 acres annually. Making the right planting decision is a critical factor in the grower's ability to capitalize on this considerable investment.
- Handlers – Michigan has a large number of both fresh and processed (canned and frozen) fruit handlers. By extrapolating data from the MSU Product Center we estimate that the fruit processing, packing and wholesaling industry in Michigan has a total economic impact of \$1.27 billion, and these industries provide 13,136 jobs. Handlers will utilize data from the survey to determine future equipment and infrastructure needs, estimate product blends, make market plans and acquire workers and storage space.
- Input suppliers – Fruit growers and handlers require services and supplies to produce, pack, and sell fruit products. Farm products are produced through converting inputs such as fertilizer, fuel, credit, equipment, land, chemicals, trees, packaging and other factors of production into fruit crops. The farm input supply industry is a critical link in the food and agriculture supply chain. For example, in 2010, Michigan farmers purchased \$599 million in fertilizer and lime, \$222.6 million in pesticides, and \$275.2 million in petroleum fuels and oil according to NASS. Approximately 280 input suppliers exhibit the Fruit and Vegetable Expo in Grand Rapids, and the Fruit Growers News lists 120 vendors in their 2013 Buyers' Guide. Input suppliers and service vendors use the survey data to tailor marketing program and guide product/service development.
- Commodity groups – Fruit industry commodity groups include commodity specific organizations like Cherry Marketing Institute and the Michigan Blueberry Growers Association to general organization like Michigan State Horticultural Society and Michigan Farm Bureau. Virtually every sector of the fruit industry is represented by the partner organization involved in supporting the Fruit Inventory Survey. These groups will utilize the survey data for use in the development of promotion and marketing program, to help direct research efforts and to respond to legislative and regulatory issues.
- Researchers and Extension Specialist – While some private sector research is conducted, most fruit research is performed by personnel at Michigan State University, other land grant

Michigan Fruit Inventory – 2011

USDA, NASS, Michigan Field Office

P.O. Box 30239

Lansing, MI 48909-7739

Telephone: (517) 324-5300

Facsimile: (517) 324-5299

E-mail: nass-mi@nass.usda.gov Project Code 482

October, 2011

Michigan's fruit industry needs updated information for planning, marketing, and production forecasting. The last inventory was conducted in 2006. Response to this survey is voluntary and not required by law, however, your voluntary cooperation in reporting about the fruit acreage you operated in 2011 is needed. Your report is strictly confidential. Thank you for your help.

Please make corrections to name, address, and Zip Code if necessary.

To avoid duplication, indicate below any farm name or partner(s) associated with this operation *not* included in the above address.

If you receive more than one of these forms, please complete one, mark any other —duplicate,|| and mail in all forms.

1. Farm sold.
2. Retired from farming.
3. Entire farm rented to others.
4. Farming, but not growing fruit.
5. Never farmed.

Farm Name:

Partners' Names:

City:

Phone:

New Operator Name:

Address:

Zip:

If not growing fruit, check reason below and give new fruit operator's name, if applicable.

Report for all land you operate (Include land you rent from others, but exclude land you rent to others).

List the total acres in your operation, for each fruit grown.

Crop	Total Acreage	Crop	Total Acreage
Apples	001	Nectarines	851
Tart Cherries	101	Pears	601
Sweet Cherries	151	Plums	501
Peaches	401	Brambles	701
Blueberries	201	Strawberries	751
Grapes	301	Cranberries	801

***** Please read instructions before proceeding. *****

Apples	Code	Variety	Code	Variety	Code	Variety	Code	Variety	Code
Variety									
Blondee	075	Fuji--main season	016	Idared	019	Mutsu /Crispin	025	Spartan	031
Braeburn	035	Gala	017	Jonagold	020	Northern Spy	026	Winesap	032
Cortland	011	Ginger Gold	042	Jonamac	046	Paulared	027		
Empire	015	Golden Delicious	012	Jonathan	023	Red Delicious	014		
Fuji--early season	076	Honeycrisp	065	McIntosh	024	Rome	030	Other (specify)	

Similar pages to the above were done for cherries, peaches, blueberries, grapes, nectarines, pears, plums, brambles, strawberries, cranberries.

Fruit Planting and Removal Intentions for 2012 - 2016

Do you plan to make any changes to your fruit acreage in the next five years? Yes Continue No Go to next page

Please record the acres of each type of fruit and variety you plan to remove and to plant over the next five years. If you have intentions to remove or plant but do not know the variety, you may leave that column blank. If you are unsure exactly which year you will plant or remove acreage, please estimate.

Fruit Species	Variety	Year	Acres to be planted	Acres to be removed	Fruit Species	Variety	Year	Acres to be planted	Acres to be removed
2012					2012				
2012					2012				

A. Direct Marketing and Agri-Tourism

1. Do you sell any of the fruit you grow directly to consumers? Yes (Continue) 621 No (Go to item 2) 622

Indicate the top 4 species of fruit you market directly and which type(s) of direct sales you use: (Check all that apply.)

Species	On-farm	Off-farm	CSA	What percentage of your operation's income comes from direct marketing?
U-pick	Stand or store	Farmers' market	Memberships	On-farm Off-farm CSA

PROJECT TITLE

Michigan Christmas Tree Association – Make it a Real Michigan Christmas: Promoting Michigan – Grown Poinsettias and Christmas Trees - FINAL

PROJECT SUMMARY

Michigan Christmas tree and poinsettia growers have been experiencing static to declining sales. This decline can be attributed to a variety of factors including competition from foreign competitors producing artificial trees and poinsettias, consumer apathy and changing consumer habits. To rejuvenate sales and profitability, we believed that the benefits of both products needed to be communicated to consumers. With the current consumer trend toward buying local and supporting the local economy, this seemed an opportunistic time to invest in an educational media campaign to encourage Michigan residents to “Make it a Real Michigan Christmas.” The concept was to preserve or increase sales and people employed in plant production with three key messages: buying real products helps preserve or build Christmas traditions while being an economically, emotionally, and ecologically beneficial choice. The desired outcome was an increased awareness among consumers about the role Michigan plays in the production of trees and poinsettias, improved understanding about the environmental implications of buying artificial trees and poinsettias, increased awareness of the emotional benefits of real flowers and plants in the home, as well as the economic contribution these two iconic symbols of Christmas make in Michigan.

PROJECT APPROACH

To achieve our goal of increasing consumer awareness and purchases of Michigan-grown poinsettias and Christmas trees, the committee developed a consumer education and public relations campaign emphasizing our three key messages: a purchase of Michigan-grown poinsettias and Christmas trees provide emotional benefits, supports Michigan’s economy and is a great environmental choice. A campaign logo and artwork was developed by MasterTag and used extensively on banners, posters and stickers at retail outlets and in the promotional campaign.

The three key messages were delivered through a public relations campaign designed by Media Matters of Detroit that secured 21 television interviews, 10 radio interviews and 16 newspaper articles. These opportunities were supported by a 30 second public service announcement that ran more than 3,500 times on Michigan radio stations. The website designed for the campaign provided information for consumers about poinsettias and Christmas trees as well as where to make a purchase. Michigan State University provided both consumer and producer survey support to determine consumer familiarity with our products, as well as producers’ feedback on the campaign. The extensive media coverage, with such a short window of time to execute the project, tells us that the campaign was successful.

GOALS AND OUTCOMES ACHIEVED

Because the “Make it a Real Michigan Christmas” campaign was to be implemented for the 2011 holiday selling season, the campaign team began meeting and planning as soon as the grant was announced. The team consisted of:

- Dr. Dean Krauskopf – Michigan Floriculture Growers Council
- Rodney Crittenden – Michigan Floral Association
- Dr. Bridget Behe – Michigan State University, coordinated pre and post surveys
- Marsha Gray – Michigan Christmas Tree Association, serving as the lead on the project
- Joe Fox – MasterTag, which donated the artwork for the campaign and printed point of sale materials

- Bil Bitz - Web Zone Marketing, website development
- Jenny Schilp and Kirsten Borgstrom – Media Matters Public Relations

The activities of the committee fell into the following primary categories:

- Pre and post campaign survey development and execution
- Website development and management
- Point of sale merchandise design and production
- Promotional activities, including a public relations campaign and public service announcements

Pre and Post Campaign Survey Development:

A 37 item questionnaire was developed, reviewed, and tested to collect information from Michigan residents about their Christmas decorating and other related activities. The instrument was reviewed and approved by the Michigan State University Committee for Research Involving Human Subjects (IRB#11-846). Market Tools was sub-contracted to collect approximately 500 responses from Michigan residents for the online survey. Between October 27 and 29, 1601 responses were collected from Michigan residents. Of those, 13.9% decorated inside their home for Christmas 2010, 1% decorated only outside their home for Christmas 2010, and 17.5% decorated both in- and outside their home. These 517 responses (32.3% of the total) were used in subsequent analyses.

One third of the sample was from the Greater Metro Detroit region, one third was from the Greater Grand Rapids region, and one third was from the remainder of the state. Ninety-two percent had a real, live, or artificial Christmas tree in 2010. Sixty-three percent had a tree from a prior year. Nearly 30% purchased a Christmas tree in 2010 and, of those, 63.2% were cut or live with 36.8% artificial. Nearly all of the 96 participants who purchased a live or cut tree had purchased a cut tree (87.5%) and 10.4% had purchased a tree ball and burlapped or 0.4% in another container. Slightly more than one third of the 520 participants (37%) had poinsettias in their home for a Christmas decoration but only 7% of them purchased poinsettias as a gift. Seventy percent of the poinsettias purchased were red.

A second on-line survey was executed in January 2012 at the completion of the 2011 holiday campaign. The same questions were used in both surveys to compare responses pre- and post-campaign. Because it takes many impressions of any sort of promotion or marketing effort to impact consumers, we didn't expect a great change in answers to the survey questions. However, we were pleased to see some positive movement in two questions indicating that consumers seemed to better understand that buying fresh Christmas trees and poinsettias can positively impact Michigan businesses and farmers.

Dr. Bridget Behe of Michigan State University, who oversaw the above surveys, also prepared a brief grower and retailer survey for poinsettia and Christmas tree growers and retailers. Christmas tree growers who responded to the survey reported a small increase in sales (2.12%) and many used the "Make it a Real Michigan Christmas" point of sale items. Poinsettia retailers reported using the point of sale materials, however they reported flat or a slight decrease in sales. A copy of Dr. Behe's complete report is attached as an addendum.

Website Development and Management:

The committee selected Web Zone Marketing to develop a website for the "Make it a Real Michigan Christmas" campaign. The website served two primary purposes; to provide

consumer information on the care and use of Michigan grown Christmas trees and poinsettias, as well as where to purchase these products, and as a place for participating retail outlets to order point of sale merchandise to promote the campaign.

After securing www.realmichiganchristmas.com as the address for the website, Web Zone Marketing used artwork provided by Master Tag as well as photos provided by others in the industry to create an attractive website that addressed the three key benefits of Michigan-grown Christmas trees and poinsettias: good for the local economy, a mood booster and the environmentally friendly choice. The website answers basic consumer questions on care of these products and addresses common myths regarding poinsettias (they are not poisonous) and Christmas trees (they are not bad for the environment).

The website also has a section for press releases and backgrounders for members of the media looking for story ideas and the aforementioned industry page where retailers of Michigan grown poinsettias and Christmas trees could order point of sales items.

At the completion of the holiday season, Web Zone Marketing was able to provide information on the activity and traffic of the website using Google Analytics. That report is attached as an addendum to this report.

Point of Sale Merchandise Design and Production

An important part of the campaign was the design of an attractive and identifiable logo. The design team at Master Tag provided options for the committee to consider and the final logo appears here:



Master Tag then developed a sticker using the logo that could be applied to poinsettia pots as well as a 22" x 28" poster, small bench card and 3' x 8' vinyl banner to be used at retail locations. The sticker, poster, bench card and banner artwork appears here:



Poinsettia pot sticker



22" x 28" retail poster



3' x 8' vinyl banner



7" x 11" bench card

Master Tag produced 120 banners and all MCTA member choose & cut farms and retail lots featured on the association's locator page received a banner to display. Nearly 200 retail florists and garden centers received a kit that included two posters, two bench cards and 200 poinsettia stickers. Poinsettia growers were also able to order stickers to place on their plants before shipping to retail locations.

Promotional Activities, Including a Public Relations Campaign and Public Service Announcements

The key to the success of getting out the three primary messages of the "Make it a Real Michigan Christmas" campaign was working with a good public relations team and using all possible opportunities to share our message. We contracted with Media Matters of Detroit to handle the public relations component of the campaign. The team of three public relations professionals created a plan to notify the media of the campaign and secure a large number of "hits" on television, radio and in print media.

The public relations team developed an eye catching media kit with a series of press releases and story ideas for media outlets. Some of these were delivered in the mail, but many were hand delivered along with a fresh poinsettia. (A sample media kit is included with this report Some of these were delivered in the mail, but many were hand delivered along with a fresh poinsettia and these deliveries were coordinated by Dean Krauskopf.

The campaign secured more than 21 television interviews in the Detroit, Grand Rapids, Lansing, Flint and Saginaw markets representing more than 75 on-air minutes. These opportunities were supported by at least 10 radio interview segments and 16 newspaper articles that directly mentioned the campaign. A detailed report on these segments is attached as an addendum.

We were also able to coordinate a press conference with Michigan Department of Agriculture & Rural Development Director, Keith Creagh that attracted three television stations, one radio station and two newspapers. Using Google Analytics, visitors to the campaign website increased on days when we had key interviews or news coverage.

The public relations efforts were bolstered by the distribution of a 30 second public service announcement created for radio stations in Michigan. The announcement was recorded at Mackinaw Harvest in Grand Rapids and distributed through the Michigan Association of Broadcasters with a guaranteed minimum of 912 airings starting in Mid-November through December 20 with the actual number of airings totaling 3,741. The public service announcement campaign provided an inexpensive way to reach many smaller markets while our public relations campaign focused on larger Michigan cities. A complete report of the number of public service announcements run on Michigan radio stations is attached as an addendum to this report. The public service announcement can be heard at the campaign [A Real Michigan Christmas | Michigan Grown Christmas Trees & Poinsettias](http://www.realmichiganchristmas.com/media.html) <http://www.realmichiganchristmas.com/media.html>.

In our original application, our first goal was to increase consumer knowledge of the environmental, economic, and emotional benefits provided by real Christmas trees and poinsettias by a minimum of 10% (measured by before and after consumer surveys). The survey analysis provided by Michigan State University did indicate that there was an increase in consumer understanding following the campaign that "Buying a live Christmas tree (or poinsettia) supports Michigan businesses and farmers," although it was closer to a 5% increase rather than the 10% increase goal.

The second goal was to generate an increase in sales of the number of poinsettias and Christmas trees (measured by a grower/broker survey). As is detailed in the MSU survey results (complete report is attached as an addendum), Christmas tree growers surveyed reported an increase in sales of 2.12% where floral retailers indicated a slight decrease in poinsettia sales. Only a few poinsettia producer surveys were returned. Those returned showed an increase in sales, but the low reporting number could not justify a confident sample.

Another goal of the campaign was to improve the awareness of the economic, environmental, and emotional benefits of real products among growers and encourage them to become partners in the campaign to increase demand (measured by use of banners, bench cards, and poinsettia stickers). This part of the campaign was very successful as nearly 200 floral retail outlets and 80 Christmas tree farms and tree lots ordered campaign posters and banners for display in their retail locations. Many of the poinsettia growers have requested access to the campaign logo to include on their own printed stickers and promotional materials.

Finally, the campaign intended to expand the available information that Michigan producers have to market real products to consumers in Michigan. The background information developed for the campaign and placed on the website was a great start in providing tools for growers and retailers when “telling their story” to consumers. Participating growers now have access to a professional logo, press releases and an attractive consumer website to help support their efforts in educating their consumers on Michigan-grown Christmas trees and poinsettias.

BENEFICIARIES

There are two levels of beneficiaries from this campaign. All Michigan based Christmas tree and poinsettia growers can potentially see long run benefits of increased or stabilized sales as consumers increase their understanding of the benefits of buying their products. However, we believe that growers who actively participate in the campaign by using the posters, banner and stickers, by using the campaign logo in their promotions and by taking advantage of press opportunities can derive even greater benefits and increased consumer sales. This grant has allowed us to lay a foundation for a campaign that can be used for years by Michigan’s poinsettia and Christmas tree growers. As funding opportunities present themselves in future years, additional opportunities can be identified and leveraged to heighten consumer awareness of the campaign and our products.

LESSONS LEARNED

As previously stated in the interim report, the cooperation of the team executing this campaign is the reason for the successes achieved. Like all projects, unexpected issues developed, but the efforts of the team kept disruptions to a minimum.

One of the greatest challenges that we faced was the fact that the timing of the grant and the timing of our campaign didn’t align well. Because the campaign had to take place during the 2011 holiday season, we had a very short window to execute the campaign. We were not able to contract with the public relations firm, web designer, printer and others until after the grant was confirmed, and then had to have the project completely ready to go in a matter of weeks. This also limited our ability to get our members and retail outlets fully engaged in the campaign.

Again, with so little lead time, our public relations team was unable to take advantage of some unique promotional opportunities and partnerships. The public relations team had some initial discussions with the Metro Detroit Chrysler Dealers and the Detroit Lions football team, however our inability to commit to a relationship earlier in the season prevented us from capitalizing on these opportunities. We have learned that with such a small promotional budget, partnerships

are key to the success of a promotional campaign. We have also learned that because our products, poinsettias and Christmas trees, are “feel good” icons of the holiday season, there are many organizations that are interested and willing to partner with us to promote their interests. We will definitely key in on these opportunities if this campaign is funded in the future.

We also discovered that the poinsettia growers would be more interested in having access to the campaign logo to print on their own labels and stickers, rather than to have to adhere a label provided by the campaign.

CONTACT PERSON

Marsha Gray, Executive Director
Michigan Christmas Tree Association
517-545-9971
marsha@mcta.org

ADDITIONAL INFORMATION

- Website Activity Report

MEMO

To: Marsha Gray

From: Jenny Schilp, Joanna Wilbee Amis, Kirsten Borgstrom

Date: January 24, 2012

RE: Make it a Real Michigan Christmas Media Relations Campaign

This package summarizes the results of the media relations efforts for the 2012 Make it a Real Michigan Christmas campaign. As a result of our efforts, we obtained a total of 42 print, radio and television clips throughout the state of Michigan. This number breaks down further as follows:

- Print clips: 16, for a total print and online circulation of 20,721,183
- Radio hits: 5, one airing on ten radio (and one television) stations throughout the state
- Television placements: 21, for approximately 75 minutes on-air

The coverage was on-message, most encouraging residents to buy real, Michigan-grown Christmas trees and poinsettias, and mentioning Make it a Real Michigan Christmas

Media Relations Recap

With a goal of securing media coverage of the inaugural year of the Make it a Real Michigan Christmas promotion, the media relations team led a successful campaign. Along the way, the team created and designed a press kit that was eye-catching, entertaining and packed full of story ideas to inspire Michigan’s print and broadcast media. Nearly 100 press kits, many with a beautiful desktop size Michigan grown poinsettia, were delivered to media throughout the state. The team was successful in pitching and securing more than two dozen broadcast interviews tied to the Make it a Real Michigan Christmas campaign. From morning talk radio programs to evening television news, the state was a buzz about the campaign. The following is a breakout of the broadcast coverage garnered.

Date	Mkt	Outlet	Program	Topic	Impressions	Interviewee
25-Nov	Det	WJR AM 760	Warren Pierce	Make it a Real MI Christmas	22,100	Marsha Gray
26-Nov	MI	PBS	MI Farm & Garden	Make it a Real MI Christmas		Marsha Gray
26-Nov	MI	PBS	MI Farm & Garden	Make it a Real MI Christmas		Jim Tuinier
27-Nov	Det	WJR AM 760	Travel Michigan	Make it a Real MI Christmas	7,500	Marsha Gray
28-Nov	MI	Various	The Big Show, MPS	Make it a Real MI Christmas		Marsha Gray
28-Nov	Det	WJR AM 760	Paul W. Smith	Make it a Real MI Christmas	36,900	Marsha Gray
28-Nov	GR	WZZM ABC 13	Take Five	Make it a Real MI Christmas	11,598	Marsha Gray
29-Nov	Det	WJBK FOX 2	9AM Weekday	Make it a Real MI Christmas	111,197	Marsha Gray
29-Nov	Det	WJBK FOX 2	9AM Weekday	MIRMC/tree, poinsettia care	111,197	Marsha Gray
29-Nov	Det	WJBK FOX 2	9AM Weekday	MIRMC/tabletop tree décor	111,197	Marsha Gray
1-Dec	GR	WXMI FOX 17	Various Newscasts	MDA/MIRMC Press Conf	10,739	
1-Dec	GR	WZZM ABC 13	Various Newscasts	MDA/MIRMC Press Conf	11,598	
4-Dec	Det	WXYZ ABC 7	Weekend Morning	MIRMC / Picking a tree	67,970	Marsha Gray
5-Dec	Det	WWJ AM 950		Make it a Real MI Christmas	24,800	Marsha Gray
5-Dec	Mqt	WLUC NBC 6	6pm Evening News	MIRMC / Picking a tree	32,005	Joe Teal, Teal's Trees
7-Dec	Det	WJBK FOX 2	9AM Weekday	Fresh MI greens to decorate	111,197	Jerome Raska
7-Dec	Flint	WJRT ABC 12	First at Four	MIRMC / Picking a tree	29,738	Marsha Gray
8-Dec	GR	WXMI FOX 17	6PM Weekday	MIRMC / Picking a tree	10,739	Marsha Gray
9-Dec	Sag	WNEM CBS 5	Better MidMichigan	MIRMC / Picking a tree	8,310	Marsha Gray
9-Dec	Flint	WJRT ABC 12	First at Four	National Poinsettia Day	29,738	Debra Schaaf, Vogt Flowers
10-Dec	Det	WDIV NBC 4	Weekend Morning	MIRMC / Picking a tree	61,617	Marsha Gray
12-Dec	Det	WJBK FOX 2	9AM Weekday	National Poinsettia Day	111,197	Wendy Wiegand
12-Dec	GR	WZZM ABC 13	Take Five	National Poinsettia Day	11,598	Jim Tuinier
14-Dec	Det	WJBK FOX 2	10AM Weekday	Edible Ornament / traditions	110,188	Kirsten Borgstrom
14-Dec	Flint	WJRT ABC 12	First at Four	Edible Ornament / traditions	29,378	Kirsten Borgstrom
22-Dec	Sag	WNEM CBS 5	Better MidMichigan	Edible Ornament / traditions	8,310	Sally Kluck
Total Broadcast Impressions					1,080,811	

The following is a breakout of the print and online coverage garnered:

Date	Outlet	Reporter	Title	Circulation	
				Print	Online
3-Nov	Detroit Free Press	Elisha Anderson	Detroit's Christmas tree finally settled in Campus Martius	246,169	1,174,440
23-Nov	C&G News	Jennie Miller	Keep it Real this Christmas	549,758	
26-Nov	Detroit News	Rene Wisely	Michigan tree sellers maker merry	129,915	
26-Nov	O & E	Sharon Dargay	Pines and Poinsettias; Growers promote buying local, live	158,439	
27-Nov	Detroit Free Press	Staff	You haven't lived here until...you've celebrated Christmas with some Michigan-grown red and greenery	614,226	1,174,440
27-Nov	Marion Star	Tabitha Clark	Cut-your-own trees are opportunity to make new Christmas memories	1,400	
29-Nov	Mlive.com	Russ White	MSU's Bert Cregg: Real Christmas trees are good for Michigan's environment and economy		2,092,500
1-Dec	MSUE Spotlight Blog	Tom Coon	Buy real, buy local and make this a real Michigan Christmas		

2-Dec	Lansing State Journal	Laura Misjak	Keeping it real: More shoppers expected to choose cut trees	43,207	
2-Dec	Patch.com	Alan Stamm	Will your holiday tree show home state loyalty?		6,356,390
2-Dec	Patch.com	Melissa Hebert	Where to get your Christmas tree		6,356,390
8-Dec	Escanaba Daily Press	Jason Raiche	Christmas Tree Advice	7,691	
10-Dec	Detroit News	Tom Greenwood	With good weather, Christmas tree lots predict busy weekend	129,915	
16-Dec	AnnArbor.com	Janet Miller	Ann Arbor area Christmas tree farms: recession proof but not rain proof?		265,694
16-Dec	Mlive.com	Nicole Schaendorf	Turning red for Christmas; Michigan agriculture makes it a Real Michigan Christmas		
			Total Print/Online Circulation	2,126,889	18,594,294

Campaign media coverage garnered equals more than 21,000,000 impressions. In addition to the traditional media outreach, coordination and implementation of the interviews, the team was also responsible for:

- The creation, development, mailing / distribution of the press kit
- Developing a Public Service Announcement (PSA)
- Researching several event and promotional opportunities, including station set décor
- MDA press conference – assistance with the media list and pitch follow up
- Attending weekly conference calls

The “Make It a Real Michigan Christmas” campaign was evaluated, in part, by two online consumer surveys. A consumer panel was purchased from Survey Sampling to be representative of three geographic areas in Michigan as self-defined by the respondent (Greater Detroit Area, Greater Grand Rapids Area, and the remainder of the state). The surveys were conducted prior to the initiation of the campaign in 2011 (October) which assessed purchases and behavior for the 2010 Christmas holiday and again after the completion of the campaign (January 2012) for the 2011 Christmas holiday. We will refer to the holiday year, not the year the survey was conducted, throughout the analyses. Survey data were collected online. The goal of each was to have at least 500 completed responses with a third coming from each of the three geographic areas. The only qualifying question was that someone in the home “decorate their house in any way for the Christmas holiday,” but no other qualifiers or limitations were made. In compliance with federal law, no participants under age 18 were invited to participate and the survey instrument was approved by the Michigan State University Committee on Research Involving Human Subjects. The pre-campaign and post-campaign surveys were identical in question and response categories with one exception; the post-campaign survey asked the respondent if he/she had seen or heard of several media campaigns, including Make It A Real Michigan Christmas.

Table 1 shows the general demographic results of each survey with 999 total respondents distributed nearly evenly across the two surveys. The 2010 holiday year sample was 16 years younger than the 2011 holiday year sample. In both samples, the gender distribution was approximately two-thirds women and one-third men. In both surveys, income was distributed relatively evenly across the 11 income categories.

One of our key measures of success was derived from a question added for the 2011 holiday which concerned the awareness of several marketing campaigns (Table 2). The campaign with highest awareness was “Pure Michigan” which has been in operation since 2006 and has an annual investment of \$25 million. Not surprisingly, the publicity in this campaign on radio,

television, and other media has given them substantial awareness among Michiganders. For campaigns without those powerful resources, the difference in awareness was substantial. The difference between awareness of the first and second campaigns (Absolutely Michigan) was 68%. Absolutely Michigan is a fictitious campaign, one of which was included, to better assess who really had heard of the campaign and who perhaps thought they had. The campaign which had the third highest recognition was “Great Lakes Great Produce,” which was another fictitious campaign. Michigan Select, a real but no longer in operation campaign, was fourth highest in recognition. Buy Michigan Grown Plants was fifth in awareness and also not a real campaign. Make It a Real Michigan Christmas was sixth in awareness with 4.1% of the sample having heard of the campaign. While this may seem like a relatively low number, it is remarkable since the campaign had only been in operation for one season. If this number is extrapolated to the population of Michigan (9.876 million), **the campaign reached approximately 237,024 residents after only 10 weeks in operation.** The final two campaigns that tied for last place (with 2.4% recognition) were “Michigan Snow Fresh”, which has been in operation for several years, and another fictitious campaign called “Make it a Real Michigan Thanksgiving.” We conclude from this finding that the campaign was highly successful and look for increased awareness in 2013.

Table 1. Demographic characteristics of the samples for survey respondents for the 2010 and 2011 holidays.

Demographic characteristic	Holiday Year		Total
	2010	2011	
Number of completes	508	491	999
Average Age (at time of survey)	52.5	68.3	60.3
Gender			
Female	343 (67.5%)	317 (64.5%)	660 (66.1%)
Male	165 (32.5)	168 (34.2%)	333 (33.3%)
Geographic Region			
Greater Detroit Metro Area	169 (33.3%)	170 (34.6%)	339 (33.9%)
Greater Grand Rapids Area	167 (32.9%)	152 (31.0%)	319 (31.9%)
Any other portion of state	172 (33.9%)	169 (34.4%)	341 (34.1%)
Annual Household Income			
Less than \$19,999	54 (10.7%)	53 (11.0%)	107 (10.8%)
\$20,000-\$39,999	127 (25.2%)	114 (23.6%)	241 (24.4%)
\$40,000-\$59,999	117 (23.2%)	122 (25.3%)	239 (24.2%)
\$60,000 to \$79,999	97 (19.3%)	94 (19.5%)	191 (19.4%)
\$80,000 to \$99,999	50 (9.9%)	45 (9.3%)	95 (9.6%)
\$100,000 to \$119,999	27 (5.3%)	24 (5.0%)	51 (5.2%)
\$120,000 to \$139,999	6 (1.2%)	14 (2.9%)	20 (2.0%)
\$140,000 to \$159,999	5 (1.0%)	11 (2.3%)	16 (1.6%)
\$160,000 to \$179,999	2 (0.4%)	1 (0.2%)	3 (0.3%)
\$180,000 to \$199,999	6 (1.2%)	0 (0.0%)	6 (0.6%)
\$200,000 or more	12 (2.4%)	5 (1.0%)	17 (1.7%)

Table 2. Post-marketing campaign (holiday year 2011) additional survey question. Survey participants were asked, “You may have seen or heard some advertisements for or about

Michigan or Michigan-grown products. Which of the following advertisements have you seen in the past three months? Please check all that apply.”

Program	%	Status
Absolutely Michigan*	15.5	Fictitious
Buy Michigan-Grown Plants*	9.0	Fictitious
Great Lakes Great Produce*	14.5	Fictitious
Have a Real Michigan Thanksgiving*	2.4	Fictitious
Make it a Real Michigan Christmas	4.1	Active
Michigan Select **	12.4	Discontinued
Michigan Snow Fresh	2.4	Active
Pure Michigan	83.5	Active

We asked Michiganders a series of questions pertaining to Christmas traditions (Table 3). The responses were made on a five-point Likert scale where 1=strongly disagree to 5=strongly agree. The statements show some of the characteristics of survey participants in their Christmas traditions and their perceptions of those traditions. Of the 20 statements, 8 of them (2, 4, 6, 9, 10, 11, 15, and 16) had been used in two prior studies (Behe et al., 2005 and Florkowski and Lindstrom, 1995). Across the 20 statements, the average rating of agreement was similar for 2010 and 2011 with two exceptions. For questions 14 and 17, there was a higher level of agreement in 2011 compared to 2010 on the statement “Buying a live Christmas tree (or poinsettia) supports Michigan businesses and farmers.” This increase in level of agreement can be, at least in part, attributed to the success of the “Make it a Real Michigan Christmas” campaign since it was one of the key talking points of the campaign.

We asked a series of questions with regard to the home decoration practices of the household (Table 4). To qualify for the survey, the participant must have decorated their house in any way for the Christmas holiday. Decoration inside and outside the home is one form of celebration. Decorating practices in both years was remarkably similar. Nearly everyone in both surveys had decorated both inside and outside the home, with slightly less than 50% decorating inside only and only 2-3% decorating outside the home only. Nearly everyone put the decorations up themselves but less than 1% had some hired help. Only one third of the Michiganders who celebrated Christmas in 2010 and 2011 had a Christmas tree which was either live or artificial. Just slightly fewer, but still nearly one third of the sample, decorated with lights. Approximately 20% decorated with garland, either live or artificial. Only 14% decorated with flowering potted plants, which could have been poinsettias, chrysanthemums, or another type of flowering potted plant.

Table 3. On a scale of 1 (strongly disagree) to 5 (strongly agree), please rate your level of agreement with each statement below. Lower case letters denote differences in rows using Wilcoxon-Mann-Whitney.

Statement	2010 mean Score (std err)	2011 mean score (std err)
N	508	491
1. Our family has a tradition of decorating a Christmas tree together	3.55 (0.0624) a	3.65 (0.0626) a
2. Live Christmas trees are harder to carry home than artificial trees	3.69 (0.0574) a	3.68 (0.0556) a
3. Poinsettia plants are an appropriate gift for most people	3.26 (0.0512) a	3.29 (0.0521) a
4. Live Christmas trees are better than artificial trees	3.21 (0.0622) a	3.27 (0.0644) a
5. Poinsettias are poisonous plants	3.53 (0.0597) a	3.45 (0.0634) a
6. Purchasing a live Christmas tree is environmentally friendly	2.96 (0.057) a	3.05 (0.0564) a
7. Poinsettias are safe to display in homes with animals or children	2.79 (0.0571) a	2.93 (0.0555) a
8. Cutting a tree for Christmas decoration is not environmentally responsible	2.85 (0.057) a	2.94 (0.0582) a
9. Live Christmas trees are harder to decorate than artificial trees	2.78 (0.061) a	2.79 (0.059) a
10. Live Christmas trees are more dangerous because they can catch on fire	3.28 (0.0566) a	3.4 (0.0547) a
11. Live Christmas trees are messy	3.91 (0.0478) a	3.93 (0.0459) a
12. Live Christmas trees are more expensive than artificial trees	3.29 (0.058) a	3.38 (0.0552) a
13. Our family has a tradition of selecting our Christmas tree together	2.64 (0.0716) a	2.63 (0.0724) a
14. Buying a live Christmas tree supports Michigan businesses and farmers	3.89 (0.0454) b	4.11 (0.0402) a
15. Live Christmas trees are harder to take down than artificial trees	3.25 (0.0613) a	3.34 (0.0583) a
16. Live Christmas trees are worth the effort of putting up and taking down	3.24 (0.0605) a	3.26 (0.0621) a
17. Purchasing a real poinsettia supports Michigan businesses and farmers	3.64 (0.0480) b	3.86 (0.0459) a
18. Purchasing an artificial tree is environmentally responsible	3.43 (0.0493) a	3.46 (0.0492) a
19. I/someone in my household plans on purchasing a live or cut Christmas tree in 2011 (2012)	2.45 (0.0857) a	2.60 (0.0845) a
20. The Christmas tree is a central part of my family's Christmas tradition	4.34 (0.0449) a	4.37 (0.0465) a
21. I/someone in my household plans on purchasing one or more poinsettias in 2011 (2012)	3.10 (0.0745) a	3.02 (0.0711) a

Table 4. Michiganders practice of decorating the home for Christmas celebrations in 2010 and 2011.

Decoration of Home	Holiday Year	
	2010	2011
<i>Portion of home decorated</i>		
Inside & outside	273 (53.7%)	252 (51.7%)
Inside	221 (43.5%)	224 (46.0%)
Outside	14 (2.7%)	11 (2.3%)
<i>Who put the decorations up?</i>		
Myself or someone else in household	505 (99.4%)	479 (98.4%)
Hired help	1 (0.2%)	0 (0.0%)
Some I/we did, some help hired	2 (0.4%)	8 (1.6%)
<i>What types of decorations did you have (live, cut, and artificial)?</i>		
Christmas tree (artificial, cut, or live)	469 (33.6%)	447 (35.0%)
Potted flowering plant (poinsettia, chrysanthemum, other)	197 (14.1%)	166 (13.0%)
Garland (artificial or fresh cut greens)	286 (20.5%)	259 (20.3%)
Lights	444 (31.8%)	405 (31.7%)

Of the all the survey respondents, approximately one-quarter purchased a live or cut Christmas tree either for the 2010 or 2011 holiday (Table 5). Of those purchases, 62% purchased a live tree, 10% purchased a tree in a ball and burlap container and the remainder were in another container.

We asked more specifically about flowering plant purchases (Table 6). Of the 197 (in 2010) and 166 (in 2011) respondents who purchased flowering plants for the holiday, approximately one-third had purchased poinsettias for each of the holidays. The average number of plants purchased was approximately 2, and this number didn't change. There was a decrease in the

percentage of survey respondents who purchased chrysanthemums, but the average number of plants purchased (2) remained the same. Purchases of other flowering potted plants remained consistent from the 2010 holiday to the 2011 holiday as did the number of plants purchased at any one time.

Table 5. Percentage of Michiganders who purchased a Christmas tree for the 2010 or 2011 holidays. Lower case letters denote comparisons in rows.

Purchase Type	Holiday Year	
	2010 number purchased (%)	2011 number purchased (%)
Purchased a Christmas Tree	147 (28.9%) a	131 (26.7%) a
Live	92 (62.5%) a	80 (61.1%) a
Cut	80 (87.0%) a	69 (86.2%) a
Balled & Burlapped	10 (10.8%) a	6 (7.5%) a
Other container	2 (2.2%) a	4 (5.0%) a

Table 6. Percent of participants who purchased live plant material and average purchases by year. Lower case letters denote differences in rows.

Plant Type	% of Participants who purchased		Avg # of plants purchased	
	Holiday Year		Holiday Year	
	2010	2011	2010	2011
Poinsettia	36.6% a	31.6% a	1.9 (0.08) a	2 (0.12) a
Mums	8.1% a	4.7% b	2.1 (0.32) a	1.8 (0.29) a
Other	8.5% a	7.3% a	1.7 (0.19) a	1.5 (0.14) a

We also queried participants for the color of the live plant material, store and reason purchased (Table 7). The vast majority (70% or more) purchased red poinsettias, while mums and other flowering plants colors varied. Roughly 50% of poinsettias were purchased at mass merchants or supermarkets for both holiday years, while mums and other flowering plants tended to be purchased at a garden center or mass merchant. For all types of live plants, most (65-82%) purchased for their own enjoyment.

Table 7. Type of plant purchased, color purchased, and type of store from where purchased by holiday year. Lower case letters denote differences in rows between years for a particular type of plant purchase.

Plant Color, Store, and Reason Purchased	Poinsettia		Mum		Other	
	2010	2011	2010	2011	2010	2011
<i>Color of Plant</i>						
Don't recall	7 (3.7%) a	0 (0.0%) b	10 (23.8%) a	3 (12.5%) a	6 (13.3%)	3 (7.9%)
Multi-colored	22 (11.7%) a	17 (10.9%) a	12 (28.6%) a	4 (16.7%) a	13 (28.9%) a	14 (36.8%) a
Pink or Peach	17 (9.0%) a	7 (4.5%) a	6 (14.3%) a	2 (8.3%) a	5 (11.1%) a	5 (13.2%) a
Red	130 (69.1%) a	117 (75%) a	7 (16.7%) a	3 (12.5%) a	11 (24.4%) a	7 (18.4%) a
White	11 (5.9%) a	13 (8.3%) a	2 (4.8%) a	5 (20.8%) a	8 (17.8%) a	8 (21.1%) a
Yellow	1 (0.5%) a	2 (1.3%) a	5 (11.9%) a	7 (29.2%) a	2 (4.4%) a	1 (2.6%) a
<i>Type of store purchased</i>						
Don't recall	35 (19%) a	29 (18.6%) a	7 (16.3%) a	6 (20.7%) a	7 (15.6%) a	7 (16.7%) a
Garden Center	46 (25%) a	35 (22.4%) a	14 (32.6%) a	7 (24.1%) a	9 (20%) a	9 (21.4%) a

Mass Merchant	61 (33.2%) a	38 (24.4%) b	13 (30.2%) a	9 (31%) a	15 (33.3%) a	9 (21.4%) a
Retail Florist	10 (5.4%) a	14 (9.0%) a	3 (7%) a	4 (13.8%) a	2 (4.4%) a	9 (21.4%) b
Super-market	32 (17.4%) a	40 (25.6%) a	6 (14%) a	3 (10.3%) a	12 (26.7%) a	8 (19%) a
<i>Reason plant purchased</i>						
Gift	35 (17.6%) a	42 (24.3%) a	8 (17.8%) a	7 (35%) a	12 (26.7%) a	8 (21.6%) a
Own enjoyment	164 (82.4%) a	131 (75.7%) a	37 (82.2%) b	13 (65%) a	33 (73.3%) a	29 (78.4%) a

We also conducted an assessment of producers, separately, of Christmas trees and poinsettias. Data were collected in a combination of online, email (return by email or fax) and mail (return by fax).

Christmas Tree Growers - We received 60 responses; 18 by fax and 42 by online response. The 60 growers produced a combined total of 671,193 Christmas Trees in 2010 and 685,734 trees in 2011 for a net increase of 14,541 trees or 2.12% increase. We asked them about awareness of the Real Christmas campaign and their use of promotional materials. The banner was the most used item (55% of the respondents used a banner) and the stickers were least used.

Table 8. Awareness and use of promotional items for the “Make it a Real Michigan Christmas” promotional campaign by 60 Michigan Christmas Tree producers.

	Stickers	Banner	Poster	Link
Was not aware of	30.0%	3.3%	18.3%	13.3%
Was aware, but did not use	21.7%	18.3%	25.0%	18.3%
Used	3.3%	55.0%	18.3%	26.7%

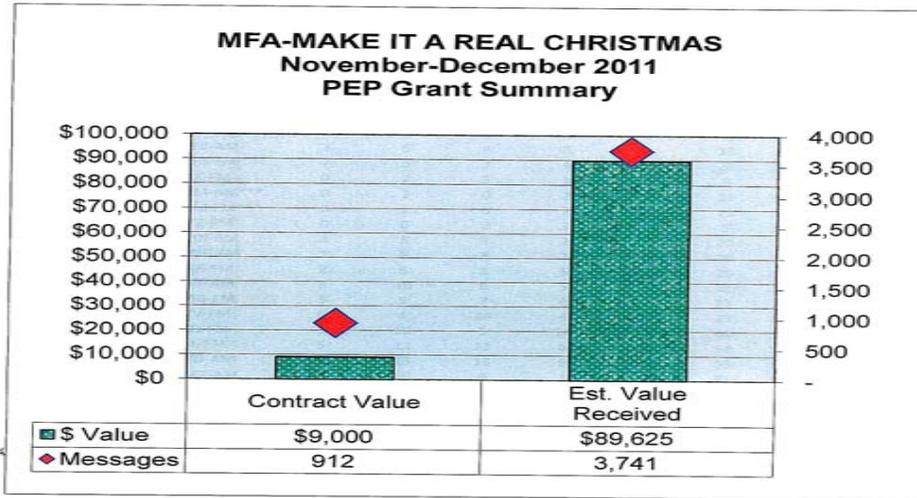
Retail Sellers - We distributed surveys to members of the Michigan Floral Association. We received 35 responses. A total of 6269 poinsettias were sold in 2011, down very slightly from 6376 in 2010. Christmas tree sales were also slightly down from 290 units in 2010 to 252 units in 2011. Retailers used the poster and stickers most, followed by the banner and link.

Table 9. Awareness and use of promotional items for the “Make it a Real Michigan Christmas” promotional campaign by 60 Michigan retail florists.

	Stickers	Banner	Poster	Link
Was not aware of	8.0%	8.6%	11.4%	22.9%
Was aware, but did not use	11.4%	11.4%	2.9%	8.6%
Used	40.0%	25.7%	40.0%	14.3%

Poinsettia Growers - We made a concerted effort to elicit responses from poinsettia growers through inclusion of the link to the website for reporting and several meeting announcements where the growers received the one-page survey. We received two online replies, but they has no data, and two fax replies that showed an upturn in sales.

However, the USDA National Ag Statistics Service reported poinsettia production for 15 states and Michigan was one of them (just published last month for 2011). There were 56 growers in 2010 and 2011 with sales (units) of 2315 in 2011 and a decline to 2177. The value declined from \$8.989 million to \$8.542.



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MAKE IT A REAL CHRISTMAS
RADIO STATIONS

City	Station	6a-9a	9a-3p	3p-8p	8p-MID	MID-6a	Message		Est. Value
							Total	Total	
Detroit	WDZH-FM	0	1	1	5	29	36	\$	815.00
Detroit	WGPR-FM	0	1	0	1	0	2	\$	180.00
Detroit	WJLB-FM	1	2	1	1	6	11	\$	710.00
Detroit	WJR-AM	0	2	1	3	13	19	\$	1,460.00
Detroit	WKQJ-FM	0	1	1	4	5	11	\$	770.00
Detroit	WMGC-FM	0	0	1	0	3	4	\$	260.00
Detroit	WMXD-FM	0	0	0	0	10	10	\$	100.00
Detroit	WNIC-FM	0	1	1	0	9	11	\$	250.00
Detroit	WOMC-FM	0	1	0	0	4	5	\$	145.00
Detroit	WPZR-FM	1	1	2	0	0	4	\$	-
Detroit	WRIF-FM	0	1	1	1	1	4	\$	905.00
Detroit	WWJ-AM	0	2	1	0	10	13	\$	700.00
Detroit	WXYT-AM	101	256	182	184	209	932	\$	41,082.50
Detroit	WXYT-FM	1	1	2	1	0	5	\$	1,125.00
Detroit	WYCD-FM	0	0	0	0	3	3	\$	15.00
Escanaba	W243CQ-FM	1	5	5	0	0	11	\$	-
Flint	WFBE-FM	4	14	6	2	0	26	\$	1,040.00
Flint	WSNL-AM	4	8	7	6	0	25	\$	425.00
Flint	WTRX-AM	7	7	12	4	1	31	\$	151.00
Flint-Saginaw	WTLZ-FM	0	0	3	6	0	9	\$	90.00
Gaylord	WMJZ-FM	2	3	6	8	0	19	\$	228.00
Gaylord	WQON-FM	8	13	7	0	0	28	\$	147.00
Gaylord	WSRT-FM***	0	0	1	0	0	1	\$	6.50
Grand Haven	WGHN-FM	1	7	5	0	2	15	\$	240.00
Grand Rapids	WBCT-FM	0	0	0	0	11	11	\$	220.00
Grand Rapids	WBFX-FM	1	0	0	3	8	12	\$	200.00
Grand Rapids	WMAX-FM	0	4	4	0	3	11	\$	270.00
Grand Rapids	WOOD-AM****	0	0	1	1	9	11	\$	290.00
Grand Rapids	WSNX-FM	2	3	2	0	4	11	\$	600.00
Grand Rapids	WSRW-FM	0	1	0	0	10	11	\$	280.00

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**MAKE IT A REAL CHRISTMAS
RADIO STATIONS**

City	Station	6a-9a	9a-3p	3p-8p	8p-MID	MID-6a	Message	Est. Value
							Total	Total
Grand Rapids	WTKG-AM	2	0	1	0	8	11	\$ 100.00
Grand Rapids	WVGR-FM	3	4	3	0	0	10	\$ -
Grayling	WGRY-AM	8	13	7	0	0	28	\$ 147.00
Grayling	WGRY-FM	8	13	7	0	0	28	\$ 455.00
Hancock	WKMJ-FM	0	4	4	6	0	14	\$ 112.00
Hancock	WMPL-AM	2	1	6	5	0	14	\$ 77.00
Hastings	WBCH-AM	4	7	9	0	1	21	\$ 220.50
Hastings	WBCH-FM	2	14	4	8	5	33	\$ 316.50
Hillsdale	WCSR-AM***	2	3	9	1	0	15	\$ 82.50
Hillsdale	WCSR-FM***	2	3	9	1	0	15	\$ 82.50
Iron Mountain	WHTO-FM	2	4	5	4	0	15	\$ 120.00
Iron Mountain	WIMK-FM	4	1	5	5	0	15	\$ 300.00
Iron Mountain	WJNR-FM	3	1	3	8	0	15	\$ 120.00
Iron Mountain	WMIQ-AM	0	1	9	5	0	15	\$ 300.00
Iron Mountain	WOBE-FM	0	4	4	7	0	15	\$ 120.00
Iron Mountain	WZNL-FM	3	2	3	7	0	15	\$ 300.00
Iron River	WIKB-FM	1	2	3	11	0	17	\$ 119.00
Ironwood	WUPM-FM	3	5	4	3	0	15	\$ 120.00
Jackson	WIBM-AM	2	10	10	5	0	27	\$ 310.00
Jackson	WKHM-AM	2	7	6	5	0	20	\$ 310.00
Jackson	WKHM-FM	2	5	5	4	0	16	\$ 348.00
Kalamazoo	WKZO-AM***	3	2	0	0	2	7	\$ 80.00
Kalamazoo	WKZO-FM***	3	2	0	0	2	7	\$ 80.00
Kalamazoo	WQLR-AM	2	3	1	1	0	7	\$ 70.00
Kalamazoo	WVFM-FM	0	4	0	0	4	8	\$ 224.00
Kalamazoo/Battle Cre	WBCK-FM	5	7	2	1	0	15	\$ 405.00
L'Anse	WCUP-FM	0	0	0	1	0	1	\$ 10.00
Lansing	WHZZ-FM	6	2	0	0	0	8	\$ 280.00
Lansing	WILS-AM	0	4	0	4	0	8	\$ 200.00
Lansing	WJSZ-FM	4	6	5	0	0	15	\$ 225.00

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City	Station	6a-9a	9a-3p	3p-8p	8p-MID	MID-6a	Message	Est. Value
							Total	Total
Lansing	WKAR-AM	0	3	6	0	0	9	\$ 306.00
Lansing	WLCM-AM	3	8	6	10	0	27	\$ 459.00
Lansing	WQHH-FM	5	3	0	0	0	8	\$ 224.00
Lansing	WXLA-AM	2	7	4	0	0	13	\$ 195.00
Ludington	WMOM-FM	2	2	2	7	0	13	\$ 234.00
Manistique	W220AJ-FM	1	5	5	0	0	11	\$ -
Marine City	WHLX-AM***	2	11	5	0	2	20	\$ 230.00
Marquette	WDMJ-AM***	5	3	5	2	0	15	\$ 67.50
Marquette	WIAN-AM***	5	3	5	2	0	15	\$ 67.50
Marquette	WJPD-FM	0	3	11	1	0	15	\$ 300.00
Marquette	WMQT-FM	3	3	5	2	0	13	\$ 156.00
Marquette	WNGE-FM	0	4	5	6	0	15	\$ 285.00
Marquette	WNMU-FM	1	5	5	0	0	11	\$ 440.00
Marquette	WUPK-FM	3	9	2	1	0	15	\$ 277.50
Marquette	WZAM-AM	3	8	2	0	0	13	\$ 130.00
McMillan/Newberry	WMJT-FM	3	5	4	7	0	19	\$ 152.00
Menominee/Marinette	W217AA-FM	1	5	5	0	0	11	\$ -
Mt. Pleasant	WCFX-FM	2	1	1	7	0	11	\$ 330.00
Mt. Pleasant	WCZY-FM	1	2	9	6	0	18	\$ 360.00
Mt. Pleasant	WMMI-AM	0	15	5	0	0	20	\$ 220.00
Mt. Pleasant/Saginaw	WCEN-FM	4	0	0	4	0	8	\$ 400.00
Muskegon	WOOD-FM***	0	0	1	1	9	11	\$ 290.00
Newberry	W216AI-FM	1	5	5	0	0	11	\$ -
Oscoda	WWTH-FM***	7	11	5	3	7	33	\$ 123.75
Petoskey	WLXT-FM	3	5	5	5	0	18	\$ 540.00
Petoskey	WMBN-AM	6	9	7	5	0	27	\$ 216.00
Port Huron	WBTI-FM	4	7	4	4	1	20	\$ 675.00
Port Huron	WHLs-AM***	2	11	5	0	2	20	\$ 230.00
Port Huron	WPHM-AM	4	6	5	4	1	20	\$ 675.00
Port Huron	WSAQ-FM	4	8	7	0	1	20	\$ 965.00

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City	Station	6a-9a	9a-3p	3p-8p	8p-MID	MID-6a	Message	Est. Value
							Total	Total
Rogers City	WHAK-AM***	7	11	5	3	7	33	\$ 123.75
Rogers City	WHAK-FM	3	14	11	7	9	44	\$ 506.00
Saginaw	WGER-FM	1	0	0	8	0	9	\$ 360.00
Saginaw	WLUN-FM	6	17	2	7	0	32	\$ 480.00
Saginaw	WMAX-AM	6	4	10	0	0	20	\$ 450.00
Saginaw	WSGW-AM	0	0	0	3	0	3	\$ 75.00
Saginaw	WSGW-FM	0	0	0	3	0	3	\$ 45.00
South Haven	WCSY-AM	4	1	1	3	2	11	\$ 212.50
South Haven	WCSY-FM	3	11	4	0	0	18	\$ 405.00
South Haven	WCXT-FM	1	2	0	2	1	6	\$ 235.00
Stephenson	W297AE-FM	1	5	5	0	0	11	\$ -
Tawas City	WIOS-AM	2	10	2	0	0	14	\$ 154.00
Tawas City	WKJC-FM	1	7	7	0	0	15	\$ 330.00
Tawas City	WQLB-FM***	3	8	4	0	0	15	\$ 142.50
Three Rivers	WLKM-FM	9	14	6	4	0	33	\$ 396.00
Three Rivers	WRCI-AM***	8	15	10	0	0	33	\$ 198.00
Three Rivers	WRCI-FM***	8	15	10	0	0	33	\$ 198.00
Traverse City	WBCM-FM	4	21	15	4	0	44	\$ 528.00
Traverse City	WCCW-AM	4	8	11	12	0	35	\$ 350.00
Traverse City	WCCW-FM***	10	12	6	11	0	39	\$ 1,092.00
Traverse City	WCZW-FM***	4	13	8	12	10	47	\$ 376.00
Traverse City	WKHQ-FM	3	4	2	9	0	18	\$ 540.00
Traverse City	WSRJ-FM***	0	0	1	0	0	1	\$ 6.50
Traverse City	WTCM-AM	2	13	18	4	8	45	\$ 1,620.00
	SBCH-FM	2	14	4	4	2	26	\$ -
	SBCT-FM	0	0	0	0	11	11	\$ 33.00
	SBFX-FM	1	0	0	3	8	12	\$ 36.00
	SKHQ-FM	3	4	2	9	0	18	\$ -
	SKJC-FM	1	7	7	0	0	15	\$ -
	SLCM-AM	3	8	6	10	0	27	\$ -

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RADIO STATIONS

City	Station	6a-9a	9a-3p	3p-8p	8p-MID	MID-6a	Message	Est. Value
							Total	Total
	SLUN-FM	2	8	0	3	0	13	\$ -
	SLXT-FM	3	5	5	5	0	18	\$ -
	SMKT-AM	4	16	8	3	0	31	\$ -
	SRCI-AM	8	15	10	0	0	33	\$ -
	SRCI-FM	8	15	10	0	0	33	\$ -
	SSNL-AM	4	8	7	6	0	25	\$ -
	SSNX-FM	2	3	2	0	4	11	\$ 33.00
	SSRW-FM	0	1	0	0	10	11	\$ 33.00
	STKG-AM	2	0	1	0	8	11	\$ 33.00
	Totals	516	1126	873	621	605	3741	\$ 89,625.00

PROJECT TITLE

Food Bank Council of Michigan-Increasing Accessibility to Specialty Crops in Underserved Communities through Farmers Markets - FINAL

PROJECT SUMMARY

The purpose of this project was to increase the number of farmers markets where consumers are able to access Michigan specialty crops using their Supplemental Nutrition Assistance Program (SNAP) benefits. There is a need for training and technical assistance for Michigan specialty crop producers and farmers markets as well as a statewide consumer outreach campaign to increase awareness among food assistance recipients of the opportunity to use their benefits at Michigan farmers markets to purchase specialty crops.

In 2004, the Food Stamp Program, now the Supplemental Nutrition Assistance Program (SNAP), converted to an Electronic Benefits Transfer (EBT) card system. The transition from paper food stamp coupons caused challenges for specialty crop producers and farmers markets across the country. It has also been an immense challenge for Michigan specialty crop producers and farmers markets. Nevertheless, it is critical for Michigan markets and producers

to be able to accept all methods of payment to ensure all residents have access to the specialty crops marketed in these venues and to increase the competitiveness of Michigan's specialty crop producers marketing their products in underserved communities. **There is great need for Michigan specialty crop producers and farmers markets to increase their accessibility to underserved individuals through the acceptance of Bridge Cards and huge potential for both enhancing sales volume for Michigan specialty crop producers and in providing access to specialty crops to low-income households.**

To accomplish this, market managers and individual specialty crop producers must know how to initiate and maintain successful Bridge Card programs. Initiating a Bridge Card program also requires the financial resources necessary to obtain the proper technology and materials necessary to process transactions. Additionally, in order to maximize Bridge Card sales, citizens in underserved communities must be aware that they can purchase specialty crops using SNAP benefits at farmers markets.

In 2010, the Food Bank Council of Michigan received funding to support efforts to increase the number of farmers markets accepting Bridge Cards by the Michigan Department of Agriculture's Specialty Crop Block Grant program. This proposal built upon the knowledge and experience gained during the implementation of that grant. This work complimented work done previously by enhancing the branding style developed for consumer outreach materials, by reaching a new audience of specialty crop producers and markets with training and technical assistance, and by sharing past knowledge gained from purchasing wireless point of sale devices and wooden nickels.

PROJECT APPROACH

This project focused on increasing the number of farmers markets where underserved consumers are able to access Michigan specialty crops using SNAP benefits distributed via their Bridge Card. This was accomplished by providing training and technical assistance to Michigan farmers markets and specialty crop producers who are interested in beginning to accept Bridge Cards at Michigan farmers markets and roadside stands and by creating a statewide consumer outreach campaign to increase awareness among food assistance recipients of the opportunity to use their Bridge Card at Michigan farmers markets to purchase specialty crops. Trainings were provided via webinar to farmers' market managers and specialty crop producers in addition to two in-person training sessions for specialty crop producers. Technical assistance was provided via phone and by email and occupied eight hours of staff time on average each week. The statewide outreach campaign included updates to the MIFMA website, printed outreach materials, and instructional videos for market managers and shoppers. As a result of the project, 18 farmers markets received assistance in beginning to accept Bridge Cards during the 2012 market season, thus creating additional revenue for 244 specialty crop producers who sold at these markets in 2012 and for numerous more specialty crop producers who will sell at these markets in the future.

GOALS AND OUTCOMES ACHIEVED

There were three main expected outcomes associated with the implementation and completion of this project. The expected outcomes were: (1) A greater number of farmers market locations where SNAP clients are able to purchase Michigan specialty crops using their Bridge Card; (2) Increased statewide consumer awareness about the opportunity to use Bridge Cards to purchase specialty crops at farmers markets; (3) A greater number of individual specialty crop producers who are authorized to accept Bridge Cards at farmers markets and/or roadside stands.

Expected outcomes include having 70 farmers markets in Michigan authorized to accept Bridge Cards in 2012. This number of markets equals approximately 30 percent of the farmers markets currently in operation in Michigan. Due to our work in 2011, 82 farmers markets were authorized to accept Bridge Cards. As a result of this success, we revised and increased our expected measurable outcome for this project to state that 100 farmers markets in Michigan will be authorized to accept Bridge Cards in 2012, representing 34% of the state's total farmers markets. In 2012, 103 farmers markets in Michigan were authorized to accept Bridge Cards including 18 there were receiving support from this Specialty Crop Block Grant.

Additionally, it was expected that 10 individual specialty crop producers would become authorized to accept Bridge Cards at the farmers markets and/or roadside stands at which they sell the specialty crops they produce. Unfortunately, we are not able to track progress towards this outcome as the USDA Food and Nutrition Service does not release information about authorized retailers. We do know that at least 13 specialty crop producers who sell in and around Kent County became authorized to begin accepting Bridge Card in 2012 with assistance from one of our project partners.

The table below outlines the activities performed to meet the three outline objectives.

Project Tasks	Activities Performed/Goals Achieved
Objective 1: To provide training and technical assistance to Michigan farmers markets in order to increase the number of farmers markets accepting Bridge Cards.	
Develop a resource manual to describe the step-by-step process of implementing a Bridge Card program at a farmers market.	<ul style="list-style-type: none"> - A resource manual was written, edited, and designed to describe the step-by-step process of implementing a Bridge Card program at a farmers market (with funding for editing and design from another source). - 111 copies of the resource manual were printed and distributed to project partners and farmers markets seeking to begin accepting Bridge Cards in 2012.
Provide one-on-one training and technical assistance to farmers markets seeking to start a Bridge Card program. Training and technical assistance will be made available to as many farmers markets as are interested.	<ul style="list-style-type: none"> - Technical assistance has been provided to both farmers markets and individual producers interested in starting to accept Bridge Cards in 2012. Approximately 3-4 emails and 3-4 phone calls are exchanged daily on this topic and it is estimated that 8 hours/week were spent providing technical assistance during the months of January through December.
Provide one educational webinar for market managers to provide step-by-step instruction for EBT use at farmers markets.	<ul style="list-style-type: none"> - A webinar was held on Monday, February 6, 2012 entitled "Accepting Bridge Cards at Michigan Farmers Markets". The webinar was promoted in the January issue of the MIFMA newsletter available at http://mifma.s434.sureserver.com/news/e-newsletter/jan12/ and by email. - 39 market managers registered for the webinar and 29 attended the live webinar. The webinar was recorded and is available at http://msucrfs.adobeconnect.com/p1v1eq4kbfq. - The webinar was evaluated by 59% of attendees. The comments or -- - webinar were positive and 89% of attendees said they would recommend this resource to another market manager that was considering starting to accept Bridge Cards at their farmers market.

Project Tasks	Activities Performed/Goals Achieved
<p>Select up to 10 farmers markets in Michigan for new SNAP program support. These markets were offered assistance with purchasing the equipment necessary to implement a program. (Farmers markets were required to cover expenses that did not benefit specialty crop producers.)</p>	<ul style="list-style-type: none"> - An application for support was created and disseminated by email to farmers markets across the state. - 21 farmers markets applied for support in starting a new SNAP program. 18 markets received assistance - Criteria was created to aid in the selection process and included that specialty crop producers must represent at least 30% of the market's vendors. We initially proposed a 50% cut-off, however after careful consideration adjusted the criteria to 30% in order to support a greater number of well qualified markets.
<p>Purchase wireless point of sale technology to support SNAP programs at selected farmers markets without access to electricity or telephone.</p>	<ul style="list-style-type: none"> - A request for proposals was released to third party processors on December 20, 2011. Five proposals were received and reviewed. - From this process, two companies were identified that understand the needs of farmers markets in regards to wireless point of sale devices. Markets receiving financial assistance were encouraged to work with one of the two providers identified and markets across the state that needed to purchase their own wireless devices were referred to them as well. - In July 2012, the USDA announced federal funding that would provide farmers markets that were beginning to accept SNAP benefits with access to wireless point of sale devices. This funding assistance was more comprehensive than what MIFMA was able to offer through this grant. Many of the markets that had applied to receive support from this grant in order to begin accepting Bridge Cards during the 2012 market season chose to pursue this new funding source instead. - There were only 2 farmers markets that choose to utilize the funding MIFMA was able to offer through this grant. Markets paid a percent of the total cost of the device he equal to the number of seasonal vendors that were not specialty crop producers. After the first month of service, markets were reimbursed for the start-up costs equal to the percent of seasonal vendors that were specialty crop producers.
<p>Purchase wooden tokens to support new SNAP programs at selected farmers markets where all participating specialty crop producers will benefit from a common point of sale device.</p>	<ul style="list-style-type: none"> - Wooden tokens were designed to meet the needs of markets beginning to accept Bridge Cards. The front of the each market's tokens was customized with the market's name and logo. The reverse side included the dollar value and the phrases "No Change Given" and "Eligible Food Items Only." - Wooden tokens were purchased for 14 farmers markets. The number of tokens each market received depended upon the number of seasonal vendors they had and their expected Bridge Card sales. Markets paid a percent of the total cost of the tokens equal to the number of seasonal vendors that were not specialty crop producers. - After payment was received for the market's portion of the token cost, the tokens were mailed to the markets or delivered during site visits.
<p>Objective 2: To provide statewide consumer outreach to increase awareness among food assistance recipients of the opportunity to use their Bridge Card at Michigan farmers markets for specialty crops.</p>	<ul style="list-style-type: none"> - Promote specialty crop purchases using Bridge Cards at Michigan farmers markets through a consumer outreach campaign. - Attended the Macomb County All About Food: Farm to Fork event. Presented a session entitled "Food Access through Bridge Card, SNAP Benefits" which was attended by approximately 30 social service providers that work with low income individuals who are eligible for food assistance benefits across Macomb County. Information was shared about how their clients could use food assistance benefits, specifically Bridge Cards, to purchase specialty crops at Michigan farmers markets. Information was distributed to all 100+ attendees about which farmers markets accept SNAP benefits.

Project Tasks	Activities Performed/Goals Achieved
	<ul style="list-style-type: none"> - A statewide outreach campaign was organized to promote purchasing specialty crops with Bridge Cards at Michigan farmers markets. Components of the outreach campaign included: (1) updates to the MIFMA website to highlight farmers markets that accept food assistance benefits including restructuring the "Find a Farmers Market" feature to allow visitors to search for a market based on which food assistance program benefits it accepts; (2) development and distribution of printed promotional materials including a statewide listing of farmers markets that accept Bridge Cards (see attached Mini Brochure for Food Assistance Outreach) and a listing of winter farmers markets that accept Bridge Cards (see attached Winter Farmers Markets Flyer); (3) development and distribution of promotional banners (see attached Image of SNAP Outreach Banner) and buttons (see attached Image of SNAP Outreach Buttons); (4) the development and posting of online promotional and how-to videos focused on increasing access to fresh, healthy, local foods through farmers markets to food assistance recipients (see links provided in the Supplemental Attachments portion of this report); and (5) increased social media outreach including purchasing a camera that can upload pictures of farmers markets directly to Facebook via a wifi connection.
<p>Host bi-monthly working group meetings to build upon individual efforts of all organizations within the Partnership and to review implementation of project.</p>	<ul style="list-style-type: none"> - Meetings of the Food Assistance Partnership Advisory Team were held by conference call on December 12, 2011, February 13, April 2, May 7, and August 9, 2012. Each of these meetings included a review of the Partnership's efforts towards implementation of this project. - A webinar was hosted on January 23, 2012 entitled "Utilizing Partnerships and Existing Resources for Consumer Outreach." The goal of this webinar was to learn from partners within our organization what they were doing to expand consumer awareness and to provide new ideas for consumer outreach. The webinar was attended by 19 farmers market managers and members of the Partnership. The webinar was recorded and is available at http://msucrfs.adobeconnect.com/p6pfsaipvgp/. - A webinar was recorded on April 16, 2012 entitled "Which Third Party Processor is Right for You?" The purpose of this webinar was to introduce farmers markets and specialty crop producers to two recommended third party processors that could provide wireless point of sale devices for SNAP transaction processing. The webinar was attended by 15 participants and is available at http://msucrfs.adobeconnect.com/p3txm1qiud0/. - A webinar was recorded on July 16, 2012 entitled "The Politics of Farmers Markets: How the 2012 Farm Bill Can Affect Michigan Farmers Markets." This webinar sought to inform participants on the current status of the Farm Bill and how it could affect farmers markets and their acceptance of food assistance benefits. The webinar was attended by 31 participants and recorded at http://msucrfs.adobeconnect.com/p4u38xr55xp/. - The final webinar of the year was recorded on September 17, 2012 and was entitled "Transportation: Getting Your Customers to the Market." Transportation to healthier food retailers is a barrier experienced by many food assistance clients. This webinar shared initiatives being implemented by farmers markets to help clients overcome this barrier. The webinar was attended by 12 people and is available at http://msucrfs.adobeconnect.com/p621mj7bcz4/.

Project Tasks	Activities Performed/Goals Achieved
Evaluate the work of the Food Assistance Partnership by conducting a Year-end meeting.	<ul style="list-style-type: none"> - A Year-End meeting of the Food Assistance Partnership was held on Monday, November 14th at Cornwell's Turkeyville U.S.A. in Marshall, Michigan. Registration was promoted via the MIFMA list serv and website as well as through direct outreach to members of the Food Assistance Partnership and to farmers markets that accept SNAP benefits. Over 60 stakeholders attended the meeting. Portions of the meeting included facilitated discussions about the work of the Food Assistance Partnership and what direction our work should take in the future to meet the needs of markets and specialty crop producers accepting food assistance benefits A meeting agenda, summary, and evaluation results are attached. - Beginning in November 2012, the Food Assistance Partnership also began collecting data from all of the farmers markets throughout the state that are known to be accepting SNAP benefits. This annual survey collects over 50 different measurable indicators that illustrate the current status of SNAP acceptance at Michigan farmers markets and what challenges markets are facing in providing this service to low-income clients. Data is still being collected from farmers markets and will be published in the annual report of the Food Assistance Partnership in early 2013. A copy of the survey instrument is attached.
Objective 3: To begin providing training and technical assistance to Michigan farmers who are interested in accepting Bridge Cards at Michigan farmers markets and roadside stands.	
Provide two, in-person educational training sessions for farmers to provide step-by-step instruction for EBT use at farmers markets and/or roadside stands as well as demonstrate EBT equipment use.	<ul style="list-style-type: none"> - In-person training sessions were held in conjunction with conferences attended by specialty crop producers. The first session was held January 28, 2012 at the Northern Michigan Small Farms Conference and had 25 attendees. The second was held March 6, 2012 at the Michigan Farmers Market Association conference and had 20 attendees. - Educational sessions were promoted by email, on the MIFMA website, and by flyers distributed at conferences attended by specialty crop producers.
Provide one online webinar training session for farmers to provide step-by-step instruction for EBT use at farmers markets and/or roadside stands.	<ul style="list-style-type: none"> - A webinar was held on Monday, February 20, 2012 entitled "Increasing Farm Profitability by Accepting Food Assistance Benefits". The webinar was promoted at conferences attended by specialty crop producers and by email. - 16 farmers registered for the webinar and 6 attended the live webinar. The webinar was recorded as is available at http://msucrfs.adobeconnect.com/p1au1eeogkg/. - The webinar was evaluated by 66% of attendees. The comments on the webinar were positive and 100% of attendees said they would recommend this resource to another farmer that was considering starting to accept Bridge Cards.

BENEFICIARIES

The project had far-reaching benefits for a great many individuals and organizations due to its collaborative nature and inclusion of consumer outreach. There was significant benefit to the specialty crop producers who become authorized themselves or who sell at newly authorized farmers markets. These specialty crop farmers benefitted from increased sales and a wider customer base. This resulted in an increase in revenue for specialty crop producers and kept dollars flowing in the local economy. Farmers markets that began accepting Bridge Cards with support from this grant, represented 244 specialty crop producers and \$6,836 in total Bridge Card sales.

By fulfilling the objective of greater consumer awareness, the Partnership has also helped more underserved individuals and families access the fruits and vegetables they need for good health. Each Bridge Card transaction that takes place at a farmers market represents an

opportunity when low-income individuals gain access to Michigan specialty crops. The number of Bridge Card transactions at Michigan farmers markets in 2012 exceeded 25,000.

LESSONS LEARNED

MIFMA and the Food Assistance Partnership have been working to increase the number of farmers markets accepting Bridge Cards since 2006 when just three markets across the state had the ability to do so. Since then, the number of farmers markets that begin accepting Bridge Cards each year has grown exponentially. As more and more markets begin accepting food assistance benefits, there is a concern that, at some point, the number of farmers markets accepting Bridge Cards will plateau and/or the rate of growth will decline. The number of markets that expressed interest in receiving support from MIFMA to begin accepting Bridge Cards in 2012 was as high, if not higher, than expected. This shows that there is still a great need to provide the training, technical assistance and resources necessary for farmers markets that have or are beginning to develop the capacity to accept food assistance benefits.

During implementation of this project, we did experience an unexpected change to our attempt to support markets in purchasing the wireless point of sale device necessary to allow them to begin accepting Bridge Cards. In July 2012, USDA announced federal funding that would provide farmers markets that were beginning to accept SNAP benefits with access to wireless point of sale devices. This funding assistance was more comprehensive than what MIFMA was able to offer through this grant. Many of the markets that had applied to receive support from this grant in order to begin accepting Bridge Cards during the 2012 market season chose to pursue this new funding source which initially promised that markets would have point of sale devices by July 15, 2012. Unfortunately, circumstances beyond our control extended the timeline for implementation and markets did not take possession of point of sale devices until late September or early October. Some markets were able to accept Bridge Cards for the last few weeks of their market season, while the majority of markets receiving this funding were not able to begin accepting Bridge Cards in 2012 because they received the device after their season had concluded. As a result of these challenges, six of the markets that were receiving support from MIFMA for starting to accept Bridge Cards this year were not able to do so. However, we are confident that these markets will begin accepting Bridge Cards during the 2013 market season.

An additional lesson learned through the implementation of a statewide outreach campaign is that it is difficult to implement low cost, wide-reaching outreach strategies. Statewide outreach strategies such as direct mailings, television and radio advertisements are too expensive to undertake with a minimal budget and smaller, regional efforts that may be more affordable, do not meet the goals of a statewide campaign.

CONTACT PERSON

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ADDITIONAL INFORMATION

[For Market Managers | Michigan Farmers Market Association \(MIFMA\) http://mifma.org/food-assistance-partnership/for-market-managers](http://mifma.org/food-assistance-partnership/for-market-managers)

- Mini Brochure for Food Assistance Outreach [Michigan Food Assistance Program: FAP Home Page](https://secure2.convio.net/fbcm/site/SPageServer?pagename=FAP_index&JServSessionIdr004=cv878dahq3.app205b)
https://secure2.convio.net/fbcm/site/SPageServer?pagename=FAP_index&JServSessionIdr004=cv878dahq3.app205b

- Links to How-to Videos focused on increasing access to fresh, healthy, local foods through farmers markets to food assistance recipients:
 - 2 minute Consumer Awareness Video: [Michigan Farmers Markets Accept Bridge Cards - YouTube](http://www.youtube.com/watch?v=QJOyp4i4WSc) <http://www.youtube.com/watch?v=QJOyp4i4WSc>
 - 30 second Instructional Video: [Use Your Bridge Card at Farmers Markets - YouTube](http://www.youtube.com/watch?v=PNxVDOzLPf4&feature=youtu.be) <http://www.youtube.com/watch?v=PNxVDOzLPf4&feature=youtu.be>
- Year-End Meeting Materials:

2012 Year-End Meeting
10:00 a.m. Welcome & Check In
10:30 a.m. Networking and Roundtable Discussions
Participants will be organized in small groups to discuss the successes and challenges of their food assistance program during the 2012 market season. A series of questions will be provided to guide the discussion.
Noon Lunch and Networking
1:00 p.m. Lessons Learned that will Shape the Future
Participants will reflect on discussions with other market managers and personal experiences to identify lessons learned through implementation of a food assistance program that may lead to future avenues of growth for their individual farmers market(s) and/or the Food Assistance Partnership.

 - **1:45 p.m. Why are Michigan Farmers Markets Not Accepting SNAP?** **Lindsay Way, MSU Graduate Student**
This summer, MIFMA received funding to interview market managers and specialty crop producers at established Michigan farmers markets that are located in counties where no markets are currently accepting SNAP benefits with the goal of uncovering the underlying reasons why these markets and vendors are not yet participating. The lead researcher will briefly share some of the initial results of that research project.
 - **2:00 p.m. Break**

Monday, November 12, 2012 from 10:00 a.m. to 4:00 p.m.
Cornwell's Turkeyville U.S.A. 18935 15 ½ Mile Road Marshall, Michigan 49068
Michigan Farmers Markets Food Assistance Partnership
 - **2:15 p.m. Food Assistance Programs: A State and National Context**
 - **Amanda Shreve, Food Assistance Partnership Coordinator**
A brief presentation on the status of food assistance programs on a state and national level and discussion of any changes to take place for the 2013 market season.
 - **2:30 p.m. Focus for 2013****Facilitator: Susan Smalley**
Reflections on the past, present and future work of the Food Assistance Partnership. Topics for discussion will include how the current policy climate affects food assistance programs, topics for bi-monthly webinars and statewide outreach campaign ideas for 2013.
 - **3:30 p.m. Check Out**
 - **4:00 p.m. Adjourn**

 - **2013 Hosts of the Food Assistance Partnership:**
This meeting is supported by the Michigan Department of Agriculture & Rural Development Specialty Crop Block Grant under Award No. 791-N-1300.

2012 Year-End Summary of the Michigan Farmers Market Association's Food Assistance Partnership Meeting
 Monday, November 12, 2012 from 10:00 a.m. to 4:00 p.m. Cornwell's Turkeyville U.S.A., Marshall, Michigan
Networking and Roundtable Discussions: Notes are organized by discussion question and consist of the main ideas reported out by each group at the end of the discussion time.

Why does your farmers market accept food assistance benefits?

 - The community needs it
 - It's the right thing to do
 - To increase vendor sales (Vendor Recruitment and Retention)
 - To attract more customers
 - To be a place for community interactions
 - To improve the health of the community
 - To set an example for other markets
 - Our customers ask for it

What were your market's greatest challenges related to accepting food assistance benefits this year?*

 - Vendor and consumer education
 - Need standardized "cheat-sheets"
 - Costs: Transactions and PEOPLE
 - Getting vendors to consistently display signage
 - Having vendors submit tokens from other markets
 - Consumer outreach
 - Human error in processing

What are possible solutions to the challenges you encountered this year?

- Work together with other markets in your area
- Hold a vendor orientation meeting
 - Show standard videos from FNS depicting how the program works
- Employee secret shoppers to test whether

What strategies are you implementing to ensure to make the process of accepting food assistance benefits sustainable at your market?

- Encouraging DUFB tokens to be spent at the market where they were distributed
- Charge vendors a percent of their sales to cover administration costs
- Providing consumer education
- Asking debit and credit customers to contribute towards to the administrative costs
- Employing effective outreach- like direct Mailings

- **Focus for 2013:** During this session, attendees discussed topics and questions that would help direct the work of the Food Assistance Partnership in 2013. Notes are organized by discussion topic/question and consist of the ideas reported out individual attendees.

2012 Hallmarks of the Food Assistance Partnership as reported by attendees

- Increased the number of Bridge Cards sales at farmers markets
- Increased the number of farmers markets accepting Bridge Cards
- Created a network of market managers
- Increased involvement in Double Up Food Bucks
- Michigan is a national model
- Increased access to fruits and vegetables and improved health for Michigan families

2012 Market Accomplishments as reported by attendees

- Being able to accept new forms of food assistance benefits
- Surpassed SNAP sales goal
- \$1.8 million in combined SNAP and DUFB sales as of October 30 across the state
- Had to ask for more matching dollars from DUFB, twice!
- Distributing \$14,000 through the Prescription for Health Program in Ypsilanti
- Successfully managing the DUFB at a mobile market
- Increasing the number of vendors accepting food assistance benefits
- 93% redemption of DUFB

What are your hopes and desires for the Food Assistance Partnership to have accomplished by 2017?

- Having paid staff at each market
- \$5 million dollars of SNAP benefits spent at Michigan farmers markets and/or 1% of total SNAP benefits distributed in the state
- Have sustainable funding for the Food Assistance Partnership
- Every county in Michigan will have a market accepting food assistance benefits
- Have some counties where every market accepts food assistance benefits
- Reduce the need for food assistance benefits

vendors are following the rules of the food assistance programs

- Do outreach where SNAP clients already are
- Distribute food assistance benefits at the market for greater redemption

- Using volunteers
- Gaining community support/in-kind donations
- Applying for grant support
- Translating materials into different languages to attract new customers
- Switching from paper records to electronic records to save staff time
- Displaying signage in the market to train customers to save staff and vendor time

MIFMA FAP 2013 Directions

Notes and Guidance in blue Provided by Susan Smalley, Meeting Facilitator

Develop more effective partnerships with public entities – especially the Michigan Department of Human Services

(DHS) and the Michigan Department of Community Health (MDCH). *Inclusion of food stamp sales at farmers markets on*

the Governor's Michigan Dashboard might provide some leverage for state-level agencies to model and encourage county level cooperation with farmers markets. This could also be a great opportunity to work with the MI Food Policy Council

Ideas provided by attendees:

- Information about farmers market food assistance program provided to and displayed at every unemployment office, WIC office, public health office, secretary of state office and given to people who use those offices
- Provide information about food assistance at farmers markets to everyone who gets a new SNAP Bridge Card.
- Have one application for all programs – SNAP, WIC, Project FRESH
- Explore ways for state agencies to inform all recipients about food assistance at farmers markets
- Government partners to promote access points at farmers markets
- Partner with organizations that sign up new SNAP participants

Develop and provide easy-to-access templates and standardized materials. *Many of these materials may already exist,*

however managers are not aware of them or how to access them. Taking inventory of what exists and developing a plan for

regularly reminding people what is there and how to get to it may be a priority in this area. Are there ways to determine who

has used the existing materials and to seek feedback from users?

Ideas provided by attendees:

- MIFMA create and make available standard materials
- Develop/provide customer information sheets on various food assistance programs
- Provide easy recordkeeping templates, especially for new managers
- Provide uniform signage, downloadable from MIFMA website
- Food assistance FAQs targeted to vendors, customers
- State retreat/network to develop/document simple seasonal recipes, demonstrations, safety issues, shared resources that all can use:
- Culinary education about how to simply prepare tasty meals with produce from farmers markets
- Secret shopper program – how to's and recruiting participants
- Compare farmers market and supermarket prices to help customers understand the value of local food

Develop and support use of statewide Food Assistance Partnership evaluation tools and metrics. *Managers seem ready*

for this. The current year-end survey provides a base to start. Engaging market managers in developing and promoting the

tools may encourage broader use. Standardizing the tools and data collected would also make it easier to provide

templates for using the data.

Ideas provided by attendees:

- Statewide evaluation tools and metrics regarding impacts on consumers – food security, nutritional, using Market Umbrella, etc – so that we all measure the same things.
- Create a platform for unified, constructive feedback and evaluation from managers, vendors and customers
- Standardized year-end vendor survey for market managers. They would then report on FAP survey no more than 10 questions.

Help market managers use technology more effectively. *The technology discussion seemed very broad and somewhat*

scattered. It was difficult to discern a clear direction for action, and the general topic certainly goes beyond food assistance.

The market-by-market technology use list provides a very concrete starting place. Perhaps MIFMA could start to consider

what types of technology competence is important for 21st century farmers market managers.

Ideas provided by attendees:

- To work smarter, use technology – social media -- to work the program for the benefit of customers and vendors
- Develop YouTube videos to train market managers on all issues and help market managers learn how to make their own videos
- Create a list of which markets/managers are using which technologies
- Wifi for markets; broadband as a public utility

- Use Iphone/Ipods to provide each vendor his/her own account so that the state would issue each vendor a check and remove the market from the equation. This would reduce administrative costs.
- Explore ways to coordinate and share marketing and outreach efforts. *This may blend with the shared materials theme, but also has considerable potential for some statewide efforts and perhaps for linking with MIFMA's marketing committee.*

Ideas provided by attendees:

- Marketing and outreach – joint and best practice efforts
- Outreach and partnerships; garnering support from the community
- Develop/provide constant year-round promotion to people we don't talk to
- Reaching underserved sectors of population to bring/encourage them to come to the market
- Messaging importance of food assistance acceptance for a variety of audiences and market contexts
- Communicate better with customers and vendors

Highlight farmer/vendor educational and training opportunities. *It is not clear whether MIFMA needs to expand farmer/vendor training opportunities or more effectively communicate to market managers what already exists and help the managers to encourage farmer/vendor participation.*

Ideas provided by attendees:

- Farmer education on these programs in April – on line or regionally, face-to-face
 - Association for vendors to provide technical support and training and to recruit vendors for markets
- Coordinate with MIFMA Policy Committee to explore policy needs and options. *It sounds like some fairly quick action may be appropriate for policy recommendations to the Michigan Food Policy Council and Jane Whitaker opened the door. One area might be to encourage MDHS, MDCH to collaborate with MIFMA and its members to better communicate farmers market food assistance opportunities.*

Ideas provided by attendees:

- Develop potential policy recommendations for food policy councils
 - City ordinances are sometimes our opposition. Markets should be more institutionalized in zoning, budget, etc.
- Additional items. *MIFMA could invite volunteers to organize regional meetings, winter market meeting.*

Ideas provided by attendees:

- Regional and more frequent meetings of the Food Assistance Partnership
 - Winter market group pow wow about ideas, marketing, etc.
 - Train market managers about the importance of food justice and farmers markets as access points for fresh food
 - Goal: At least one farmers market per county accepting food assistance by 2016. Work at county-level partnerships
-



**Upper Peninsula
Downtown Marquette
Farmers Market**

112 S. Third St., Marquette,
Marquette Co. Open
May 19-Oct 27, Sa 9a-2p.
www.mqtfarmersmarket.com
Escanaba Farmer's Market
N. 9th St., Escanaba, Delta Co.
Open May 26-Oct
27, W 3-6p & Sa 8a-12p.
Contact 906-789-8696,
escanabadda@att.net.

Gwinn Farmers Market
Old Gwinn Middle School, 135
Granite St., Gwinn,
Marquette Co. Open June 14-
Sept 27, Th 5-7p.
Contact 906-346-3600,
rlht@charter.net.

**Jackson Mine Farmers and
Crafters Market**
Miners Park, Corner of U.S. 41
& Maas St.,
Negaunee, Marquette Co. Open
May 30-Aug 29
(not open 7/4), W 4:30-7p.
www.cityofnegaunee.com

**Northern Lower Peninsula
Boyne City Farmers Market**
319 N. Lake Street, Boyne City,
Charlevoix Co.
Open May 2-Oct 31, W & Su
7:30a-12:30p.
www.boynecityfarmersmarket.com

**Cadillac Area Farmers Market
LLC**

Lake St., Cadillac, Wexford Co.
Open June 15-
June 29, Tu & F 8a-1p and July
3-Oct 30, Tu & F
8a-4:30p. Contact 231-775-
6310, cgriffin@dhd10.org.

Charlevoix Farmer's Market
Charlevoix, Charlevoix Co.
Open year round, Th
9a-1p. June- Oct at East Park
and Nov-May at the
Charlevoix Public Library.
www.charlevoix.org

Grow Benzie Farmers Market

5885 Frankfort Hwy, Benzonia,
Benzie Co. Open
June 18-Sept 10, M 3-7p.
www.growbenzie.org
**Lake Leelanau Farmers
Market**
Corner of M-204 & M-641, Lake
Leelanau,
Leelanau Co. Open June 17-
Sept 2, Su 9a-1p.
www.eatleelanau.org

Manistee Farmer's Market
Washington St. & Memorial Dr.,
Manistee,
Manistee Co. Open May 12-Oct
15, Sa
8a-12p. Contact 231-357-4334,
brandon@manisteeekitchen.org.

**Northeast Michigan Regional
Farm Markets**
losco Co. Open May 19-Oct 31,
W 9a-2p at 4440 N.
US-23, Oscoda and Sa 8a-1p at
202 W. Westover
St., East Tawas.
www.getitfresh.org

Pellston Farmer's Market
US-31 & Main St., Pellston,
Emmet Co. Open June
16-Sept 29, Sa 8:30a-1:30p.
Contact 231-838-
3859, cmrapin@gmail.com.

**Sara Hardy Downtown
Farmers Market**
Cass & US-31, Traverse City,
Grand Traverse Co.
Open May 12-Oct 27, W 8a-12p
& Sa 7:30a-12p.
www.downtowntc.com

Suttons Bay Farmers Market
M-204 & M-22, Suttons Bay,
Leelanau Co. Open
May 12-Oct 27, Sa 9a-1p.
www.eatleelanau.org

**East-Central Lower Peninsula
Ada Farmers' Market**
7239 Thornapple River Dr.,
Ada, Kent Co.
Open June 19-Sept 25, Tu 12-
6p. www.adafarmersmarket.com

Byron Farmer's Market
8350 Bryon Center Ave., Byron
Center, Kent Co.

Open May 5-Oct 27, Sa 8a-1p.
Contact 616-293-
1019, a.j.grover@juno.com.

**Downtown Big Rapids
Farmers Market**
226 Michigan Ave., Big Rapids,
Mecosta Co. Open
May 11-Oct 19, Tu 1-6p & F 8a-
2p. Contact 231-
629-1557,
germain70@frontier.com.

**Downtown Sparta Farmers
Market**
72 N. Union St., Sparta, Kent
Co. Open June 13-
Sept 26, W 3-7p.
www.spartachamber.com

Edmore Farmers Market
Corner of Lewis St. & Pine St.,
Edmore, Montcalm
Co. Open June 1-Oct 26, Tu 4-
7p & F 8a-1p.
www.edmore.org

Fremont Farmers Market
Dayton St., Fremont, Newaygo
Co. Open June
30-Oct 13, Tu 3:30-6:30p & Sa
8a-1p.
www.fremontcommerce.com

Fulton Street Farmers Market
1147 E. Fulton, Grand Rapids,
Kent Co. Open year
round, May-Dec Tu, W, F & Sa
8a-3p. June-Sept, W
4-7:30p and Jan-Apr, Sa 10a-
1p.
www.fultonstreetmarket.org

Greenville Farmer's Market
Veteran's Park, W. Washington
St., Greenville,
Montcalm Co. Open May 15-
Oct 31, Tu & F
8a-12p. www.greenvillemi.org

**Healthy Street Farmers
Market**
Maple St. btwn Lagrave &
Jefferson, Grand Rapids,
Kent Co. Open May 24-Oct 1,
Th 11a-5p. Contact
616-685-6300, lozickis@trinity-health.org.

Holland Farmers Market
8th St. Market Place btwn Pine
Ave. & Maple St.,

Holland, Ottawa Co. Open May
16-Dec 16, W & Sa
8a-4p.
www.hollandfarmersmarket.com

Howard City Farmers Market
Corner of Ensley & Edgerton
St., Howard City,
Montcalm Co. Open May 12-
Oct 20, Sa 9a-1p.
www.howardcity.org

**Hudsonville Farmers Market
& Crafts**
3302 Prospect St., Hudsonville,
Ottawa Co. Open
June 6-Oct 17, W 8a-2p.
www.fcelevator.com

Metro Health Farm Market
5900 Byron Center Ave.,
Wyoming, Kent Co. Open
May 3-Oct 11, Th 9a-2p.
www.metrohealth.net/livehealthylife/farm-market

Muskegon Farmers Market
700 Yuba, Muskegon,
Muskegon Co. Open May
1-Dec 22, Tu, Th & Sa 6a-3p.
www.muskegonfarmersmarket.com

Newaygo Farmers Market
28 State Rd., Newaygo,
Newaygo Co. Open June
29-Oct 12, F 2-7p.
www.newaygonaturally.com

**Plainfield Township Farmer's
Market**
Plainfield & 5 Mile, Grand
Rapids, Kent Co. Open
June 12-Oct 18, Tu & Th 2-7p.
Contact 616-364-
8466 x116,
harveys@plainfieldchartertpw.org.

**South East Area Farmers'
Market**
Grand Rapids, Kent Co. Open
June 2-Oct 27, Sa
10a-3p at Garfield Park, 334
Burton SE. and June
15-Aug 31, F 2-7p at G.R. Ford
Middle School, 851
Madison SE.
www.oktjustice.org/farmers-market

**Spectrum Health Farmer's
Market**
100 Michigan St. NE, Grand
Rapids, Kent Co. Open
June 5-Oct 30, Tu 11a-4p.
www.spectrumhealth.org/greeninitiatives

**Sweetwater Local Foods
Market**
6401 Prairie St., Muskegon,
Muskegon Co. Open
year round, Sa 9a-1p.
www.sweetwaterlocalfoodsmarket.org

Westside Farmers' Market
Grand Rapids, Kent Co. Open
June 7-Oct 30,
Tu 9a-4p at Walgreens, 800
Leonard St. and Th
9a-4p at Leonard Christian
Reform Church, 1050
Leonard St. Contact 616-451-
0150, wgn0@att.net.

YMCA Farmers Market
475 Lake Michigan Dr. NW,
Grand Rapids, Kent Co.
Open June 7-Sept 27, Th 3-7p.
www.grymca.org/outreach/community-based-programs

**Menominee Historic
Downtown Farmers
Market Association**
Menominee, Menominee Co.
Open year round,
June 9-Oct 3, Th 3-7p & Sa 9a-
1p at 1st St. &
8th Ave. and Oct-May, Sa 9a-
1p at 905 10th St.
Contact 906-863-8718,
menomineefarmersmarket@hotmail.com.

**Munising Farmer's and
Artisan Market**
Bayshore Park, Munising, Alger
Co. Open May
29-Oct 15, Tu 4-7p. Contact
906-202-3030,
hortholictreasa@yahoo.com.

**Porter School Farmers'
Market**
303 E. Center St., Alpha, Iron
Co. Open June 16-
Sept 29, Sa 9a-12p.

www.porterschoolmarketplace.com

**West-Central Lower
Peninsula**

**Downtown Bay City Farmers
Market**
318 Sixth St., Bay City, Bay Co.
Open
May 31-Oct 15, Th 10a-3:30p.
www.downtownbaycityfarmersmarket.org

**Downtown Saginaw Farmers'
Market**
507 S. Washington Ave (M-13),
Saginaw, Saginaw
Co. Open May 25-Oct 31, M, W
& F 10a-3p and
July 7-Oct 31, Sa 9a-1p.
www.saginawfarmersmarket.org

Fenton Farmers Market
150 S. Leroy St., Fenton,
Genesee Co. Open July
12-Sept 27, Th 5-8p.
www.slpr.net

Flint Farmers' Market
420 E. Boulevard Dr., Flint,
Genesee Co. Open year
round, Tu, Th & Sa 8a-5p.
www.flintfarmersmarket.com

Frankenmuth Farmers Market
Main & Cass St., Frankenmuth,
Saginaw Co. Open
May 19-Oct 20, W 3-6p & Sa
8a-2p.
www.frankenmuthfarmersmarket.org

Hemlock Farmers Market
Richland Township Park,
Hemlock, Saginaw Co.
Open June 21-Oct 18, Th 4-7p.
Contact 989-385-
0602, klyvere5@yahoo.com.

Imlay City Farmers Market
Corner of Main St. & Third St.,
Imlay City, Lapeer
Co. Open May 3-Oct 25, Th 1-
6p. www.icdda.com

**Grand Blanc City Farmers
Market**
Grand Blvd., Grand Blanc,
Genesee Co. Open May
13-Oct 21, W 4:30-8p & Su
10a-3p.
www.cityofgrandblanc.com

Lapeer Farmers' Market
286 W. Nepessing St., Lapeer,
Lapeer Co. Open
May 2-Oct 27, W & Sa 9a-3p.
www.lapeerfarmersmarket.com
Information Valid for 2012
Market Season

**Southeast Lower Peninsula
Ann Arbor Farmers Market**
315 Detroit St., Ann Arbor,
Washtenaw Co. Open
year round, May-Dec, W 7a-3p
& Sa 8a-3p, May-
Sept W 4:30-8:30p and Jan-Apr
Sa 8a-3p.

www.a2gov.org/market
Auburn Hills Farmers Market
Corner of S. Squirrel & Auburn
Rd., Auburn Hills,
Oakland Co. Open June 7-Oct
11, Th 3-7:30p.
www.auburnhills.org/farmersmarket

Canton Farmers Market
500 N. Ridge Rd., Canton,
Wayne Co. Open May
13-Oct 14, Su 9a-1p.
www.cantonfun.org

Chelsea Farmers Market
Park St., Chelsea, Washtenaw
Co. Open May 5-Oct
27, Sa 8a-12p.
www.chelseafarmersmkt.org
Detroit Eastern Market
Russell St. btwn Mack &
Gratiot, Detroit, Wayne
Co. Open year round, Sa 5a-5p
and July 10-Oct
30, Tu 11a-6p.
www.detroiteasternmarket.com

Dexter Farmers Market
3233 Alpine, Dexter,
Washtenaw Co. Open May
5-Oct 27, Tu 3-7p.
www.villageofdexter.org
**Downtown Ypsilanti Farmers'
Market**

Ferris St. btwn Adams &
Hamilton, Ypsilanti,
Washtenaw Co. Open May 1-
Oct 30, Tu 2-6p.
www.growinghope.net
Dundee Farmers Market

223 Tecumseh St., Dundee,
Monroe Co. Open May
19-Oct 24, W 4-7p & Sa 8a-1p.
www.dundeefarmersmarket.com

Eastside Farmers Market
Mack Alter Square, Mack &
Alter, Detroit, Wayne
Co. Open June 9-Oct 20, Sa
9a-2p. Contact 313-
331-3427,
aopperman@warrenconner.org.

Southern Lower Peninsula

100-Mile Market
507 Harrison, Kalamazoo,
Kalamazoo Co. Open
May 2-Oct 31, W 3-7p.
www.peoplesfoodco-op.org

Battle Creek Farmers Market
Festival Market Square, corner
of Jackson &
McCamy, Battle Creek,
Calhoun Co. Open May
5-Oct 31, W & Sa 9a-1p.
www.battlecreekfarmersmarket.com

Bellevue Farmers Market
Washington Park, Main & Mill,
Bellevue, Eaton Co.
Open June 7-Oct 25, Th 4-7p.
www.battlecreekfarmersmarket.com

**Benton Harbor Farmers
Market**
Pipestone & Main St., Benton
Harbor, Berrien Co.
Open June 27-Oct 10, W 12-6p.
Contact 269-927-
5607,
bentonharborfarmersmarket@gmail.com.

**City of Springfield Farmers
Market**
503 Military Ave., Springfield,
Calhoun Co. Open
year round, Sa 8a-1p.
www.springfieldmich.com

Douglass Farmers' Market
1000 W. Paterson St.,
Kalamazoo, Kalamazoo Co.
Open June 5-Aug 28, Tu 3-6p.
www.douglassfarmersmarket.wordpress.com

**Downtown Jackson Grand
River Farmers**

Market
Corner of Louis Glick Hwy &
Mechanic St.,
Jackson, Jackson Co. Open
Apr 3-Nov 30, Tu, F &
Sa 8a-1p. www.jacksondda.org

**Green Market at Allegiance
Health**
1201 E. Michigan Ave, Jackson,
Jackson Co. Open
May 3-Oct 25, Th 11a-3p.
Contact 517-788-7378,
fojtasek@msu.edu.

Hastings Farmers Market
220 W. State St., Hastings,
Barry Co. Open May
5-Oct 31, W & Sa 9a-1p.
Contact 269-945-2454,
valerie@mibarry.com.

Kalamazoo Farmers Market
1204 Bank St., Kalamazoo,
Kalamazoo Co. Open
May 5-Nov 17, May 5-Nov 17,
Sa 7a-2p and Jun-
Oct Tu, Th & Sa 7a-2p.
www.kalamazoo-city.org

Middleville Farmers Market
100 E. Main St., Middleville,
Barry Co. Open May
4-Oct 19, F 7a-1p.
www.villageofmiddleville.org

Richland Farmers' Market
Gull Lake Middle School, 9550
E. M-89, Richland,
Kalamazoo Co. Open May 23-
Oct 17, W 3:30-
6:30p.
www.richlandfarmersmarket.webly.com

**Texas Township Farmers'
Market**
7110 West Q Ave., Kalamazoo,
Kalamazoo Co.
Open May 19-Oct 20, Sa 8a-
12p and July 3-Sept 4,
Tu 4-7p.
www.texastownship.org

Allen Street Farmers Market
Corner of Allen St. & E.
Kalamazoo, Lansing,
Ingham Co. Open May 23-Oct
31, W 2:30-7p.
www.allenneighborhoodcenter.org

Bath Farmers Market

Bath, Clinton Co. Open year
round, Th 3-7p. May-
Oct at Couzens Park, Webster
Rd. and Nov-Apr at
Bath Community Center.
www.bathtownship.us

**Downtown Owosso Farmers
Health**
Exchange St. btwn Water St. &
Park, Owosso,
Shiawassee Co. Open May 5-
Oct 27, Sa 8a-1p.
Contact 989-494-3344,
heather.rivard@ci.owosso.mi.us.

East Lansing Farmer's Market
201 Hillside Ct., East Lansing,
Ingham Co. Open
July 8-Oct 28, Su 10a-2p.
www.cityofeastlansing.com/farmersmarket

**Eaton Rapids Medical Center
Farmers Market**
1500 S. Main St., Eaton Rapids,
Eaton Co. Open
May 23-Oct 10, W 11a-5p.
www.eatonrapidsmedicalcenter.org

Holt Farmers Market
2150 Cedar St., Holt, Ingham
Co. Open May 12-
Nov 17, Th 4-7p & Sa 9a-2p.
www.holtfarmersmarket.org

Lansing City Market
325 City Market Dr., Lansing,
Ingham Co. Open
year round, Tu-F 10a-6p, Sa
9a-5p & Su 12-4p.
www.lansingcitymarket.com

**Meridian Township Farmers
Market**
Okemos, Ingham Co. Open
year round, May
5-Oct 27, Sa 8a-2p & July 4-Oct
31, W 8a-2p at
5151 Marsh Rd. and Dec-Apr,
1st and 3rd Sa 10a-
3p at Meridian Mall.
www.meridian.mi.us.

Old Town Farmers Market
Corner of Turner St. & E. Grand
River Ave., Lansing,
Ingham Co. Open May 6-Oct 7,
Su 10a-3p.
www.iloveoldtown.org

**Owosso Original Farmer's
Market**
1401 E. M-21, Owosso,
Shiawassee Co. Open
May 5-Oct 27, Sa 8a-1p.
Contact 989-413-2039,
KraftyKayls@yahoo.com.
**South Lansing Farmers
Market**

1905 W. Mt. Hope, Lansing,
Ingham Co. Open
June 7-Sept 27, Th 3-7p.
www.southlansing.org
Westside Farmers' Market
743 N. Martin Luther King Jr.
Blvd., Lansing,
Ingham Co. Open June 4-Sept
17, M 4-7p.
www.nwlansing.org

**Central Lower Peninsula
Linden Farmers Market**
Tickner St., Linden, Genesee
Co. Open July 25-
Sept 12, W 5-8p. www.slpr.net

Port Sanilac Farmers' Market
Fire Hall Park, M-25, Port
Sanilac, Sanilac Co. Open
May 25-Oct 12, F 3-7p & Sa 12-
4p.
www.portsanilac.net

**Vantage Point Farmers
Market**
51 Water St., Port Huron, St.
Clair Co. Open May
12-Oct 27, Tu & Sa 8a-2p.
www.achesonventures.com

**East-Central Lower Peninsula
VA Medical Center Farmers
Market**
5500 Armstrong Rd., Battle
Creek, Calhoun Co.
Open June 4-Sept 24, M 11a-
1p.
www.battlecreekfarmersmarket.com

**Farmers & Artisans Market
Dearborn**
Michigan Ave. btwn Mason &
Howard St.,
Dearborn, Wayne Co. Open
May 25-Oct 26, F 8a-
1p.
www.dearbornfarmersartisansmarket.com

**Inkster Mobile Produce
Market**
Inkster, Wayne Co. Open June
20-Sept 19, W 10a-
2p. 1st & 3rd W at YWCA,
26429 Michigan Ave.
and 2nd & 4th W at Focus
Hope, 759 Inkster Rd.
www.waynemetro.org

Lincoln Park Farmers Market
Southfield Rd., Lincoln Park,
Wayne Co. Open
May 6-Oct 28, Su 11a-4p.
Contact 313-427-0443,
lpfm@inbox.com.

Melvindale Farmers Market
3155 Oakwood Blvd.,
Melvindale, Wayne Co.
Open June 13-Sept 12, W 2-7p.
www.melvindale.org

Milford Farmers' Market
Liberty St. btwn Main St. &
Union St., Milford,
Oakland Co. Open May 10-Oct
18, Th 3-8p.
www.milfordfarmersmarket.org

Monroe Farmers Market
20 E. Willow St., Monroe,
Monroe Co. Open year
round, Tu & Sa 6a-12p.
www.farmersmarketmonroe.com

**New Baltimore Farmers
Market**
Washington St. & Main, New
Baltimore, Macomb
Co. Open July 15-Oct 21, Su
8a-1p.
www.newbaltimorefarmersmarket.com

**Northwest Detroit Farmers'
Market**
15000 Southfield Service Dr.,
Detroit, Wayne
Co. Open June 7-Oct 11, Th 4-
8p. www.grandmontrosedale.com/farmers-market.html

**Oakland Avenue Farmers
Market**
9354 Oakland Ave., Detroit,
Wayne Co. Open May
12-Sept 29, Sa 11a-3:30p.
www.northend-cdc.org
Royal Town Farmers Market

Wyoming & Pasadena, Royal Oak, Oakland Co. Open June 3-Oct 28, Sa 8a-4p. Contact 248-494-8780, rotocodev@yahoo.com.

Saline Farmers Market

Saline, Washtenaw Co. Open May 5-Oct 27, Sa 8a-12p at S. Ann Arbor St. and June 5-Sept 25, Tu 3-7p at Saline District Library, 555 N. Maple Rd.

www.cityofsaline.org/farmersmarket

Sowing Seeds Growing

Futures Farmer's Market

Joy Rd. & Artesian, Detroit, Wayne Co. Open June 5-Oct 16, Tu 3-7p. Contact 313-581-7773 x108, Thopkins@joysouthfield.org.

Springfield Farmers' Market

12000 Davisburg Rd., Davisburg, Oakland Co. Open June 17-Oct 14, Su 10a-2p.

www.springfieldfarmersmarket.wordpress.com

Warren Farmers Market

One City Square, Warren, Macomb Co. Open May 6-Oct 28, Su 9a-2p.

www.cityofwarren.org/index.php/farmers-market

Wayne Farmers Market

Michigan Ave. & Elizabeth, Wayne, Wayne Co. Open May 16-Oct 24, W 3-7p. www.waynefarmersmarket.com

Wayne State University

Farmers Market

5201 Cass Ave., Detroit, Wayne Co. Open June 6-Oct 31, W 11a-4p.

www.clas.wayne.edu/seedwayne

Westside Farmers' Market

2501 Jackson Ave., Ann Arbor, Washtenaw Co. Open June 7-Sept 27, Th 3-7p.

www.a2wsfm.com

Wyandotte Farmers Market

Elm St. & First, Wyandotte, Wayne Co. Open June

14-Oct 18, Th 12-7p.

www.wyandottefarmersmarket.com

Ypsilanti Depot Town Farmers' Market

Ypsilanti Freighthouse Plaza, 100 Rice St., Ypsilanti, Washtenaw Co. Open May 5-Oct 27, Sa 8a-1p. Contact 734-478-0584, depottownmarket@gmail.com.

Winter Farmers Markets Accept Bridge Cards

Everyone should have access to fresh, healthy, local food. You can purchase fresh produce at these Michigan winter farmers markets accepting Bridge Cards.

*This information is valid for the 2012
winter farmers market season.*

Upper Peninsula

Menominee Historic Downtown Farmers Market Association

Menominee, Menominee Co. Open year
round, Oct-May, Sa 9a-1p at 905 10th St.
Contact 906-863-8718,
menomineefrmkt@hotmail.com.

West-Central Lower Peninsula

Fulton Street Farmers Market

1147 E. Fulton, Grand Rapids, Kent Co. Open year
round, May-Dec Tu, W, F & Sa 8a-3p and Jan-Apr,
Sa 10a-1p.

www.fultonstreetmarket.org

Holland Farmers Market

8th St. Market Place btwn Pine Ave. & Maple St.,
Holland, Ottawa Co. Open May 16-Dec 16, W & Sa
8a-4p.

www.hollandfarmersmarket.com

Muskegon Farmers Market

700 Yuba, Muskegon, Muskegon Co. Open May 1-
Dec 22, Tu, Th & Sa 6a-3p.

www.muskegonfarmersmarket.com

Sweetwater Local Foods Market

6401 Prairie St., Muskegon, Muskegon Co. Open
year round, Sa 9a-1p.

www.sweetwaterlocalfoodsmarket.org

East-Central Lower Peninsula

Flint Farmers' Market

420 E. Boulevard Dr., Flint, Genesee Co.
Open year round, Tu, Th & Sa 8a-5p.

www.flintfarmersmarket.com.

Central Lower Peninsula

Bath Farmers Market

Bath, Clinton Co. Open year round, Th 3-7p. Nov-Apr
at Bath Community Center. www.bathtownship.us

Lansing City Market

325 City Market Dr., Lansing, Ingham Co. Open year
round, Tu-F 10a-6p, Sa 9a-5p & Su 12-4p.

www.lansingcitymarket.com

Meridian Township Farmers Market

Okemos, Ingham Co. Open year round, Dec-Apr, 1st
and 3rd Sa 10a-3p at Meridian Mall.

www.meridian.mi.us.

Southern Lower Peninsula

City of Springfield Farmers Market

503 Military Ave., Springfield, Calhoun Co. Open
year round, Sa 8a-1p.

www.springfieldmich.com

Downtown Jackson Grand River Farmers Market

Corner of Louis Glick Hwy & Mechanic St., Jackson,
Jackson Co. Open Apr 3-Nov 30, Tu F & Sa 8a-1p.

www.jacksondda.org

Southeast Lower Peninsula

Ann Arbor Farmers Market

315 Detroit St., Ann Arbor, Washtenaw Co. Open
year round, May-Dec, W 7a-3p & Sa 8a-3p, May-Sept
W 4:30-8:30p and Jan-Apr Sa 8a-3p.

www.a2gov.org/market

Detroit Eastern Market

Russell St. btwn Mack & Gratiot, Detroit,
Wayne Co. Open year round, Sa 5a-5p.

www.detroiteasternmarket.com

Monroe Farmers Market

20 E. Willow St., Monroe, Monroe Co. Open year
round, Tu & Sa 6a-12p.

www.farmersmarketmonroe.com

Key for Listings:

Double Up Food Bucks*	WIC Cash Value Benefits
Youth Activities	Cooking Demonstrations
Walking	Biking
Bus	MIFMA Member

*available through November 30 **USDA**

Year End Meeting Evaluation

Monday, November 12, 2012 from 10:00 a.m. to 4:00 p.m. At Cornwell's Turkeyville U.S.A. in Marshall, Michigan 54 Participants, 36 Respondents (67%)

Strongly Disagree Disagree Neither Agree nor Disagree Agree Strongly Agree

1. Overall, I am satisfied with the meeting.

1 Did not answer 25% (9) 72% (26)

2. The networking session in the morning was well organized and helpful.

1 Did not answer 42% (15) 56% (20)

3. Sharing lessons learned from my farmers market and other markets around the state helped me learn ways to improve my farmers market(s).

1 Did not answer 42% (15) 56% (20)

4. The presentation of the data from MIFMA's summer research project helped me understand the barriers that are preventing farmers and markets from beginning to accept food assistance benefits.

17% (6) 50% (18) 33% (12)

5. The presentation on food assistance programs by Amanda Shreve helped me understand the state and national context of our work.

3% (1) 47% (17) 50% (18)

6. Discussing a focus for the Food Assistance Partnership in 2013 helped me understand how the Partnership plans to help my farmers market(s) next year

14% (5) 53% (19) 33% (12)

7. It was helpful to share my experiences with accepting food assistance benefits at my farmers market(s).

1 Did not answer 3% (1) 47% (17) 47% (17)

8. This training session was a valuable learning experience and worth the time I committed to being here today. 1 Did not answer 3% (1) 22% (8) 72% (26)

9. I would recommend this meeting to another farmers market manager who is accepting Bridge Cards at their farmers market.

17% (6) 83% (30)

10. What do you feel was the best part of the meeting?

- (14) Networking
- (9) Group discussions
- (4) The presentation providing a State and National Context
- (4) Sharing ideas with other market managers
- Sharing lessons learned, experiences, challenges and successes with other market managers
- It was nice to meet other managers and talk about their operations
- Discussing a focus for the Partnership in 2013
 - Meeting new market managers
 - Information about FNS application changes
 - How different markets charge for EBT ie. 5% of SNAP and DUFB
 - Getting real information about food assistance benefits
 - Well organized, helpful information
 - Meeting face to face

11. What do you feel could have been improved?

- Time management
- Schedule/time frames- I felt rushed
- Recording of ideas during facilitation
- Regroup more than once
- One more short break
- Not such a long day
- Need copies of presentations
- Networking session was choppy
- Large group brainstorming session for the future
- Last session was too passive; too much sitting around.
- The presentation from the grad student- information many of us already know
- Maybe a pre-meeting questionnaire or survey for market managers to submit questions or needs
- Barriers to seeing the projector
- Better view of the screen and audio
- Room became warm
- Better lighting

12. Please add any additional comments that you feel would be helpful in organizing future events.

- Additional sessions where we can do things together with other markets in the counties we serve
- I will need help in applying for SNAP, etc. for my market
- Looking forward to the 2012 Partnership report!
- More often please!
- Great job
- Thank you MIFMA- you are wonderful!
- Thank you for helping to organize this network!
- Thank you for the information!
- Thank you for all that you do!
- I was pleased with the day.

480 Wilson Road, Room 172 East Lansing, MI 48824 517-432-3381

One of the goals of this survey is to get an accurate representation of the number of SNAP Bridge Card sales that took place at farmers markets in Michigan during 2012. In order to do so, we ask that you wait to complete this survey until you have an accurate and complete figure that shows the number of SNAP Bridge Card sales conducted at your farmers market in 2012.

1. Do you have an accurate and complete record of the number of SNAP Bridge Cards that were conducted at your farmers market in 2012?

Yes

No- Please return to complete the survey once you have an accurate and complete record of the number of SNAP Bridge Card sales that were conducted at your farmers market in 2012. Thank you.

Farmers Market Personnel & Contact Information

2. What is the name of the farmers market(s) for which you are submitting information?

3. Please provide the following information for the primary person responsible for accepting food assistance benefits at your farmers market. This may be the market manager or another individual who coordinates these programs.

Name: Position Title:

Organization: Phone Number:

E-mail Address:

4. Please provide additional contact information for any additional individuals who should receive information about accepting food assistance benefits at your farmers market(s).

Name Email

Survey of Markets Accepting SNAP Bridge Cards

The Michigan Farmers Market Association's Food Assistance Partnership is working to increase consumers' access to healthy, locally grown food through farmers markets across the state. Please complete this survey to help us understand how accepting Bridge Cards affects your farmers market. A few minutes of your time will help us identify future growth opportunities and tell the story of this important work. Thank you!

5. Please provide a mailing address where information about accepting food assistance benefits can be mailed to your farmers market(s).

Name: State:

Address: Zip Code:

City: County:

6. Please provide the web address for the market's website if one is available.

7. Thinking of the primary person responsible for accepting food assistance benefits at your farmers market(s), is that person paid or volunteer? Paid Position Volunteer

8. Please use the space below to share any additional comments or concerns about staffing the food assistance program at your farmers market(s).

SNAP Bridge Card Redemption at Your Farmers Market in 2012

9. Was 2012 the first year your farmers market(s) accepted SNAP Bridge Cards? Yes No

10. For how many weeks this year did your market accept SNAP Bridge Cards?

11. How would you rate your experience with the SNAP Bridge Card program at your farmers market in 2012?

Very Negative Negative Neutral Positive Very Positive

12. What other forms of payment does your farmers market(s) accept? Check all that apply.

Double Up Food Bucks Market FRESH (formerly Senior Project FRESH)

WIC Cash Value Benefits and Summer EBT for Children Debit Cards

WIC Project FRESH Credit Cards

Other, Please describe:

13. How many SNAP Bridge Card **transactions** took place at your farmers market in 2012?

Number of Transactions: We do not collect this information.

14. What was the **dollar value** of SNAP Bridge Card **sales** at your farmers market in 2012?

15. If your farmers market(s) use an alternative redemption system (like wooden tokens), what was the **dollar value** of scrip or tokens **redeemed by farmers/vendors** in 2012? This number will be subtracted from the market's total SNAP sales to calculate the number of unredeemed scrip or tokens still remaining in circulation.

- The farmers market does not use an alternative redemption system
- Dollar value of Scrip/Tokens Redeemed:
- Don't know

16. How many SNAP customers visited your farmers market(s) for the first time this year?

- Number of first-time SNAP Users: We do not collect this information.

17. Please note how 2012 SNAP Bridge Card sales compare to the volume of sales in previous years and what you believe contributed to this change. (If not a first year market.)

Management Practices for SNAP Bridge Card Program

18. What record-keeping method(s) do you use to record SNAP Bridge Card sales and to reimburse vendors? Check all that apply.

- Paper records/ Receipt book
- Microsoft Office Excel
- Quickbooks Accounting Software
- Reports Associated with MobileMarket+ App on iPods
- Other: _____

19. How often does your farmers market reimburse vendors for SNAP Bridge Card sales?

- Once a month
- Once Every Two Weeks
- Once a week
- Daily
- On Demand
- Other, Please Describe: _____

20. Please fill in the table below with the number of people involved and how many hours each month they dedicate to accepting SNAP Bridge Cards at your farmers market(s). Please include time spent conducting transactions, reimbursing farmers/vendors, and any other related activities.

Number of People Involved	Approximate Total Hours Per Month
Paid Positions	Volunteers

21. Please select the option that best describes how your farmers market facilitates SNAP Bridge Card transactions.

- Through a central, hard-wired point-of-sale device and token or scrip system
- Through a central, wireless point-of-sale device and token or scrip system
- Each farmer/vendor is equipped with their own wireless point-of-sale device
- Each farmer/vendor is equipped with an iDevice (like an iPod Touch) and the MobileMarket+ App

22. If your market uses a central, wireless point-of-sale device, would you recommend other farmers markets work with the same third party processor (the company that provides and services your point-of-sale device) that you did in 2012?

- No, Why?:
- Yes, Please provide the company's name and contact information?

23. Please use the space below to share any additional comments or concerns about point-of-sale devices or third party processors.

Vendor Participation in the SNAP Bridge Card Program

24. How does your farmers market support vendor participation in the SNAP Bridge Card program?

- Vendor participation is voluntary
- Vendor participation is encouraged
- Vendor participation is strongly recommended
- All eligible vendors are required to participate

25. At your farmers market, how many vendors are eligible to accept SNAP Bridge Cards?

26. Of those vendors that are eligible, how many accept SNAP Bridge Cards? (Do not ask if all eligible vendors are required to participate.)

27. Do all of the vendors that accept SNAP Bridge Cards sign a participation agreement with your farmers market in order to do so? (Ask only first year markets)

Yes	No
-----	----

Consumer Outreach Strategies

28. Please rank the following consumer outreach strategies to indicate how effective they are for increasing SNAP Bridge Card utilization at your farmers market. Number 1 would be the most important strategy, while number 10 is the least important strategy.

- | | |
|----------------------------------------------|-------------------------------------------------|
| ___ Signage & Banners | ___ Website |
| ___ Working with Community Partners | ___ Radio |
| ___ Word of Mouth | ___ Social Media (i.e. Facebook and/or Twitter) |
| ___ Print Media (i.e. Flyers & Posters) | ___ Other: _____ |
| ___ Newspapers | ___ Other: _____ |
| ___ A Market Newsletter | ___ Other: _____ |
| ___ Holding Educational Events at the Market | |

29. Please describe any new and/or innovative outreach strategies used by your farmers market to increase the number of food assistance clients shopping at your farmers market.

30. Please use the space below to share any additional comments or concerns about SNAP Bridge Card acceptance at your farmers market in 2012.

Participation in Double Up Food Bucks (Ask only if DUFb was selected in question number 12)

31. Please select the option that best describes how your market participated in the Double Up Food Bucks program this year.

- Through a token based system
- Each Vendor used an iPod Touch and DUFBA app
- Each Vendor used a wireless point-of-sale device
- Other, Please describe:

32. How would you rate your experience with the Double Up Food Bucks Program in 2011? One represents a negative experience and five represents a very positive experience.

Very Negative; Negative; Neutral; Positive; Very Positive

33. Please use the space below to share any additional comments or concerns about SNAP incentive programs at farmers markets including the Double Up Food Bucks program.

Present and Future Market Involvement

34. What topics would you like to see covered in future educational offerings from MIFMA's Food Assistance Partnership or what additional information do you need to facilitate a successful food assistance program at your farmers market?

35. Are you, or is your farmers market, a member of MIFMA?

- Yes, my farmers market is a member of MIFMA
- Yes, as an individual I am a member of MIFMA
- No, neither my farmers market nor I are members of MIFMA

36. (If no) What has prevented you or your market from joining the Michigan Farmers Market Association?

37. Do you plan to sign a 2012 Commitment Form in order to receive information from and be recognized as a partner of MIFMA's Food Assistance Partnership?

- Yes, please send me a 2013 Commitment Form.
- No, I'm not interested in receiving information from MIFMA's Food Assistance Partnership.
- I'm not sure, I need more information.

Please use the space below to share any additional comments or suggestions with MIFMA's Food Assistance Partnership.

You can return this questionnaire by email to amanda@mifma.org, by fax to 517-353-7961 or by mail to:

MIFMA, 480 Wilson Road, Room 172, East Lansing, MI 48824

PROJECT TITLE

MI Food & Farming System-Enhancing the Profitability of MI Specialty Crops in Underserved Communities through Retail, Wholesale, and Institutional Channels and Continuous Education - FINAL

PROJECT SUMMARY

While specialty crop producers are taking steps to keep their food crops safe, we have learned from our previous good agricultural practices (GAPs) training session evaluations, farmer surveys, and conversations with growers that there is still confusion about what a good traceability plan is for their farm and how to do it cost-effectively. Additionally, we have learned that by providing a venue and forum, growers are more successful in establishing and building relationships with buyers of specialty crops.

PROJECT APPROACH

Our project activities were completed in partnership with a diverse group of industry representatives, including:

- Four Seasons Cooperative (On Farm Mock Audit)
- Michigan Department of Agriculture & Rural Development (MDARD)
- Michigan Farmers Market Association
- MSU Extension
- MSU Product Center for Agriculture and Natural Resources
- Michigan Vegetable Council
- Great Lakes Fruit, Vegetable & Farm Market Expo,
- Various retail, wholesale, and institutional specialty crop buyers

Several project activities were carried out to enhance the competitiveness of specialty crop producers, including developing and delivering workshops and a food safety website that provided growers with information on the latest food safety research and trends. These enabled growers to make appropriate adjustments to their operations. In our workshops and on our food safety website (created with previous SCBG funds), we also provided current information and resources on traceability to support growers in developing and implementing GAPs and/or GHPs through an on-farm food safety plan. We convened a workgroup to study best practices for group and greenhouse audits and developed and conducted a USDA Good Agricultural Practices (GAP) group audit for smaller growers with our project partner, Four Season Cooperative. Finally, we provided specialty crop producers a venue to meet with buyers at retail and wholesale institutions and increase their market share of the expanding fresh and local produce market.

The curriculum that was used for the sessions was developed using the USDA- Good Agricultural and Handling Practices (GAP or GHP) standards.

For a detailed explanation of both qualitative and quantitative project results and accomplishments, please refer to "*Table 1. Summary of Evaluation Plan and Activities*". The participant surveys from workshops indicate that 99% are confident enough to put together a traceability plan, 95% have a better understanding of how important traceability is for a farm operation and 100% have a better understanding of why traceability is important from a buyers perspective. Approximately 60% of participants will develop a traceability plan in the next 0-3 months, approximately 20% in the next 4-6 months, 12.5% in 7+ months, and 5.26% will not create a plan.

Survey results from the Meet the Buyer event indicated that 100% of buyers have increased access to fruit and vegetable producers; 75% of buyers agree that they have a stronger relationship with Michigan growers; 50% of buyers surveyed indicate that over the past five years they've had an increase of 6-10% in expenditures of MI fruits and vegetables and half expect to increase the number of MI fruit and vegetable producers with whom they do business. Approximately 75% of buyers surveyed purchase from 20-25 Michigan producers annually

Of significant importance is one long time participants (buyer) expectation to increase annual purchases of Michigan grown specialty crops by 11% or more.

Summary of Evaluation Plan and Activities

Program Goals	Indicators (outcomes/outputs)	Data Source	Performance Standard	Results
Convene a workgroup to study a group audit/pilot and develop hoop house food safety plans.	Research models Identify new partners Understand growers needs	Meeting minutes	Meet monthly for planning,	The workgroup and leadership from Four Seasons Cooperative (FSC) discovered that their membership needed to learn about food safety plans and the auditing process before trying to develop a group model.
Conduct farm safety workshops on traceability	75 participants -Two educational sessions -Increased confidence in ability to complete farm food safety plans. -Increased number of growers who complete farm food safety plans, self audits, certified audits -Increased knowledge of GAP	-Attendance lists -Pre and post workshop evaluation	2 traditional workshops 54 participants	56% currently have a traceability plan (pre survey) 99% are confident enough to put together a traceability plan 95% have a better understanding of how important traceability is for a farm operation and 100% have a better understanding why traceability is important from a buyers perspective 60% of participants will develop a traceability plan in the next 0-3 months, approximately 20% in the next 4-6 months, 12.5% in 7+ months, and 5.26% will not create a plan.
Conduct a Meet the Buyer event at the Great Lakes Expo.	-Buyers have increased access to fruit and vegetable producers. -Buyers have a stronger relationship with Michigan growers -Increased number of growers who have increased sales. - Increase expenditures of MI fruits and vegetables from the buyer group. -Increase the number of producers that buyers do business with.	-Attendance lists -Dot Survey -Meet with select buyers and conduct statistical sampling of attendees (MSU)	300 participants 15 buyers representatives -Growers meet 1-3 buyers -Increase f/v expenditures by 5% -Increase number of buyers purchasing from MI growers by 10%. -50% of growers strengthen relationships. -15% of the producers increase their sales to the buyer institutions.	15 buyer representatives Over 400 growers 100% of buyers indicated they have increased access to fruit and vegetable producers. 75% of buyers agree that they have a stronger relationship with Michigan growers , 50% of buyers surveyed indicate that over the past 5 years they've had an increase of 6-10% in expenditures of MI fruits and vegetables and half expect to increase the number of Mi fruit and vegetable producers with whom they do business. One long time attendee expects to increase annual purchases by 11% or more. 75% of buyers surveyed purchase from 20-25 Michigan producers annually
Develop and pilot a group food safety audit process.	A model for cooperative members and greenhouse growers to complete a group food safety plan and audit. Compare/contrast GlobalGap Option 2	-Completed food safety plan. -Interview with key leaders of the cooperative.	One group food safety plan could be successfully developed. Reduced cost of audits for growers. NOTE: When Four Seasons Cooperative (FSC) discovered that their membership needed to learn about food safety plans and the auditing process first, they decide to conduct one educational session and two	After mock audits were completed, members rated their understanding and knowledge of food safety plans, understanding and knowledge of on-farm audits, and confidence in ability to write a food safety plan as 6 on a scale of 1 to 7 (with 7 being the highest score). 86% of participants agreed that the on-farm mock audits were helpful or extremely helpful. Leadership at FSC identified the development of a Whole Farm Food Safety Certification process for individual members as their number one need. Additionally, the cooperative needs to 1) hire a market coordinator, 2) develop an integrated distribution network, and 3) scale up production to serve a larger quantity of smaller customers or increase volume and

			mock audits in lieu of developing a group model.	decrease prices to attract institutional customers to enhance individual farm profitability and invest in GAP certification.
Improve the Farm Safety website	-Increased number of growers utilizing farm food safety materials and resources -Increased variety (hoop houses, cooperatives, etc) of growers utilizing farm food safety materials and resources.	Count # of hits	Visitor hits will increase 20% from previous year.	Traceability information was added to the food safety website. According to Google Analytics, hits from January to the beginning of October were approximately 20% higher than visitor usage on www.miffs.org in the previous year.
Strengthen relationships between MIFFS and partners supporting food safety education.	-Past and current stakeholders will continue to partner with MIFFS and support ongoing food safety efforts. -Stakeholders will continue to promote activities. -New partners will emerge	-promotion on websites -participation on planning team -attendance at workshops -Interview partners	Partners will indicate a stronger relationship with MIFFS. One new partner	Four Seasons Cooperative members indicated a strengthened relationship with MIFFS and identified two new partners (Center for Environmental Farming Systems and United Fresh) to collaborate on future work in group food safety audits
Enhance the ability of specialty crop growers to expand into new or existing markets	Provide timely and important farm food safety information and trends. -Provide opportunities to meet buyers of specialty crops.	-Meet the Buyer survey results -Website hits	(Long term) 5,000 specialty crop producers using food safety website.	As of October 9, 2012 visitor count on the food safety website is 600 for a total of 1,100 over two years.

Table 1. Summary of Evaluation Plan and Results

GOALS AND OUTCOMES ACHIEVED

The goals of this ongoing project were to 1) reduce the risks of microbial contamination of fruits and vegetables produced by Michigan's specialty crop growers and 2) increase profitability of growers through reducing costs and increasing market access.

This was the second year of providing educational workshops and web-based resources to growers to improve their ability to assess risks and write on farm food safety plans. The workshops and website provide free advice and resources, whereas growers would have to pay for a mock audit to get the same information. This was the fourth year of conducting a Meet the Buyer Event to link growers to buyers and increase market access.

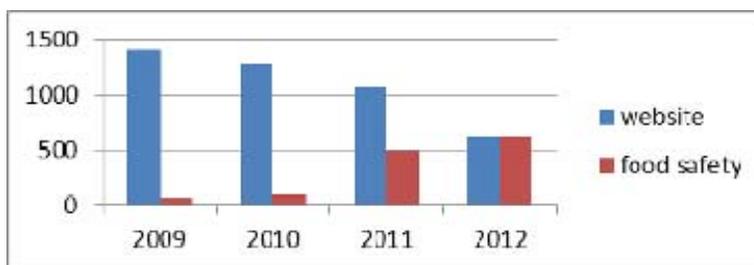
Goal	Baseline	Activity	Short and Long term Results
Develop and pilot a group food safety audit process	None – no group model exists.	Conduct a group audit	When Four Seasons Cooperative (FSC) discovered that their membership had no baseline knowledge about food safety plans and the auditing process, they decided to conduct one educational session and two mock audits in lieu of developing a group model. They identified partners to develop a group process in the future.
Teach 75 growers about traceability		Conduct two farm safety workshops on traceability	54 growers attended
Reduce the risks of microbial contamination and improve the ability of farmers to access risk.	495 hits on farm safety pages of www.miffs.org	Improve the farm safety website	Traceability information was added to the food safety website and hits were approximately 20% higher than visitor usage on the host website (www.miffs.org) in the previous year
Open market access for growers by introducing them to buyers	12 buyers 300 growers	Conduct a Meet the Buyer event	12 buyers Over 400 growers

Table 2: Summary of Major Goals and Related Outcomes

Project Accomplishments

Workshop attendance was down slightly in 2012, but over a four year period we have impacted nearly 400 growers, or 25% of 1,500 specialty crop growers in Michigan. Several other entities now conduct workshops on food safety and growers can obtain resources on the food safety website in lieu of attending a workshop. To count the number of growers using [Michigan Farm and Food Safety](http://www.mifarmfoodsafety.org/) <http://www.mifarmfoodsafety.org/> (launched at the end of 2011), MIFFS used Google Analytics. According to website tracking systems, hits on this new food safety website over the past nine months (Jan 1, 2012 –October 9, 2012) were slightly over 500, or about 20% higher than the previous year (visitors viewing farm safety information on [Michigan Food & Farming Systems - MIFFS](http://www.miffs.org/) <http://www.miffs.org/>). Approximately 23% of the visitors viewed the resources and tools content.

Results of the Meet the Buyer event were better than anticipated. We used a Dot Survey to collect data from growers as they exited the event. The number of buyers and grower participants continues to increase annually and data indicates that almost half (49%) of growers met 3-5



buyers and 17% of growers had a 1-8% increase in sales from the previous year. If not for the Meet the Buyer event, 18% of growers would not have access to buyers, which justifies the need for this ongoing event. Additionally, 75% of buyers agree that they have a stronger relationship with Michigan growers. Additional buyer survey results are summarized in the “Project Approach” section above.

Outcomes for the group audit were different than anticipated. Since cooperative membership had no baseline knowledge about food safety plans and the auditing process, we conducted one educational session and two mock audits in lieu of developing a group model. Survey data from the mock audit demonstrated that 86% of participants indicated that the on-farm mock audits were helpful or extremely helpful. Leadership at FSC identified the development of a Whole Farm Food Safety Certification process for individual members as their number one need. Additionally, the cooperative needs to 1) hire a market coordinator, 2) develop an

integrated distribution network, and 3) scale up production to serve a larger quantity of smaller customers or increase volume and decrease prices to attract institutional customers that will ultimately enhance individual farm profitability and allow them to invest in GAP certification.

BENEFICIARIES

This project benefitted individual specialty crop growers who were either looking for new market opportunities, or who needed technical assistance to enter specific markets. It also benefitted a group of growers (Four Seasons Cooperative) who were seeking low cost alternatives to an on farm audit.

Workshop participant survey responses indicate that over 92% of them plan to complete a food safety plan, and 60% of them within three months of attending the traceability workshop.

LESSONS LEARNED

- Food Safety Plans not a “One Size Fits All”

There isn't a single, effective approach for educating specialty crop growers on how to write a food safety plan. When operations range from a few crops to many varieties of fruits and vegetables, growers have difficulties understanding and translating the requirements for their particular situation. Interviews with cooperative members revealed their desire for USDA to use a more holistic approach and/or create more models for teaching purposes using different farming scenarios. The development of a Whole Farm Audit would be most economical for diverse, specialty crop growers and eliminate the duplicate expenses incurred by requiring an audit when each crop is harvested.

- History of Food Recalls Important

Based on questions from the first workshop conducted, MIFFS added a presenter from the health department to their second traceability workshop. Producers wanted a better understanding of how a food recall was started and the process that helped determine where the error occurred. Participants were satisfied with the answers provided in this segment and MIFFS will consider adding that topic to future traceability sessions.

- Teach Food Safety from a Local Point of View

From the lesson above, talking about the importance of local food and how businesses and their customers are assured safe food is a new angle that MIFFS could consider in future projects. With the increased number of municipalities and townships getting involved in the development of local food systems, MIFFS could expand their educational objectives to include local planners, township officials, and zoning administrators in understanding how GAP requirements and certification could impact their local producers and community goals.

- Understand the Needs of Your Target Audience

When MIFFS agreed to develop a food safety model for cooperatives, they had not taken into consideration that their target audience (members of a cooperative) were unfamiliar with food safety plans and the auditing process. One participant stated that, “*there seems to be a tendency for food and farming organizations to miss the boat when working with small farmers... to not thoroughly understand our needs. We already had large buyers and they don't require us to be GAP certified*”. Overcoming a lack of knowledge and awareness about food safety requirements and the certification process was a necessary first step to give growers information and tools for the future, but many felt that they weren't ready for that step. It is readily assumed that institutional buyers will require growers to become GAP certified in the future, but the volume of purchases must increase first for growers to justify the costs associated with that practice.

- On Farm Mock Audits Valuable Teaching Tool

MIFFS conducted two on-farm mock audits in this grant cycle and from an interactive evaluation exercise, learned that the session was helpful or extremely helpful to 86% of participants. Mock audits continue to be a valuable teaching tool as confirmed by 100% of participants who responded that “they now know 1-2 things that will cause an automatic audit stop”, they have “expanded understanding of water issues on the farm”, and they “could give an initial explanation (of GAP) to someone else” as a result of attending a session. Additionally, 60% of participants responded positively that “knowledge (about points/area in the audit) will cause you to make improvements in your practices”. This result demonstrates that on farm mock audits are impacting future behavior. The recommendation going forward is that a participatory evaluation exercise be conducted immediately after each on-farm mock audit session to continue monitoring effectiveness.

Conclusions and Recommendations

This grant project was year four of a multi-year approach to educate specialty crop producers on food safety topics. With the exception of writing a food safety plan for a cooperative, MIFFS completed their plan of work within the time frame allotted, including a Meet the Buyer event, two traceability workshops, enhancements to the food safety website, and an additional educational workshop and two on-farm mock audits for members of Four Seasons Cooperative.

Demographic information from workshop evaluations indicates that participants are split almost equal between fruit and vegetable farms. No data on farm size was collected this year (previously, approximately 65% were farming 100 acres or less). No data was obtained on number of participants who are currently GAP certified to compare to previous year - the only one collecting this data is the MSU Extension Educator who conducts the workshops. He works with approximately 5% of the growers who attend MIFFS sponsored workshops because they are small farms who lack resources to do so.

Attendance at traceability workshops was slightly lower than predicted (75% of target) this past year, but post workshop surveys indicated that *93% of workshop participants know what resources are available to develop traceability plans in the future*. When you consider that 60% of participants already had a traceability plan and the main reason for attending was to obtain information, (*20% of participants attended to learn how to create a traceability plan, 38% attended to improve their existing traceability plan, and approximately 40% want to learn more about traceability*) it appears that the educational sessions and the website are filling a void for Michigan producers who are willing to do the paperwork, but want assurance that they are in compliance with this process.

An important issue that has been identified is the need to expand the number of food safety experts in Michigan. Currently, there is one staff person with MSU Extension who is considered to be the state-wide expert in food safety issues. Resource should be secured and allocated to ensure that Michigan has more educators who have knowledge and job responsibilities in this area.

In the future, MIFFS needs to conduct a more thorough needs analysis with intended audiences and beneficiaries to help identify and address discrepancies in market readiness. This step will ensure that grant activities are timely and appropriate for the intended audience. It continues to be a challenging endeavor to identify ways and means to assist producers and now, producer groups, in writing farm safety plans and preparing for certification, but these venues allow growers to continually learn from each other. The on-farm mock audits were especially helpful, but growers still find it hard to apply a single model to their own unique situations.

MIFFS had two unexpected outcomes, including an interest from Center for Environmental Farming Systems (CEFS) and United Fresh, an independent auditor, to pursue a Whole Farm audit with Four Seasons Cooperative. Additionally, MDARD Director requested that MIFFS assist in creating an online program to help farmers become USDA GAP, ISO 9000 and MAEAP certified with one central computer program. Currently no such “one stop” certification program exists.

CONTACT PERSON

Contact Person for the Project – Michelle Napier Dunnings, Executive Director
Telephone Number: 517.432.0712
Email Address: michelle@miffs.org

ADDITIONAL INFORMATION

Evaluation Tools

1. Food Safety Mock Audit Evaluation – Annotated

Educational Materials

- a. Good Agricultural Practices.ppt (MSUE)
- b. USDA Audit
- c. Good Agricultural Practices (GAP) and Good Handling Practices (GHP) Internet Resources
- d. Food Safety Auditors (MSU Product Center)
- e. Checklist of Potential On-Farm Food Safety Risk (MSUE)
- f. Creating a Field Map with Google Maps (MSUE)
- g. Illustrated Guide to Growing Safe Produce on Your Farm (National Sustainable Agriculture Information Service).
- h. GAP material (Du Russels' Potato Farms Inc.)
- i. Wholesale Success Manual (Family Farmed.org)
- j. Sample Audit (MSUE and Michigan Agriculture Commodity Marketing Association-Apple Division.)

Four Seasons Produce Co-op Food Safety Mock Audit

Monday, July 30, 2012

On Site Evaluation Results

Facilitated and documented by Michelle Napier-Dunnings, MIFFS ED

Approximately 15 of the 18 participant's engaged in the evaluation and responded to a question by raising his/her hand or moving in a designated direction.

Question #1

- a. Before today, were you aware of all the items in the USDA GAP audit?
- b. Did you get a better overall understanding of the reason for an audit?
- c. Could you give an initial explanation to someone else?

Question #2

- a. Before today, how many knew what would automatically cause an auditor to stop?
- b. Do you now know 1-2 things that will cause an automatic stop?
- c. Do you now know 3 or more things that will cause an automatic stop?

Question #3

- a. Before today, had you considered the extent of water issues on the farm?
- b. Did today expand your understanding of water issues on the farm?
- c. Did today significantly expand your understanding of water issues?

Question #4

- a. Before today, were you aware of all the health & hygiene standards?
- b. Did you learn 1-2 additional items?
- c. Did you learn more than 3?

Question #5

- a. Before today, did you know how many points per area were awarded in the audit?
- b. Did you learn 1-2 situations in which the points are higher?
- c. Will that knowledge cause you to make improvements in your practices?

Question #6

On a scale from 1-5, 1 being low (this was a waste of time) and 5 being high (great investment of time), how would you rank today's session?

Each answer has a total potential of 15 responses

1a)	1	.06%
1b)	13	86%
1c)	15	100%

2a)	1	.06%
2b)	15	100%
2c)	7	47%

3a)	11	73%
3b)	15	100%
3c)	3	20%

4a)	9	60%
4b)	13	86%
4c)	9	60%

5a)	1	.06%
5b)	14	93%
5c)	9	60%

Low 0 @ 1
 0 @ 2
 2 people @ 3
 5 people @ 4
 High 7 people @ 5
 86% said it was a good investment of time

(NOTE: 14 people participated in question #6)

PROJECT TITLE
MI Apple Committee-Promoting Fresh & Processed Apples in Chicago and Targeted Restaurant Groups - FINAL



PROJECT SUMMARY

The initial purpose of this project was to utilize \$40,000 to further develop customer loyalty for fresh Michigan apples in the produce departments of targeted stores in the western Chicago suburbs and to spend \$35,000 to make Michigan processed apples more prominent in the restaurant trade. In 2013 a change of scope on this project was granted replacing some of the processed components with activities to promote fresh Michigan apples in the target market of Detroit.

Research paid for by Michigan apple grower dollars found that 45-50 percent of Chicagoans surveyed said they preferred Michigan apples, yet only 14 percent of them purchased Michigan apples. This gap is attributed to the inability to identify Michigan apples in store and the lack of tray-packed (non-bagged) Michigan apples in the stores. Focus groups conducted in Chicago suburbs and Detroit suburbs support the same two challenges. The fresh apple promotions conducted through this grant aim to address the challenge of making Michigan apples more identifiable in the stores through promotion that draws attention to Michigan apples.

Prior work funded by SCBG funds in Chicago has allowed MAC to build on that work and continue to have a strong presence in the western suburbs of Chicago. The focus on the Detroit market, which is a target market for MAC, has not been funded with SCBG funds in the past, but will continue to be a strong focus for MAC marketing efforts. Additionally, grant funded efforts in Detroit and Chicago have been especially important in 2013, as Michigan apples were completely out of the marketplace in 2012 due to the crop loss.

PROJECT APPROACH

Activities and tasks performed in both markets during the grant period include creative in-store activities, special events, and radio use in Chicago and creative in-store activities, social media and text marketing, and radio use in Detroit. Creative in-store activities included 27 in-store chef demonstrations in Chicago and 31 chef demonstrations in Detroit. In Chicago, special events with WTMX and WILV radio remotes took place, one at an Oktoberfest event in Naperville and one at a Mariano's Retail Store in Arlington Heights. In Detroit, MAC partnered with Detroit Metro Parent on a Facebook contest and a campaign for Detroit consumers to opt in to a text messaging program. MAC also participated in in-store radio advertising at a major retailer in the Chicago market.

These activities created a great deal of excitement amongst consumers in the target markets. We find that the greatest impact comes with special events at the point of sale, where we can increase the interest in Michigan apples and their uses, and shoppers can pick them up right there and place them in their carts. Additionally, using the media to generate awareness of the product adds to the in-store excitement.

GOALS AND OUTCOMES ACHIEVED

In the Chicago market, MAC completed the following activities:

- Creative in-store activities – in Chicago, MAC completed 27 in-store chef demos. MAC works with the retailers to secure a demo position near the Michigan apple display. Chefs estimate interacting with 20 – 60 shoppers per demo, meaning interaction about Michigan apples with, at minimum, 540 shoppers while they are in the produce section of the store. In addition, total 332 “Pure Michigan Apples” bins were distributed to stores in Chicago, helping to differentiate Michigan product within the stores. Kwik Loks, marked with Michigan’s “Pure Michigan Apples” and Locally Grown messaging, also were used in Chicago stores. In fact four out of eight Michigan Apple Shippers participated in the Kwik Lok program for Fall 2013.
- Special events – MAC worked with WTMX and WILV (Hubbard Radio Group) in Chicago to promote locally grown Michigan apples at two events in the western suburbs. The WTMX “Road Crew” promoted and sampled Michigan Apples at an Oktoberfest event in Naperville on October 5, and the WILV “Road Crew” broadcasted live from Mariano’s in Arlington Heights on October 11.
- Radio/Video Use – MAC purchased in-store radio with one major retailer (73 stores) in the Chicago market. In addition, MAC partnered with Pure Michigan to run radio ads in the Chicago market in October. As a part of this partnership, Pure Michigan matches MAC’s ad buy commitment dollar for dollar, getting MAC \$150,000 worth of radio ads in this market.

For the processed apple portion of the grant:

- Recipe Development – prior to receiving a change of scope, MAC worked with an individual to develop appetizer and dessert recipes.
- Recipe Photography/Styling – prior to receiving a change of scope, MAC worked with a photographer and food stylist to photograph the recipes that were developed.
- Recipe Layout/Printing – prior to receiving a change of scope, MAC produced and printed recipe cards featuring the recipes that were developed.

In the Detroit market, MAC completed the following activities:

- Creative in-store activities - in Detroit, MAC completed 31 in-store chef demos. MAC works with the retailers to secure a demo position near the Michigan apple display. Chefs estimate interacting with 20 – 60 shoppers per demo, meaning interaction about Michigan apples with, at minimum, 620 shoppers while they are in the produce section of the store. In addition, total 160 “Pure Michigan Apples” bins were distributed to stores in Detroit, helping to differentiate Michigan product within the stores. Kwik Loks, marked with Michigan’s “Pure Michigan Apples” and Locally Grown messaging, also were used in Detroit stores. In fact four out of eight Michigan Apple Shippers participated in the Kwik Lok program for Fall 2013.
- Social media marketing – MAC partnered with a Detroit media outlet to implement a contest on the social media platform Facebook. During the month of October, we collected 465 contest entries and increased our Facebook likes by 433. The email addresses and other data is MAC’s to use indefinitely.
- Text Marketing – MAC worked with a text marketing firm to target Detroit-area consumers with text messages about Locally Grown and the October social media contest. We collected 78 opt-ins and zero of those have opted out of the program. 80% of those users possess Detroit-area area codes (313, 248, 586, 734).
- In addition, MAC partnered with Pure Michigan to run radio ads in the Detroit market in October. As a part of this partnership, Pure Michigan matches MAC’s ad buy commitment dollar for dollar, getting MAC \$50,000 worth of radio ads in this market.

In regards to long term outcome measures, certainly past SCBG funds focused on the Chicago market have been helpful to us as we go forward. It takes years to achieve market penetration, but we are making headway each year. In 2012, some ground was lost due to the crop loss, but we believe the efforts described here have moved us forward in 2013, by raising interest in the 2013 record-sized crop. Data we collected from Michigan apple shippers shows that 146,927 cases of Michigan apples were shipped to the Chicago market in October, and 66,169 cases of Michigan apples were shipped to the Detroit market in October. This data sets a baseline for us to measure against in future years, and of course, it is a great increase in the amount that was distributed in 2012, which was basically zero.

Comparison of actual accomplishments and goals established:

MAC established the goal of helping consumers identify Michigan apples in the marketplace, through in-store activities in 90 targeted stores.

In Chicago, in-store activities included in-store chef demos, Pure Michigan Apples bins, and Kwik Lok bag tags with the Locally Grown message. In-store chef demos were conducted in 27

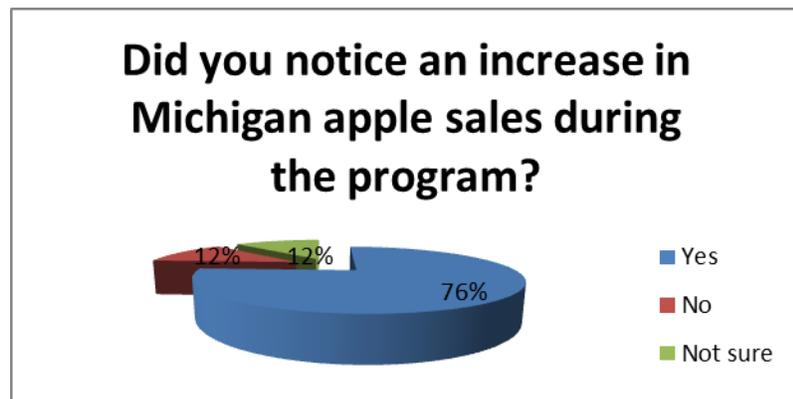
Chicago stores, 332 bins were utilized in Chicago stores and Kwik Loks were used by four out of the five Michigan Apple Shippers who supply Chicago.

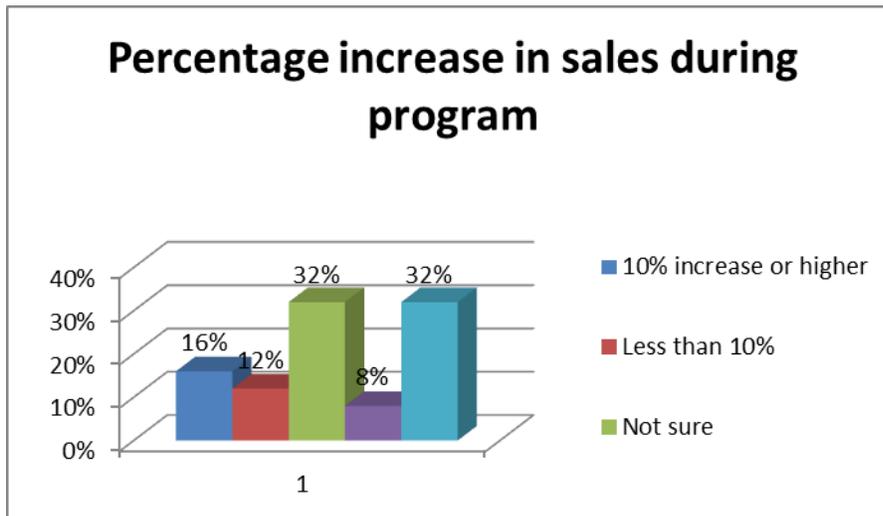
In Detroit, in-store activities included in-store chef demos, Pure Michigan Apples bins and Kwik Lok bag tags with the Locally Grown message. In-store chef demos were conducted in 31 Detroit stores, 160 bins were utilized in Detroit stores and Kwik Loks were used by four of the Michigan Apple Shippers who supply Detroit.

In Detroit, MAC focused on a social media and text marketing campaign encouraging consumers to buy Michigan grown apples. During the month of October, we collected 465 contest entries and increased our Facebook likes by 433. MAC also worked with a text marketing firm to target Detroit-area consumers with text messages about Locally Grown and the October social media contest. We collected 78 opt-ins and zero of those have opted out of the program. Eighty percent of those users possess Detroit-area area codes (313, 248, 586, 734). The text marketing piece is intriguing as a way to communicate with consumers. They opt-in, showing an interest in our product, and we engage them from there. We are pleased to have this additional way to touch consumers and remind them to look for Michigan apples in stores. This new program provides yet another baseline with which to begin measurement.

MAC also sent a follow-up survey to the retailers who participated in the in-store activities mentioned above, in both the Chicago and Detroit markets. With a 42% response rate, the surveys asked questions of the produce manager in the store about their perceptions of the effectiveness of the in-store tactics. Ninety-six percent of the respondents felt that the Locally Grown in-store program was somewhat or very effective, with 52 percent indicating the program was very effective. Also, 16 percent of respondents said they saw a 10 percent or higher increase in Michigan apple sales at their stores (see graphs below).

Key Retailer Survey Results





MAC inquired to Michigan apple shippers about shipments to the Chicago and Detroit markets in the month of October 2013. Shippers sent 66,169 cases of Michigan apples to the Detroit market in October, and 146,927 cases were sent to Chicago. Due to 2012's crop loss, this 2013 data will be MAC's benchmark going forward.

Again, the 2012 crop loss meant an absence from the marketplace for over a year. Therefore, the baseline data was zero. This project allowed us to gather new baseline data which we can utilize in future efforts.

BENEFICIARIES

The beneficiaries of this SCBG funded project are Michigan's 850 apple growers, as well as Michigan apple shippers.

Important quantitative data that concerns Michigan's apple growers and shippers would be data such as the movement numbers to the Detroit and Chicago markets. From the survey to retailers, 96 percent of the respondents felt that the Locally Grown in-store program was somewhat or very effective, with 52 percent indicating the program was very effective. Also, 16 percent of respondents said they saw a 10 percent or higher increase in Michigan apple sales at their stores.

Michigan apple shippers sent 66,169 cases of Michigan apples to the Detroit market in October, and 146,927 cases were sent to Chicago.

To put an economic impact on this project would be nearly impossible, since MAC is not a sales organization. That said, based on smaller-sized crops of the past, it has been estimated that the Michigan apple industry has had a \$700 – 900 million economic impact on the state's economy, so it would stand to reason that with a 30 million bushel crop, that number would be higher.

LESSONS LEARNED

There are many lessons learned with a project such as this. We continue to find that in-store efforts and special events are received well by consumers. They particularly like the face-to-face engagement of the in-store chef demos. We have also found that bins, Kwik-Loks and other signage helps to differentiate Michigan product from apples from outside Michigan. Our consumer research continues to show that consumers want apples to be clearly marked as grown in Michigan.

Some challenges we encountered included in-store execution of the program. As may be expected, it can sometimes be difficult to rely on someone from outside your organization to implement a portion of your program, who may have little interest or investment in the program.

This project was also our first foray into text marketing, as well as involvement in a Facebook contest with an outside partner. The text marketing piece is intriguing as a way to communicate with consumers. They opt-in, showing an interest in our product, and we can engage them from there. However, the partnership on the Facebook contest turned out to be disappointing. We did not achieve as much consumer data or Facebook “likes” as we expected. Also, the contest took over our Facebook page during our busiest marketing month, when we could have been using it for other messages.

As mentioned above, one unexpected outcome of the project was less social media engagement through the Detroit media partnership Facebook contest. We estimated that we would acquire a list of 1,000 consumers through data collection from the social media effort combined with the text marketing campaign. However, we only collected a list of 543 consumers. In the future, we may be better served to cast a “wider net” and work with a media outlet with a larger reader/viewer base.

CONTACT PERSON

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ADDITIONAL INFORMATION

**Photos from Creative In-Store Activities, Special Events
Locally Grown Kwik Lok Bag Tag**



WTMX and WILV Radio Events in Chicago



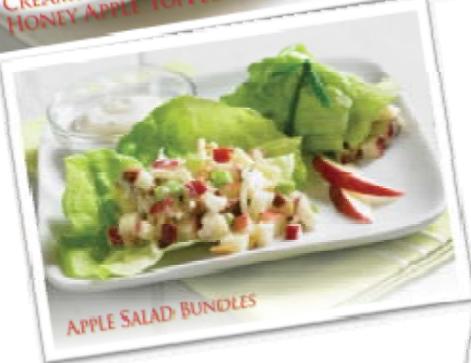


Pure Michigan Apple Bins

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CREAMY BLUE CHEESE AND HONEY APPLE TOPPED CROSTINI



APPLE SALAD BUNDLES

Creamy Blue Cheese and Honey Apple Topped Crostini

- 1 lb. part skim ricotta cheese
- 3 oz. crumbled blue cheese
- 2 tbsp. chopped fresh basil
- 1 tbsp. honey
- 1/4 tsp. ground black pepper
- 4 tbsp. olive oil
- 24 mini sliced baguette
- 36 unpeeled core'd thin sliced Michigan McIntosh or Northern Spy apples
- 26 small fresh basil leaves

Combine all ingredients except olive oil, cream and apple slices. Refrigerate at least 2 hours.

Preheat convection oven to 375°F. Brush one side of each baguette slice lightly with oil. Place on a full sheet pan. Bake 4-5 minutes or until toasted. Cool.

For each serving, top 2 crostini with 1 tbsp. apple mixture, 1 apple slice and 1 fresh basil leaf each. Place next to each.

Makes 12 servings (3 crostini each)

Copyright © 2017 Michigan Apple Growers | MichiganApples.com PURE MICHIGAN MICHIGAN APPLES



SPICY APPLE GLAZED MEATBALL SKEWERS

Recipe Cards Examples

Chicago and Detroit In-Store Chef Demos



Online (Facebook) Art and Magazine Ad Promoting Facebook Contest



PROJECT TITLE

MI Potato Industry Commission-Expansion and Programming of MI State University's Enviro-Weather Network to Facilitate Loss Reduction in Potatoes - FINAL

PROJECT SUMMARY

The Michigan potato industry suffers losses of \$1.5 to \$2.5 million each year due to weather-induced crop stress (particularly excessive heat) that cause potatoes to deteriorate in storage. Improved access to information on local weather conditions would enable growers to identify these stresses and to take steps to ameliorate those effects. Growers could also better understand the physiological condition of their potatoes at harvest and make more informed decisions about when to send potatoes to market (before quality deterioration occurs). Michigan State University's Enviro-weather program provides access to local weather data and information through its website: www.enviroweather.msu.edu. Enviro-weather operates a

network of weather stations across Michigan that record, display and archive local weather data. The data is used in on-line tools and applications to help growers with decision-making. For example, the potato “Heat Stress Summary” table shows an overview of yearly crop stress by displaying the number of heat stress events each year. However, much of the Michigan potato-growing region was outside of the range of existing stations. This project involved purchase and installation of four additional weather stations in potato growing regions of Michigan (Mecosta, MI, Kalkaska, MI, Gaylord, MI and McMillan, MI) and development and implementation of improved potato stress applications. The additional weather stations deliver detailed local weather information for major potato growing regions of Michigan. The new, improved “Potato Maturity and Stress” graphical tool provides customized and detailed information about the stresses experienced by a potato crop and can help growers make informed crop management and marketing decisions.

PROJECT APPROACH

Weather station components were obtained and stations were installed in 2012 at four predetermined locations: Mecosta, MI (March 22, 2012), Kalkaska, MI (March 22, 2012), Gaylord, MI (May 2, 2012) and McMillan, MI (June 28, 2012). Each installation involved one or more trips to select and prepare the site, and a trip to install the station. Once the stations were installed, the data transmitted was integrated into the Enviro-weather database and incorporated into the Enviro-weather website. These stations are currently collecting data and transmitting it to the Enviro-weather database and are available via the website.

The potato stress and maturity graphical application was designed during winter 2011/12. A prototype was developed and presented to growers, industry representatives and consultants at several meetings. Based on feedback received, this application was modified several times before it was made available through the Enviro-weather website in February 2012.

During summer and fall of 2012 the weather stations were maintained as necessary to keep them operational. The new Enviro-weather potato maturity and graphical tool was presented to potential users in the Michigan potato industry through a series of meetings, presentations, and articles. Feedback from users will be used to modify the application for 2013.

GOALS AND OUTCOMES ACHIEVED

A goal of this project was to incorporate four additional weather stations into the Enviro-weather network. Components for the weather stations were ordered and, once received, they were assembled and tested on the Michigan State University campus before being installed in the new location. Each new location was visited at least once prior to station installation and a specific site was selected and prepared to ensure a representative area and maximum data transmission. The Kalkaska and Mecosta stations were installed in March 2012, the Gaylord station was installed in May 2012, and the McMillan station was installed in June 2012. Continued station operation involves monthly costs for communication and periodic site and station maintenance and these sites have been visited since installation (site maintenance, sensor calibration, etc.).

Once the new weather stations were collecting and transmitting data via cellular IP to the Enviro-weather server on the Michigan State University campus, the data was incorporated into the Enviro-weather database so that it could be stored, archived and displayed. After database incorporation, the new stations were integrated onto the Enviro-weather website. The stations are now accessible to users via the website [Enviro-weather - Weather for IPM decisions - Station Map](http://www.enviroweather.msu.edu/homeMap.php) <http://www.enviroweather.msu.edu/homeMap.php>.

Development of a new graphical tool to help growers evaluate the maturity of their potato crop and the timing of various stresses began in late 2011. We met with potential users to discuss the application and gather input. Enviro-weather staff and Chris Long, MSU potato specialist,

met several times to plan the design and features of the new application. Enviro-weather chief programmer, Tracy Aichele developed a prototype, which was demonstrated to potato growers at meetings to solicit feedback for improvements and enhancements. Repeated modifications were made to the application and features were added. The revised tool, now called “Potato Maturity and Stress Graph” was loaded on the Enviro-weather webpage in mid-February 2012. It is now available to users. Modifications to the functionality and usability of the tool, including a faster way to generate a PDF file and better/contrasting colors on the graphs, were made, based on user feedback after the first growing season.

The current tool allows users to create an account on Enviro-weather and to create graphs for each of their potato fields. Users designate the dates of crop maturity events, such as planting, hilling, flowering, vine kill, harvest, etc., and also the dates of non-weather stress events (e.g., herbicide damage, excessive defoliation, etc.). The application produces a graph that plots crop maturity over time (degree-days base 40F vs. calendar date, with user-defined maturity events marked on the graph). The application uses weather data from a selected Enviro-weather station to calculate cumulative degree-days since planting and to identify and mark weather-induced stress events (excessive daily heat, excessive nighttime heat, high evapotranspiration, heavy precipitation, etc.) (Appendix A).

Once the Potato Maturity and Stress Graph tool was available through Enviro-weather, it was publicized through meetings, presentations, articles, and on the web. Specifically, Beth Bishop, Enviro-weather Coordinator, and Chris Long, MSU Potato Specialist, attended the annual Winter Potato Conference February 21, 2012 in Mount Pleasant, MI and presented the new application and the new weather stations to an audience of approximately 60 Michigan potato growers, Michigan potato industry representatives.

The Potato Maturity and Stress Graph tool and the new stations were also presented to an audience of approximately 50 Michigan potato growers and industry representatives at the MSU Montcalm Research Center Summer Field day August 9, 2012, Entrican, Michigan. It was also discussed at the Michigan Potato Industry Commission Luncheon earlier that day.

The new tool and new stations were also presented in the potato education session at the Great Lakes Fruit, Vegetable and Farm Market EXPO, December 4-6, 2012 in Grand Rapids, MI. The session title was “Enviro-weather Tools for Potato Growers” and approximately 120 people attended this session. It was also highlighted in a poster (Enviro-weather Tools for Vegetables) presented at the EXPO.

Additional, smaller meetings and presentations were held throughout 2012, including presenting information on the Potato Heat Stress Tool to Agri-Business Consultants, February 27, 2012, a meeting with Dennis Iott, Michigan potato seed grower on April 10, 2012, Montcalm County MSU Extension Consultants Breakfast Aug 17, 2012. The tool was also presented to 15 growers and industry representatives at the Michigan Potato Industry Commission Storage and Handling Committee November 5, 2012.

Enviro-weather staff also prepared a “how to use” document for the application, and this was distributed and is available for download on the website. The tool was also publicized through Michigan State University’s Extension News:

http://msue.anr.msu.edu/news/new_potato_maturity_and_stress_graphic_tool_available_on_enviro-weather

and on the Michigan Potato Industry Commission website: [Michigan Potato Industry Commission - News](http://www.mipotato.com/centerforinformationoutreach.aspx?NewsID=347)

<http://www.mipotato.com/centerforinformationoutreach.aspx?NewsID=347>

During the 2013 growing season, we met with potato growers and discussed their use of the tool in 2011. Some of the comments we received were used to modify the tool. We also developed a survey to gather feedback and that survey was distributed to Michigan potato growers. We received 14 responses. Six (43%) indicated that they had used the new potato maturity and stress graphical tool. One of these respondents was an extension educator, one was a crop consultant (16,000 acres) and the remaining three of four respondents reported that they grow a collective 10,300 acres of potatoes (one did not respond to this question).

Of the respondents answering that they had used the potato maturity and stress graphical tool, 2 (33%) said they changed the way they handled their crop after harvest, 3 (50%) said they did not, and 1 (12%) were unsure. Comments made on how the use of the tool affected their management included: "I kept the potatoes a little warmer in storage", "I used it to evaluate crop heat units and stress" and "high heat stress fields were sprout-nipped earlier. When asked if the tool helped to reduce losses, four of five respondents were not sure. Comments included: "Need more experience and history. Good potential." And "hard to estimate". We had significant losses in 2012, and the tool was instrumental in analyzing the sources of the losses.

Of the remaining (eight) respondents that indicated they had not used the tool, seven of those (88%) indicated that they have heard of the tool but had not yet tried to use it; only one respondent indicated that s/he had never heard of the tool. Comments from these respondents included: "Good idea" and "Great Tool".

We are continuing to work on developing and improving the potato maturity and stress graphical tool and educating growers about its use. There are several enhancements that have been suggested by users, and we are working to implement them. We are also planning more educational events to help publicize the usefulness of the tool.

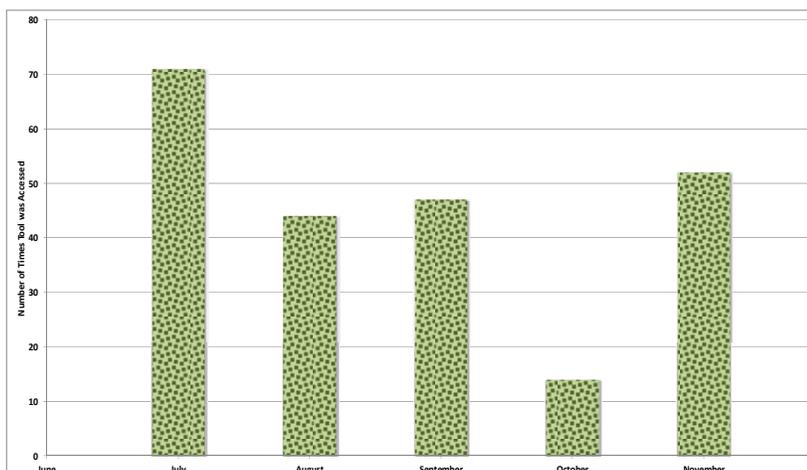
Use Statistics 2012.

We continually collect usage statistics, and have included those from 2012 (Table 1, Figure 1, below). Use of this tool has increased in 2013, although exact statistics won't be available until the end of the year.

Table 1. Number of Times the four new Enviro-weather stations serving Michigan potato growing regions were accessed by month in 2012. NA = Station not set up.

	April	May	June	July	August	September	October	Nov	Dec
Gaylord	NA	147	59	52	41	126	33	33	9
Kalkaska	73	132	76	56	105	91	23	49	23
Mecosta	75	145	256	132	73	85	43	69	48
McMillan	NA	NA	NA	99	34	72	31	2	14

Figure 1. Number of times the new potato stress graphing tool was accessed in 2012.



BENEFICIARIES

The beneficiaries of this project include Michigan potato growers and seed potato growers, who now have a tool to evaluate the timing and extent of stress events (especially heat stress) to their potato crop. The Michigan potato industry as a whole also benefits, since an outcome of this project will ultimately be a reduction in losses. The extent of such a reduction will only become evident over time. In addition, as growers continue to use and provide feedback for the application Enviro-weather will continue to expand and improve the tool and there may very well be additional benefits to its use.

This system is freely available to all potato growers and seed growers in Michigan. In 2012 this number is estimated to be 15 seed potato farms (representing 2,352 acres of seed potatoes) and 85 potato farms, representing 42,500 chip and table stock acres.

We learned a lot about how growers use computer-based tools and how to develop such tools to increase usability. There were no unexpected results or outcomes for this project.

LESSONS LEARNED

The biggest problem we encountered was, ironically, the weather. The 2012 growing season was the warmest on record for much of Michigan. While growers are able to compensate, to some extent, for heat stress by managing their crop differently, options are limited and losses are inevitable under extreme conditions.

However, we expect the tool to be more helpful during most growing seasons. Users also discovered an unanticipated use of the tool: the ability to use the tools to analyze past problems with the potato crop, with an eye to making better choices in the future.

CONTACT PERSON

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ADDITIONAL INFORMATION

Appendix A. Screenshots of the Potato Maturity and Stress graphical tool.

[Add a new field](#) [Advanced settings for this field](#) [Add events](#) [Delete this field](#)

Field name:

Use weather station data from

Planting Date:

Harvest Date (actual or estimated):

Advanced settings

Degree Day Base Temperature (°F):

Highlight days with more than: Degree Days

Highlight days with temperatures greater than °F.

Highlight nights with temperatures greater than °F.

Look for these high overnight temperatures between and

Look for at least consecutive hours above this temperature.

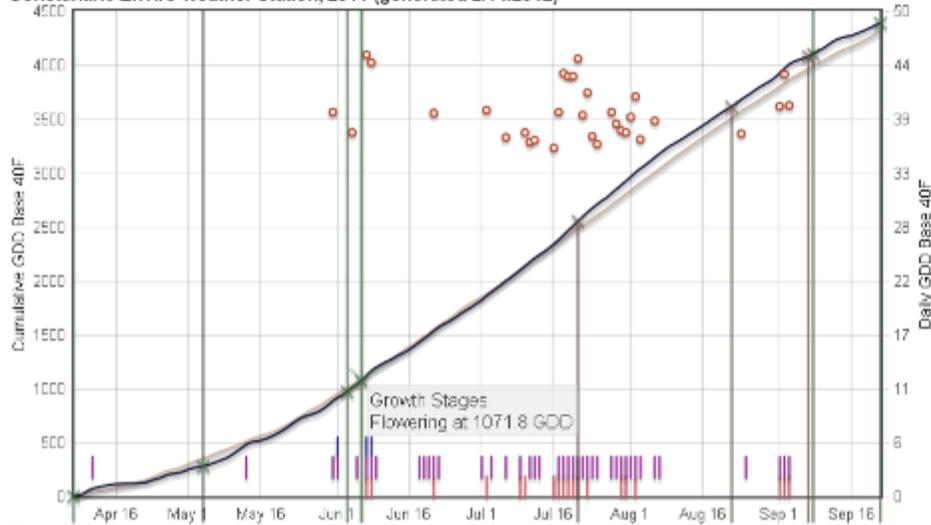
Highlight days with more than inches of rain in a day.

Highlight days with more than inches of rain in an hour.

Highlight days with reference potential evapotranspiration greater than inches.

Test 2 Snowden

Constantine Enviro-weather Station, 2011 (generated 2/14/2012)

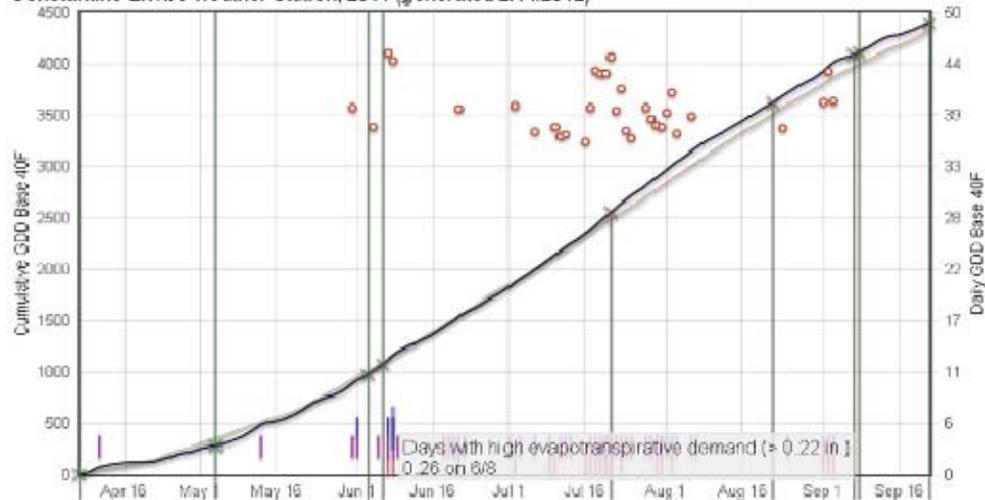


Show:

- Historical GDD, Base 40F (2007 to 2011)
- Cumulative Growing Degree Days (GDD), Base 40F
- Days with temperatures > 90F (19 days)
- Days with high evapotranspirative demand (> 0.22 in.) (3 days)
- Growing Degree Days, Base 40F
- Days with GDD > 35 (32 days)
- Nights with temperatures > 72F (42 nights)
- Growth Stages

Test 2 Snowden

Constantine Enviro-weather Station, 2011 (generated 2/14/2012)



Show:

- Historical GDD, Base 40F (2007 to 2011)
- Cumulative Growing Degree Days (GDD), Base 40F
- Days with temperatures > 90F (19 days)
- Days with high evapotranspirative demand (> 0.22 in.) (3 days)
- Growing Degree Days, Base 40F
- Days with GDD > 35 (32 days)
- Nights with temperatures > 72F (42 nights)

PROJECT TITLE

MI Carrot Industry Development-Enhancement of the Knowledge and Control of Foliar Diseases of Carrot - FINAL

PROJECT SUMMARY

Each year, carrot yields are threatened by foliar blights caused by fungi (*Alternaria dauci*, *Cercospora carotae*) that reduce photosynthetic area and weaken leaves and petioles which interfere with harvest because tops break off in lifting. The fungi responsible for these blights occur each year and overwinter readily in carrot debris in the soil. Carrots are usually planted in closely spaced rows (12 to 18 inches) that close quickly once tops are fully developed. Once rows are closed, the microclimate within the plant canopy becomes more humid, and leaves remain wet longer because air circulation is reduced.

Currently fungicides like chlorothalonil (Bravo), iprodione (Rovral), triazoles, and strobilurins are the only fungicides registered for control of *Alternaria* and *Cercospora* blights other than copper-based formulations, and may be applied as frequently as every seven to ten days beginning in June and ending in mid-September. Minimizing fungicide use is a goal of growers, processors, and consumers. Disease management programs that reduce the number of fungicide applications also reduce grower costs, potential residues on the produce, and risk of development of fungicide resistance in the pathogens. The TOM-CAST forecaster is used to determine when favorable weather conditions have occurred and will result in rapid increase in disease pressure. If fungicides are not initiated early in the fungal disease outbreak, disease levels can quickly increase to a level of infection that cannot be cured with fungicide applications.

Aster yellows disease, caused by a phytoplasma transmitted by aster leafhoppers (*Macrostelus quadrilineatus*), results in distorted growth and bitter taste. Since aster leafhoppers can remain infective for 100 days, disease is managed by insecticide sprays depending on leafhopper numbers, cultivar resistance, and the presumed proportion of infective insects. Treatment thresholds are difficult to develop because the infectivity rate of aster leafhoppers can vary among years and locations. The efficacy of the preferred pyrethroid insecticides is compromised at high temperatures when control is most needed. If pyrethroids are relied upon solely, development of insect resistance is a concern.

Foliar bacterial blight (caused by *Xanthomonas campestris* pv. *carotae*) on carrot has been a problem on Michigan processing carrots since 1999 resulting in large losses in yield. Another outbreak of this disease occurred in 2010 in many fields in Oceana County which resulted in blighted foliage and rot of the carrot root itself. This disease is seedborne and is hard to control unless detected early or by knowing the level of infection of the seed. Detecting symptoms and treating the disease in the field can be too late to achieve satisfactory control of the disease for the season. Only copper-based fungicides are effective in controlling bacterial blight, and they have to be applied before a disease outbreak occurs and reapplied on a short interval.

Bacteria can become resistance to copper fungicides which will make their application non-effective. If this resistance develops, then growers will have no registered products that are effective.

The tolerance of current carrot cultivars to fungal blight, bacterial blight, and aster yellow infection is unknown at this time. The last variety trial to examine these factors was conducted in 2003 in Fremont, MI, and many of those varieties are no longer available to growers.

Growers would benefit from the knowledge of what current cultivars show tolerance to blight and if resistance to copper fungicides exist in the bacterial organisms that cause disease. Michigan processing carrot growers have a limited selection of suitable carrot varieties. Due to the

popularity of fresh “baby” carrots and the emerging market for colored carrots seed companies are devoting little effort into developing a new processing type carrot that is disease-tolerant while providing vigorous top growth and a high yielding carrot root. Knowing the level of disease tolerance in each cultivar will help growers determine when initial applications of fungicides are needed and how long an interval is needed between applications. Reduction in fungicide applications can lower growers’ input costs in both chemical requirements and cost of application.

To help reduce losses to foliar blights, this project goal was to increase information on foliar diseases that impact carrot yields in Michigan and advance control programs for these diseases by combining effective fungicides with tolerant carrot cultivars.

PROJECT APPROACH

A replicated field trial was established to test fungicide efficacy of 15 different chemicals on *Alternaria* and *Cercospora* blights in a commercial carrot field. The trial was treated by commercially-licensed technicians over the course of the summer and disease control ratings and yields were taken at the end of the season. To determine tolerance of carrot cultivars, a replicated variety trial was also planted in a commercial carrot field by researchers. The 18 different cultivars were grown by the cooperating grower to commercial standards and rated for disease tolerance to foliar blights and aster yellows infection. Data collected from both trials were analyzed and results were presented to growers at the Great Lakes Fruit, Vegetable and Farm Market Expo held in Grand Rapids, MI. Approximately 53 attended the Great Lakes Expo and Carrot Educational Session held on Dec 5, 2012. Twenty-three attended the Michigan Carrot Research Summit meeting held in DeWitt on Jan 22, 2013. Fungicide recommendations and cultivar tolerances will be used in the future by growers to help mitigate the loss of yield to foliar blights.

GOALS AND OUTCOMES ACHIEVED

Successful research studies on fungicide efficacy and the tolerance of carrot cultivars to foliar blights were conducted in the growing season of 2012. Results of these studies were shared with the carrot industry growers and processors at several meetings in order to help carrot producers to develop foliar blight management programs that combine effective fungicide use with carrot cultivars that resist foliar infections. Data for fungicide crop safety and efficacy will be used by companies to help support future registrations for new carrot fungicides.

Testing New Fungicide Products. A fungicide study was conducted in a commercial carrot field located in Mason County, MI on a sandy field that was previously planted to squash. The field was cultivated, formed into beds, and planted to ‘Cupar’ carrots with a vacuum seeder on 20 April. Plots were arranged in a randomized complete block design with four replicates. Each treatment plot was comprised of a three-row bed (18 in. row spacing) 20 ft long with a buffer of 5 ft between treatment plots within the row. The bed spacing was 60 in. on center and the seed population at planting was 200M/A. The overall plot dimension was 16 beds wide by 100 ft long. Fungicide sprays were applied with a CO₂ backpack sprayer equipped with three XR8003 nozzles spaced 19 in. apart, operating at a boom pressure of 50 psi, and delivering 50 gal/A. Spray applications were applied on a seven-day schedule for 13 weeks. Visual foliar disease estimates and harvest data were taken on 2 October. Diseased petiole incidence and infection severity were assessed for each carrot in the inner 5 ft of the center row. Petiole infection rates were determined by counting the number of plants with at least one infected petiole. A petiole infection severity rating was given to the carrot tops and was based on a 1 to 5 scale (1=no lesions, 2=1-10 lesions per petiole, 3=11-20, 4=21-50, and 5=>50 lesions per petiole) (*data not shown*). Carrots were hand-topped and weighed on a platform scale (*data not shown*).

remaining carrot foliage in each plot was rated for percent leaf blight. Data were analyzed using Sigma Stat version 3.1 (Systat Software Inc.) and statistical differences were compared using the Fisher LSD multiple comparison test.

As a result of the hot and dry weather conditions that occurred during the 2012 growing season, foliar blight was delayed in becoming established in the carrot plot. Because the disease developed late in the season, significant differences among the treatments were not detected. Follow up studies are needed to determine whether the *Alternaria* pathogen on carrots is sensitive to the strobilurin fungicides that play an important role in Michigan growers' standard spray program.

Carrot Cultivar Trial. A total of 18 cultivars of carrots were obtained from Nunhems, Seminis, and Bejo to be evaluated in a variety trial that was planted in a commercial field. The trial was arranged in a randomized experiment using four replicates of each cultivar. The trial was planted on 10 May with a precision vacuum planter at a seed density of 200M per acre in 3-row beds. The beds were spaced 5½ ft apart and each plot was 50 ft long to get an accurate planting of each replicate. Our research plot was irrigated as needed based on the cooperating grower's schedule. The trial was evaluated (10 ft of row per treatment) for the total number of plants, number of aster yellows-infected plants, number of plants with fungal infections, and total yield on 10 October.

Disease pressure from *Alternaria* blight was not evident until relatively late in the growing season due to the dry conditions that prevailed for much of the summer. Some cultivars had very little *Alternaria* and included A85190, CR2289, and 7315 (Figure 1). These cultivars also showed a reduced amount of aster yellows. The cultivars 5102 and Santa Cruz had significantly more *Alternaria* than many of the other carrot cultivars included in this study but 'Santa Cruz' had few plants with aster yellows. Bacterial blight was not observed.

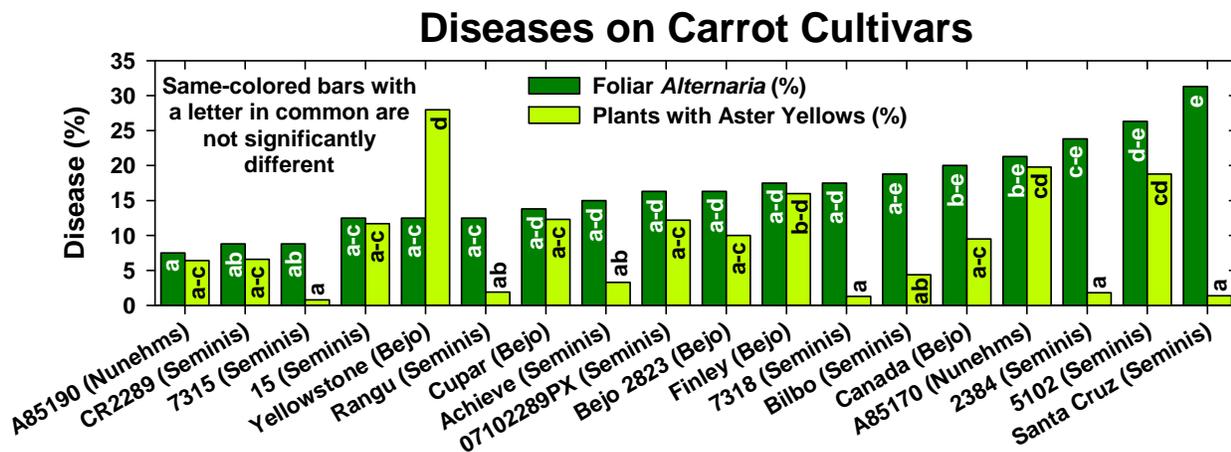


Figure 1. Aster yellows and *Alternaria* incidence on carrot cultivars planted in Mason County, MI.

Bacterial blight sampling. The hot and dry conditions of the 2012 growing season were not conducive to development of bacterial blight. Michigan carrot growers did not report any bacterial blight disease in their fields, nor was this disease observed by technicians in any of the grower-cooperator fields where this project was conducted.

Pairing cultivars that have tolerance to foliar blights and aster yellows with new effective fungicides that are applied at lower rates has given the carrot growers in Michigan the tools needed to reduce the amount of active ingredients for effective foliar blight control. Cultivar tolerance to aster yellows also allows for reduction in the use of insecticides by altering the trigger value for applications targeted to control the leafhopper that transmits this disease.

This year's losses due to foliar blight were low and averaged 4% for most fields in Oceana and Mason Counties. This lower than average yield loss was due to the use of tolerant varieties and the TOM-CAST forecasting system for foliar blights. The summer weather conditions were not favorable for disease development and the TOM-CAST forecaster issued two fewer spray triggers than previous years. This resulted in a reduction of 1,250 pounds of active ingredient being used on 1,000 acres of processing carrots. The use of cultivars Cupar, Canada, Finley, which are more tolerant to foliar blights, also reduced the amount of fungicide applications needed. Growers also used more effective strobilurin fungicides during weather patterns that favored disease.

Growers and food processors attended the Michigan Carrot Summit held on February 22nd, 2013 in Dewitt, Michigan. Research supported by the carrot SCBG was presented and discussions followed on future cultivar trials, fungicide efficacy, and effects of weather on carrot disease and leafhopper populations.

- **1) suitability of cultivars determined to have disease resistance for Michigan growing conditions;**

Growers felt that currently available carrot cultivars have good disease tolerance with acceptable yields but the food processors are concerned that fiber content is too high in these lines. This higher fiber content impedes the processing of the carrots into puree for infant baby food and produces carrot pieces for frozen or canned foods that are too tough. This concern has prompted the industry to rescreen cultivars in 2013 for root quality along with tolerance to disease. This is a high priority of processing carrot growers as processing contracts can be cancelled if the fiber issue is not resolved.

- **2) efficacy of new products to effectively limit foliar blighting;**

Growers indicated they will now use the new strobilurin class of fungicides when weather conditions are highly favorable for disease development. They have requested that more fungicides be tested for foliar disease control of carrot to ensure that new active ingredients are available for future registration.

- **3) over-all satisfaction with delivery of research results and ease of implementation.**

Several growers thanked the researchers after the Great Lakes Expo Carrot Educational Session for the information provided on efficacy of new chemistries and the tolerance of carrot cultivars for foliar diseases. This session was attended by 48 members of the carrot industry from the Great Lakes region as well as seed company technical staff. Several seed companies have offered to support the 2013 carrot cultivar trial and growers want to increase the number of entries to include different types of carrots of both new and older cultivars.

- **Target: Reduce total yield losses (from 25% to 15%) and the cost of disease management (a minimum of two fungicide sprays).**

Three farms incurred losses due to high levels of fiber in harvested carrot roots as a result of more seeders in the carrot crop. Seeders are plants that produce flower stalks, which in turn lower the quality of the carrot roots. The losses of yield from foliar blights were low this year due to the planting of tolerant cultivars during a year when early weather patterns didn't favor disease development. When weather did favor disease, growers used newer fungicides that are more effective on foliar blight control.

BENEFICIARIES

Carrot growers and food processors in Michigan will use this data to select carrot cultivars that have both high tolerance to foliar blights, high yields, and favorable fiber content preferred by the consumer. These same members of the carrot industry will also benefit from the future registrations of new fungicides that can be used in rotation with the older chemistries.

Four growers that represent 1000 acres of processing carrots that supply carrots to three different processors (Gerber, Michigan Freezepak, and Arbor Farms) have used the 2012 variety trial data to select cultivars for 2013 growing season. Their decision is based on top health ratings, root quality, and resistance to aster yellows infection in these cultivars. Representatives from the carrot industry and food processors have asked for additional carrot variety trials in 2013 to be conducted to further evaluate other cultivars for top health, root quality, yield, and level of Aster yellows infection.

LESSONS LEARNED

There is a concern that potential fungicide resistance to the strobilurin class of fungicides might be developing in Michigan. This threat is very serious, and future research will be designed to monitor the development of possible resistance. If the use of the standard fungicide Bravo is reduced or eliminated, the Michigan carrot industry would face a critical shortage of available active ingredients that can effectively control fungal blights. Cultivar development for processing carrots for Michigan is a low priority of the private commercial seed companies. The Michigan carrot industry is concerned about the lack of public university cultivar development in the United States. A higher priority will be placed on finding suitable carrot cultivars for the Michigan processing carrot industry.

CONTACT PERSON

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Executive Director, Asst. Secretary-Treasurer
Phone: 517-669-4250

ADDITIONAL INFORMATION

Publications

- Hausbeck, M.K. 2012. Carrot variety and disease susceptibility trials. Pages 6-8 in: Carrot Session Summaries, Great Lakes Fruit, Vegetable and Farm Market Expo. Online.
- Hausbeck, M.K. 2012. Carrot disease update. Carrot Country 20(2):6-8.
- Hausbeck, M.K. 2011. Carrot disease update. Pages 9-11 in: Carrot Session Summaries, Great Lakes Fruit, Vegetable and Farm Market Expo. Online.

Tours

Integrated Pest Management: Asparagus epidemiology, carrot variety trial, cucurbit downy mildew and *Phytophthora*, and onion diseases research, 2012 Decision Makers EPA Tour, 17-18 Jul, Hart, Pentwater and Grant MI (30 attendees).

Presentations

- 'Carrot variety and disease susceptibility trials,' Carrot Session, Great Lakes Fruit, Vegetable and Farm Market Expo, Grand Rapids, Dec 2012. (48 attendees)
- 'Carrot disease update,' Carrot Session, Great Lakes Fruit, Vegetable and Farm Market Expo, Grand Rapids, Dec 2011.

Website: [Hausbeck Lab Research Carrot](http://hausbecklabresearchcarrot) <http://veggies.msu.edu/ResearchCarrot.html>

PROJECT TITLE

MI Nursery Landscape Association-Major Weed Control Issues in Michigan Nurseries - FINAL

PROJECT SUMMARY

Initial purpose: With Michigan nurseries geographically unique weed problems, weed with high reproductive potential and biomass production have been found through previous years of SCBG research. Estimates of 30,000 lb. /ac of weeds removed in hand weeding operations taking 1200 man hours/ac, at a cost of \$18,000 have been calculated. Effective preemergence herbicide applications have been shown to cut these costs by 66% to \$6,000/ac. Further research with difficult weed species such as Kik, marestalk, mugwort and wild garlic is required to reduce these costs further and deplete the seed bank. Objectives of this proposal were to help growers understand what their current weed control program is really costing, how to decrease their weed control costs but increase their success, and why cutting weed control should be the last consideration for reducing production costs in these challenging economic times.

We achieved the following three successes (A-C) in our initial purpose to reduce weed control costs from \$18,000 / ac to \$915.00 / ac. The total savings achieved from these three (A-C) successes is **\$5 Mn or a 50% reduction** in previous weeding costs.

- A) Many nurseries we met with in fall 2011 were unaware that shoot and root inhibitors were in the same MoA. Five of the sites thought rotations between root and shoot inhibitors were rotations in MoAs. These sites were thus experiencing weed species they could not control. As a result of our trials at these sites, we have provided herbicide recommendations outside their current program to control five major problem species. Our SCGB work at these nurseries has saved \$640.00 per hand weeding event per acre for a total of \$ 0.5 Mn per site in hand-weeding costs due to past improper herbicide choices.
- B) One field nursery had severe weed infestations due to ineffective controls which relied heavily on expensive hand weeding operations. The reduction in ability to employ large weeding crews due to the economic downturn and without proper herbicides, their fields were infested with weeds. As a general rule, for every pound of weed growth produced, about one less pound of crop growth is produced. Many of the crops at this nursery are sold by inch of top growth achieved. As a result of our SCBG trials, we were able to recommend two new herbicide products, Tower + pendulum and Indaziflam, that were providing exceptional control 7 WAT even though infested with perennial weeds with potential long-term economic impact to the crop. We estimate that our studies at this site were worth \$2 Mn as a result of marketing the crop one or two years sooner due to releasing the crop from current weed pressures. The work at this site was also applied at one other nursery for a total of \$4 Mn.
- C) Another field nursery required more effective longer residual preemergence herbicides. They had reduced their postemergence herbicide usage over the past three years due to previous OSU research relating glyphosate to bark cracking. This nursery had been using SureGuard, a PPO inhibitor, for the past several years and needed an alternative MoA to rotate out of the PPO MoA. At this site, we were able to recommend three new herbicide alternatives that provided statistically similar or superior control to SureGuard at 10 WAT: Tower + pendulum, V-10336 at 15 or 30 oz. /ac and Barricade + Goal. We estimate that the ability to rotate chemistries at this site will be worth \$0.25 Mn in reduction of supplemental cultivation and postemergence use to control break through weeds. This information was also applied at one other site for a total of \$0.5 Mn.

Timeliness: Sustainability is a common phrase in agriculture and horticulture today. Although the word sustainable often conjures thoughts of organic operations – this project focused on bio-rational approaches with synthetic herbicides with the evaluation of new herbicides that have extended efficacy and require minimal applications. We also focused the project on other sustainable weed management features such as what causes nursery weed problems, what weeds growers had, an integrated system of prevention and bio-controls (especially for liverwort problems). Principles of crop rotation, herbicide rotation and MoAs, cover cropping, weed seed bank management, allelopathy and most fundamental good soil quality, fertility and drainage for a competitive crop have also been stressed in all presentations and literature that has come out of the project. We also emphasized what is not sustainable such as over use and misuse of postemergence herbicides. This project has been very timely as there is little research conducted in ornamental sustainable weed management although public pressure is requiring the nursery and landscape industries to use more sustainable practices.

Build on previous funding: Due to previous SCBG projects funded in 2009-10 and 2010-11 and now 2011-12, we were able to provide data to assist in the registration of two new herbicides for the ornamental industry. In addition to the registration of these two new products we showed growers the utilization of indaziflam (registered January 2013, as Marengo (OHP, Inc., Mainland, PA) at 0.11 lb. ai/ac and oxyfluorfen + prodiamine (registered as Biathlon) (OHP) at 2.75 lb. ai/ac in field and container operations as extended efficacy products and replacements to less sustainable preemergence herbicides currently used. In addition we also built on our research from previous SCBGs in liverwort control and were able to expand our research with sodium bicarbonate (Baking soda) to explore potassium bi-carbonate applied as a dust application, show its superior efficacy to anything currently on the market and submit an invention disclosure in 2012. The development of this new control has already generated tremendous demand inside and outside MI and would have never been discovered without these MI SCBGs.

PROJECT APPROACH

One hundred and fifty-seven trials were conducted in MI in 2012 at the three sites listed above, 75 liverwort, 59 container in-season and 23 field trials. Before this project, MI Nurseries had never used Biathlon or Indaziflam commercially. Indaziflam not only represents a new active ingredient but most importantly a little used mode of action for MI nursery growers. As a result of this project and building on past SCBGs we are actively advocating rotating Tower + Pendulum combination with SureGuard and Gallery/Barricade (Indaziflam) for field weed control. Each of the three host nurseries for the 2010-11 SCBG weed control trials [Berryhill Family of Nurseries (BFN), Grand Haven, MI (BFN, formerly Zelenka Nursery), Spring Meadow Nursery, Inc., Grand Haven, MI and Northland Farms Nursery, LLC, West Olive, MI) contributed in-kind donations of plant materials, facilities for herbicide testing (such as nursery fields, polyhouses and container yards), plant material maintenance and supplies (such as fertilizer, insecticides, pots and media) totaling approximately \$4,000 per site. They also absorbed any costs regarding plant damage or losses caused by herbicides being tested at their sites. Two of the sites (BFN and Northland Farms) also served as hosts for a bus tour in August, 2012 highlighting this SCBG project.

GOALS AND OUTCOMES ACHIEVED

Accomplishing Objectives 1, 2: Preemergence herbicide efficacy, phytotoxicity and control of liverworts:

Marchantia polymorpha L. (a thalloid liverwort) is a common plant pest in nursery and greenhouse production systems and one of the major weed issues we are addressing in this Specialty Crop Block Grant (SCBG). The presence of liverwort is considered unsightly and is often taken as an indication of reduced quality or plant vigor, all of which impacts the final

valuation of the crop. It is estimated \$650,000 is lost annually in MI nurseries due to ineffective liverwort control. In MI, the rapid growth and dissemination of liverwort has resulted in heavy thallus mats on the surface of pots, restricting water penetration, competing for nutrients, and providing habitat for other pests and disease vectors. To date there are no registered products that are used by nursery growers for effective liverwort control in enclosed structures. In our past SCBG we have also examined liverwort controls and found in the 2010-11 SCBG that Baking Soda (sodium bicarbonate) had potential for control and 1/3 the normal rates of SureGuard (flumioxazin, Valent U.S.A.) reduced phytotoxicity to the crop experienced at the full rate but still controlled liverwort. In this 2012 SCBG, we have evaluated SureGuard at 1/4 the normal rate in an attempt to reduce phytotoxicity further but maintain liverwort control. We have also examined MilStop® (Potassium Bicarbonate 85%, BioWorks®, Victor, NY) because it is similar chemically to Baking Soda but may have potential to be registered as a herbicide; whereas, Baking Soda (a household product) may not.

We have identified SureGuard at 3 oz./ac (1/4 normal rate); WeedPharm™ (20% acetic acid) at 10% v/v (Pharm Solutions Inc., Port Townsend, WA), MilStop® (5 g/ ft²) and Baking soda applied as a dusting (2.24 g/ ft²)(per Northland Farms, West Olive, MI) can all be effective in controlling liverwort. However, WeedPharm will cause phytotoxicity as will SureGuard if not applied dormant. MilStop® is an OMRI listed sprayed broad spectrum fungicide (with **no** registration as an herbicide). Used as a spray MilStop® was non-effective for liverwort control. Baking soda is not registered for moss control. However, applications made at Northland Farms with a handheld crop duster (Fig. 1 A-C) were very efficacious with no phytotoxicity noted. The duster used at Northland Farms is quite old (Fig. 1. C); however, it is similar to a Dustin Mizer (Nitron Industries) that will be used in subsequent trials. Further work with rates of MilStop® and Baking Soda are warranted from this trial. Application made by hand at 10g/ ft² of Baking Soda at Spring Meadow Nursery were 4.5 times higher and far more phytotoxic than the duster application method at Northland Farms.



Liverwort product efficacy and phytotoxicity trials were initiated on dormant plant material on 7 February, 2012 at two nurseries; Spring Meadow Nursery, Grand Haven, MI (Fig. 2A) in a heated open-roof greenhouse (60°F) and Northland Farms, West Olive, MI (Fig. 2B) in an unheated polyhouse (34°F). Data has been collected from 3 evaluations; 1, 2, and 4 WAT (weeks after treatment). At Spring Meadow Nursery, treatments included MilStop® at 2.5 lb./100

gallons applied as a spray, MilStop® applied as a powder at 2.5 tsp./flat (5g/ft²), SureGuard (flumioxazin, Valent U.S.A., Walnut Creek, CA) at two rates; 3 oz./ac (1/4 rate) and 4 oz./ac (1/3 rate), WeedPharm™ (Pharm Solutions, Inc., Port Townsend, WA) at two rates 5% and 10% v/v and baking soda at 10 gram/ft². The MilStop® powder application rate was calculated to apply a similar amount of product as applied for the registered fungicide spray rate. At Northland farms, treatments included SureGuard at 3 oz./ac (1/4 rate), WeedPharm™ at 5%, MilStop® at 5 gram/ft² and baking soda applied at 2.24 grams/ft² with a crop duster (Fig. 1D.). Liquids were applied in a spray volume of 100 gal/ac delivered with a CO₂ backpack sprayer equipped with 8003XR nozzles (Teejet, Inc., Wheaton, IL). All treatments were watered in according to IR-4 protocols within four hours after application.

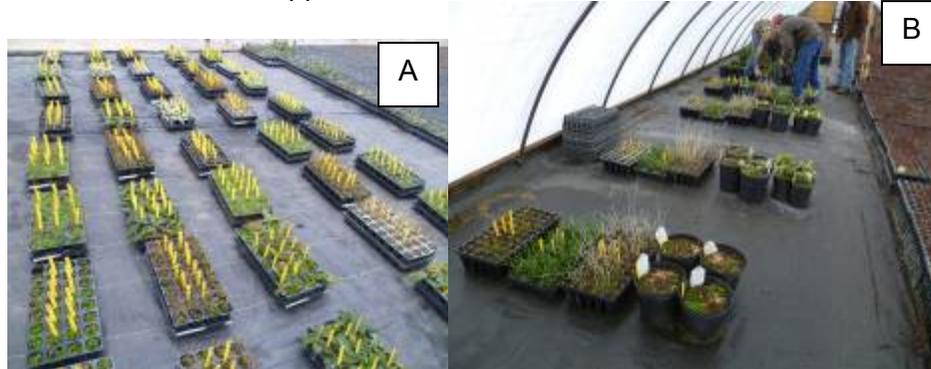


Fig. 2 (A and B). **A.** Liverwort trial initiation at Spring Meadow Nursery, Grand Haven, MI on Feb. 7, 2012 on dormant plants in trays of 4" containers of various species. **B.** Liverwort trial initiation at Northland Farms, West Olive, MI on Feb. 7, 2012 on dormant plants in trays of 2 1/4", 1 and 3 gallon containers of various species.

At Spring Meadow Nursery phytotoxicity was evaluated using hydrangea (*Hydrangea* 'Invincibelle spirit'), winterberry (*Ilex verticillata* 'Winter red'), dwarf burning bush (*Euonymus alata* 'Unforgettable fire'), lilac (*Syringa patula* 'Miss Kim') and viburnum (*Viburnum rhytidophyllum* 'Cree'). Viburnum and Hydrangea are key species we identified in our objectives to utilize in this SCBG. At Northland Farms phytotoxicity included hosta (*Hosta* 'Halcyon'), Autumn fern (*Dryopteris erythrosora*), lirioppe (*Lirioppe spicata*), Russian sage (*Perovskia atriplicifolia*), and Dwarf Korean lilac (*Syringa meyeri* 'Palibin'). Only the fern and lirioppe will be discussed as the hosta, Lilac and the Russian sage had not broken dormancy when this report was compiled.

Evaluations of control and phytotoxicity were taken at 1 WA1T, 2 WA1T, 4 WA1T, 1 WA2T (weeks after second treatment), 2 WA2T, and 4 WA2T. Phytotoxicity visual ratings were based on a 0-10 scale with 0 being no phytotoxicity, 10 death and ≤ 3 commercially acceptable. Liverwort control ratings were based on a 0-10 scale with 0 being no control, 10 perfect control and ≥ 7 commercially acceptable. The trials were set up in a completely randomized design for each species with 12 replications /treatment at Spring Meadow and 4 replications /treatment at Northland Farms. For phytotoxicity, treatments were compared to the untreated control using Dunnett's t-test with $\alpha = 0.05$ and 0.10. For liverwort control, treatment means were separated using lsmeans with $\alpha = 0.05$. Statistics were analyzed using SAS® software using the Proc Mixed method.

Liverwort control. All treatments with the exception of the MilStop® applied as a liquid provided some level of liverwort control (Table 1). MilStop® is marketed as a fungicide when applied as a liquid at the tested rates, and in this trial, it was not an effective treatment to control liverwort. On the contrary, when MilStop® is applied without water, right out of the bag, it controlled

liverwort very well (Table 1) (Fig. 3 A and B). MilStop® in its granule form has an inhalation hazard and is NOT labeled to be applied in this form. WeedPharm™ will control liverwort; both at 5% and 10%, with the 10% solution having better control, but in most cases the two are not significantly different from each other. From this trial, the 5% solution would be a better choice, especially in terms of economics. However, with WeedPharm™, just like many other “contact” control herbicides, thorough coverage is necessary, and whenever the liverwort was covered by plant foliage, control decreased. WeedPharm™ also seems to work better under higher temperatures, as seen with the differences between Spring Meadow and Northland Farms (Table 1), and from the first application to the second application at Northland Farms (Table 1). Although baking soda does not have a label for weed control, a few nurseries use it for liverwort control, and thus we added to the trial.

Baking soda provides exceptional liverwort control (Fig. 4B), although residual is limited. SureGuard has shown to control liverwort in previous SCBGs. The IR-4 protocol suggested using a rate of 4 oz. /ac; a rate. The 3 oz. /ac was added in this SCBG trial. In terms of control, the two rates were *not* significantly different from each other at any evaluation (Table 1). SureGuard is slow to control liverwort but is the only product we have tested that provides residual control for liverwort (Table 1). For this reason it remains of high interest in these SCBG grant evaluations.

Phytotoxicity. All species were dormant at the first application at Spring Meadow, and all but *Dryopteris* and *Liriope* were dormant at Northland Farms (NF) at the first application. Thus, there are no ratings for the first two evaluations except for those two species at NF (Table 2). When applied at 10 g/ft², baking soda is phytotoxic to all five of the species tested at Spring Meadow Nursery (Table 2). However, when applied at 2.2 g/ft², phytotoxicity was only noticed on *Liriope* at Northland Farms, and the damage was still commercially acceptable (Fig. 4A). After the first application, SureGuard at both rates provided significant damage on only *Hydrangea* and *Ilex* at Spring Meadow, but the damage was still commercially acceptable (Table 2). The damage that SureGuard provided at both rates after the second application is quite noticeable in many of the species tested (Table 2), which provides evidence that SureGuard may be applied as a dormant application on many species that are normally injured by SureGuard when applied during the growing period. Even after the second application, SureGuard did not injure *Viburnum* or *Dryopteris* at the 3 or 4 oz. rate. When applied as a liquid, MilStop® provided no real damage on any of the species tested at Spring Meadow, which is not surprising. MilStop® did cause damage to 6 of the 10 species tested when applied as a granular (Table 2). Baking Soda was phytotoxic on active growth with 8 of 10 species. WeedPharm caused significant damage, with the higher rate causing more damage than the lower rate (Table 2). *Dryopteris* and *Viburnum* were the only species not significantly damaged by WeedPharm™. WeedPharm™ is acetic acid, which causes leaf burning, but eventually many plants will grow out of the damage if not too severe.

From these trials, it can be concluded that when applied as a dormant application, SureGuard can be an effective product for control of liverwort with a lasting residual when applied at 3 or 4 oz. /ac. Lower rates should be evaluated. Residual control at these lower rates may not last as long with higher rates; however, they provided exceptional control of the life of these evaluations. SureGuard should NOT be applied to actively growing material unless the species is already on the product label as safe. MilStop® and baking soda are two other materials that warrant further consideration for liverwort control. However, both products are not currently labeled, so any application would be considered off label. MilStop® also has some applicator exposure issues as a granular formulation, so this would also have to be taken into consideration. However, both products are very effective for liverwort control, and further research is needed for MilStop® to get a good rate for lowered phytotoxicity. At approximately

2 g/ft², baking soda is quite effective with low phytotoxicity, but more species need to be tested at this rate. WeedPharm™ could also be applied to many species in the dormant stage, but even at 5%, it will cause leaf burning on many crop species. The trial also provided evidence that liverwort infestations do cause growth reduction due to the thick thallus mat (Fig.5 B) and thus control is important (Fig. 5A).

Table 1. Liverwort control from various products at Spring Meadow Nursery and Northland Farms near Grand Haven, MI.

Spring Meadow							
Treatment	Rate	1 WAT ^z	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
Baking Soda	10 g/ft ²	9.6 ^{yx} a	9.6 ab	9.8 a	10.0 a	10.0 a	10.0 a
MilStop	2.5 lbs./100 gal	4.0 c	4.1 c	4.8 c	4.6 b	5.1 b	4.5 b
SureGuard	3 oz./ac	6.7 b	8.5 b	10.0 a	10.0 a	10.0 a	10.0 a
SureGuard	4 oz./ac	6.3 b	8.6 b	9.9 a	10.0 a	10.0 a	10.0 a
WeedPharm	5%	9.0 a	8.8 b	7.9 b	9.2 a	9.3 a	9.1 a
WeedPharm	10%	9.7 a	9.8 a	9.3 a	10.0 a	9.9 a	9.7 a
MilStop	2.5 tbsp./flat	9.8 a	9.9 a	9.3 a	9.9 a	10.0 a	9.6 a
Untreated	--	3.5 c	3.2 c	3.9 d	4.5 b	4.6 b	4.6 b
Northland Farms							
Treatment	Rate	1 WAT	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
SureGuard	3 oz./ac	5.3 cd	5.9 b	7.2 b	8.2 a	8.4 a	9.1 a
WeedPharm	5% v/v	6.8 bc	6.6 b	7.9 b	9.2 a	9.0 a	8.8 a
MilStop	5 g/ft ²	9.8 a	9.8 a	9.5 a	9.1 a	9.5 a	9.6 a
Baking Soda	2.2 g/ft ²	8.0 ab	8.5 a	7.9 b	5.2 b	5.1 b	--
Untreated	--	3.7 d	3.5 c	3.2 c	2.0 c	2.1 c	1.5 b

z = WAT: weeks after first treatment; WA2T: weeks after second treatment
y = Liverwort control ratings based on a 0-10 scale with 0 being no control and 10 perfect control with ≥7 commercially acceptable

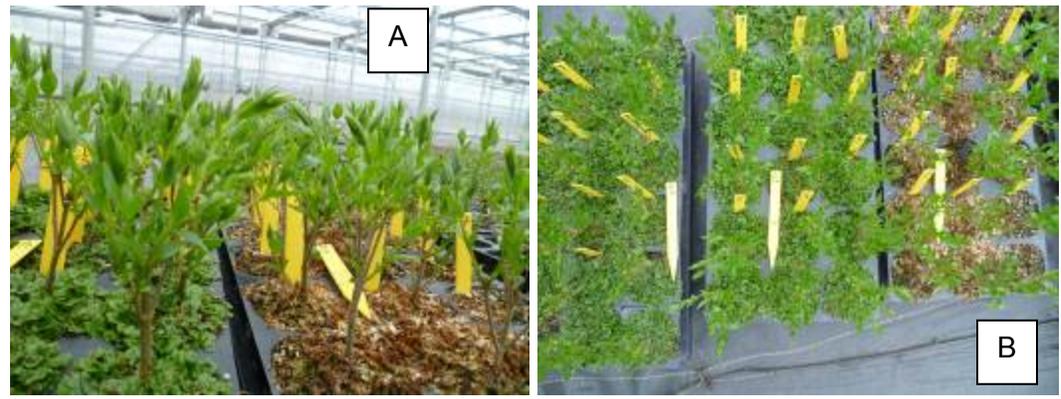


Fig. 3. (A and B). **A.** Side view of liverwort control with Dwarf Korean lilac (*Syringa meyeri* 'Palibin') at Spring Meadow Nursery at 2WAT left to right, MilStop® spray (2.5 lb./100 gallons) treatment and MilStop® powder (5g/ft²) treatment. **B.** Top view of liverwort control with Dwarf Korean lilac (*Syringa meyeri* 'Palibin') at Spring Meadow Nursery at 2WAT left to right, Control, MilStop® spray and MilStop® powder.

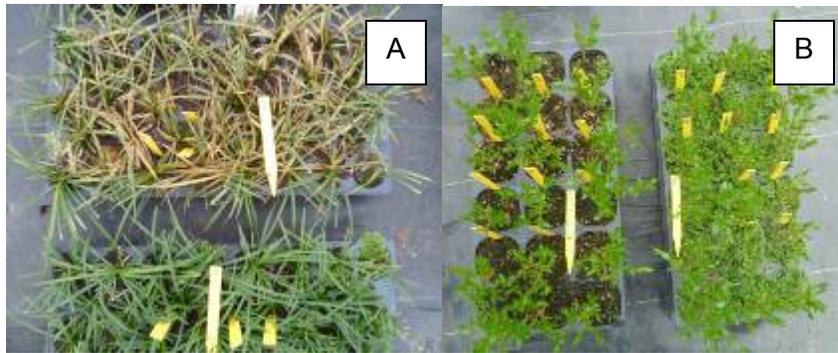


Fig. 4 A. Liriope (*Liriope spicata*) at Northland Farms 2 WAT showing contact burn symptoms from MilStop® powder application (top) versus control (bottom). **B.** Baking soda application at 10 g/ ft² at Spring Meadow Nursery 2WAT on Dwarf Korean lilac (*Syringa meyeri* 'Palibin') (left) versus control (right).

Table 2. Phytotoxicity of several ornamental species from various liverwort control products at two nurseries near Grand Haven, MI.							
<i>Hydrangea</i> 'Invincibelle Spirit'							
Treatment	Rate	1 WAT ^z	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
Baking Soda	10 g/ft ²	--	--	7.8 ^{yx} **	7.8 **	8.3 **	8.7 **
MilStop	2.5 lbs./100 gal	--	--	0.1	2.9 *	2.3	0.0
SureGuard	3 oz./ac	--	--	2.4	6.2 **	9.5 **	9.6 **
SureGuard	4 oz./ac	--	--	2.9 *	5.7 **	9.3 **	8.2 **
WeedPharm	5%	--	--	1.0	4.6 **	4.5	1.3
WeedPharm	10%	--	--	1.2	4.3 **	3.7	3.0 **
MilStop	2.5 tbsp./flat	--	--	1.0	3.0 **	3.9	2.2 **
Untreated	--	--	--	0.8	0.8	2.8	0.0
<i>Ilex verticillata</i> 'Winter red'							
Treatment	Rate	1 WAT	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
Baking Soda	10 g/ft ²	--	--	3.0 **	4.3 **	4.9 **	4.5 *
MilStop	2.5 lbs./100 gal	--	--	1.9 *	4.4 **	4.0 **	2.2 **
SureGuard	3 oz./ac	--	--	2.0 *	5.4 **	9.9 **	7.2
SureGuard	4 oz./ac	--	--	1.9 *	5.9 **	9.7 **	6.2
WeedPharm	5%	--	--	0.4	4.7 **	4.8 **	4.5 *
WeedPharm	10%	--	--	1.3	4.9 **	4.8 **	7.3
MilStop	2.5 tbsp./flat	--	--	3.3 **	4.7 **	4.6 **	7.7
Untreated	--	--	--	0.0	0.1	1.8	7.9
<i>Viburnum rhytidophyllum</i> 'Cree'							
Treatment	Rate	1 WAT	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
Baking Soda	10 g/ft ²	--	--	10.0	8.9	--	10.0 **
MilStop	2.5 lbs./100 gal	--	--	0.0	1.5 **	--	0.6 **
SureGuard	3 oz./ac	--	--	4.3	6.9	--	7.1
SureGuard	4 oz./ac	--	--	6.0	6.4	--	6.5
WeedPharm	5%	--	--	4.0	5.8	--	5.7
WeedPharm	10%	--	--	4.8	7.3	--	7.1
MilStop	2.5 tbsp./flat	--	--	--	8.7	--	9.2

Untreated	--	--	--	5.0	5.8	--	5.9
<i>Euonymus</i> 'Unforgettable fire'							
Treatment	Rate	1 WAT	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
Baking Soda	10 g/ft ²	--	--	4.7	4.4 **	4.3 **	5.3 **
MilStop	2.5 lbs./100 gal	--	--	3.5	0.1 **	2.3 **	3.3
SureGuard	3 oz./ac	--	--	4.3	7.4	7.7	8.8 **
SureGuard	4 oz./ac	--	--	4.4	6.4	6.8	9.5 **
WeedPharm	5%	--	--	1.9	5.3 **	5.2 **	4.3
WeedPharm	10%	--	--	4.3	7.8	7.9	4.3
MilStop	2.5 tbsp./flat	--	--	4.8	7.1	7.0	4.2
Untreated	--	--	--	3.7	8.8	9.0	2.9
<i>Syringa patula</i> 'Miss Kim'							
Treatment	Rate	1 WAT	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
Baking Soda	10 g/ft ²	--	--	0.0	3.7 **	4.8 **	8.4 **
MilStop	2.5 lbs./100 gal	--	--	2.8 **	0.9	1.8 *	1.5
SureGuard	3 oz./ac	--	--	0.0	4.8 **	9.0 **	6.0 **
SureGuard	4 oz./ac	--	--	0.0	5.2 **	9.0 **	6.3 **
WeedPharm	5%	--	--	0.0	0.0	3.5 **	3.0 **
WeedPharm	10%	--	--	0.8 *	3.8 **	5.4 **	5.0 **
MilStop	2.5 tbsp./flat	--	--	0.0	1.3	1.3	0.2
Untreated	--	--	--	0.0	0.0	0.0	0.0
<i>Hosta</i> 'Halcyon'							
Treatment	Rate	1 WAT	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
SureGuard	3 oz./ac	--	--	--	3.3 **	3.5 **	5.0 **
WeedPharm	5% v/v	--	--	--	4.0 **	3.0 **	2.0
MilStop	5 g/ft ²	--	--	--	3.0 **	2.8 **	2.8
Baking Soda	2.2 g/ft ²	--	--	--	0.0	0.0	--
Untreated	--	--	--	--	0.0	0.3	0.8
<i>Dryopteris erythrosora</i> Autumn Fern							
Treatment	Rate	1 WAT	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
SureGuard	3 oz./ac	0.0	0.0	0.0	0.8	1.5	3.0
WeedPharm	5% v/v	0.8	1.3	2.3	2.8	2.3	0.8
MilStop	5 g/ft ²	3.0 **	2.8 **	5.3 **	5.0 **	5.0 *	6.3 **
Baking Soda	2.2 g/ft ²	0.3	0.5	2.3	1.3	0.3	--
Untreated	--	0.0	0.0	2.0	1.5	2.0	2.0
<i>Perovskia atriplicifolia</i> Russian sage							
Treatment	Rate	1 WAT	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
SureGuard	3 oz./ac	--	--	--	5.8 *	7.3	6.5 *
WeedPharm	5% v/v	--	--	--	7.0 **	6.5	6.0 *
MilStop	5 g/ft ²	--	--	--	8.5 **	8.3	5.0
Baking Soda	2.2 g/ft ²	--	--	--	0.0	2.5	--
Untreated	--	--	--	--	0.0	2.5	0.0
<i>Liriope spicata</i>							

Treatment	Rate	1 WAT	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
SureGuard	3 oz./ac	0.0	0.0	0.0	4.5 **	4.3 **	4.0 **
WeedPharm	5% v/v	0.0	0.0	0.0	2.8 *	3.5 **	3.0 *
MilStop	5 g/ft ²	5.5 **	7.5 **	6.8 **	5.8 **	5.8 **	6.3 **
Baking Soda	2.2 g/ft ²	1.5	2.8 **	1.8 **	1.0	2.0	--
Untreated	--	0.0	0.0	0.0	0.0	0.0	0.0

<i>Syringa meyeri</i> 'Palibin'							
Treatment	Rate	1 WAT	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
SureGuard	3 oz./ac	--	--	--	7.5 **	9.8 **	9.8 **
WeedPharm	5% v/v	--	--	--	4.3 **	6.0 **	5.3 **
MilStop	5 g/ft ²	--	--	--	3.3 **	3.0 **	2.5 **
Baking Soda	2.2 g/ft ²	--	--	--	0.0	0.0	--
Untreated	--	--	--	--	0.0	0.0	0.0

z = WAT: weeks after first treatment; WA2T: weeks after second treatment
y = Phytotoxicity visual ratings based on a 0-10 scale with 0 being no phytotoxicity and 10 death with ≤3 commercially acceptable
x = Treatment means followed by *,** are significantly different from the control, based on Dunnett's t-test (α = 0.10 and 0.05, respectively)



Fig. 5 (A and B). A. SureGuard at 3 oz. /ac (left) compared to the untreated control (left) showing a dramatic decrease in growth caused by the liverwort infestation 10 WAT on *Hydrangea* Invincibelle Spirit.' B. The thick thallus mat of a liverwort infestation is the cause of the growth reduction.

Accomplishing Objectives 1, 2 and 3: Preemergence herbicide efficacy, phytotoxicity from in-season container and field nursery trials:

Three cooperating nurseries located near Grand Haven, MI were selected as sites for the container and field trials, which included Berryhill Family of Nurseries (BFN, formerly Zelenka Nursery), Spring Meadow Nursery, Inc., and Northland Farms Nursery, LLC. At BFN, containerized and field trials were carried out, while at Spring Meadow and Northland Farms, only containerized trials were performed. The trade and common names and manufacturers of the herbicides used are as follows: Tower (dimethenamid-p) + Pendulum (pendimethalin, BASF Corp.), FreeHand (dimethenamid-p + pendimethalin, BASF Corp.), Biathlon (oxyfluorfen + prodiamine, OHP, Inc.), F6875SC (sulfentrazone +prodiamine, FMC), Gallery (isoxaben, Dow Agro Sciences + Barricade (prodiamine, Syngenta), SureGuard 51 WDG (flumioxazin, Valent

U.S.A) + Surflan (oryzalin, Dow Agro Sciences) and Indaziflam G (Bayer Corp.). Phytotoxicity evaluations were performed at 1 WA1T (week after first treatment), 2 WA1T, 4 WA1T, 1 WA2T (weeks after second treatment), 2 WA2T, and 4WA2T. Visual ratings were performed on a scale of 0-10 with 0 being no phytotoxicity, 10 being dead, and ≤ 3 commercially acceptable. All liquid treatments were applied with a CO₂ backpack sprayer with a spray volume of 20 gal/ac using nozzles delivering 0.15 gal/ min/ nozzle and the nozzle spacing at 12 inches. Field plots included 3X 3 ft. areas for liner beds in each replication, with 4 replications/ rate for each variety.

For the containerized portion at BFN, species selected included: daylily, (*Hemerocallis* 'Stella d'Oro'), elderberry (*Sambucus nigra* Blacklace™), barberry (*Berberis thunbergii* 'Crimson Pygmy'), purple coneflower (*Echinacea purpurea* 'Purple Magnus'), and euonymus (*Euonymus fortunei* 'Emerald & Gold'). The species selected for the field trial at BFN included common lilac (*Syringa* 'Common Purple') and compact euonymus (*Euonymus alatus* 'Compacta'). For the containerized portion at Northland Farms, species selected included daylily (*Hemerocallis* 'Stella d'Oro'), elderberry (*Sambucus nigra* Blacklace™), barberry (*Berberis thunbergii* 'Crimson Pygmy'), purple coneflower (*Echinacea purpurea* 'Purple Magnus'), and euonymus (*Euonymus fortunei* 'Emerald & Gold'). Species selected at Spring Meadow included rose (*Rosa* 'Home Run RED'), barberry (*Berberis thunbergii* Sunjoy® Gold Beret 'Talago'), azalea Azalea Bloom-athon® Pink Double and viburnum (*Viburnum* Red Balloon™ 'Redell').

Herbicides selected for the containerized portion included: Indaziflam (Bayer Corp.) at 0.11, 0.22, and 0.44 lb. ai/ac on daylily; Tower + pendulum at 21 oz./ac + 2qt/ ac on daylily and viburnum; Gallery + Barricade at 1.0 lb. ai/ac + 0.66 lb. ai/ac on daylily, euonymus, elderberry and coneflower; FreeHand at 2.65, 5.3, and 10.6 lb. ai/ac on elderberry, viburnum, azalea and coneflower; Biathlon at 2.75 lb. ai/ac on azalea, coneflower, daylily and viburnum and F6875 at 0.375, 0.75, 1.5 lb. ai/ac on barberry, euonymus and daylily. The containerized trials were initiated on March 27, 2012, at all locations, with each location having at least 10 replications/ herbicide/ rate. Treatments were reapplied at six weeks after original treatments were applied. Pot sizes were one-gallon trade pots at BFN and Northland Farms and at Spring Meadow four inch pots were used.

Results and discussion.

Container trials: At BFN phytotoxicity occurred with *Berberis* 'Crimson pygmy' with F6875 1 and 2 WA1T at the 2X and 4X rate; however, the plants recovered from the injury by the end of the trial (Table 3 and Fig. 6).

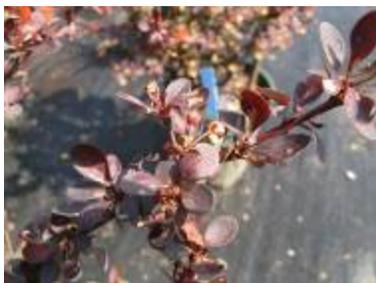


Fig. 6. Damage from F6875 at 4X rate on *Berberis thunbergii* 'Crimson pygmy' 2 WAT at BFN Nursery near Grand Haven, MI.

Injury also occurred on *Echinacea* 'Purple Magnus' with FreeHand at BFN and at Northland Farms. At Northland Farms the injury was just above commercially acceptable at the 4X rate 4WA2T (Table 3 and Fig. 7). At BFN the injury occurred after the second application at the 4X rate and at that time was just above commercially acceptable (Table 3). However, pictures taken during on August 12 of the BFN *Echinacea* indicated the stunting effect of the FreeHand had continued for the three months after the trial ended with severe root stunting also occurring (Fig. 8). Damage also occurred to *Echinacea* with Gallery + Barricade at Northland Farms (Table 3) (Fig. 9). Although the plants were starting to grow out of the injury at 4WAT (Fig. 9 B) the second application increased the injury through to the end of the trial (Table 3). The products that caused no injury are included in Tables 3 and 6.



Fig. 7. (left) Leaf distortion from FreeHand at 600 lbs. / ac on *Echinacea* 'Purple Magnus' at Northland Farms at 4 WAT. Picture by: Luke Case.



Fig. 8 (A and B). **A.** Side view of *Echinacea* 'Purple Magnus' at BFN, three months after the trial ended (August 12, 2012) showing severe root inhibition with FreeHand at the 4X rate (foreground) compared to the control (background). **B.** Front view of stunting caused by FreeHand at 4X rate (left) compared to the control (right). Pictures by: Hannah Mathers.



Fig. 9. (A and B). **A.** Damage from Gallery + Barricade at 1.0 lb. + 0.66 lb. ai/ac, respectively on *Echinacea* 'Purple Magnus' at Northland Farms at 2 WAT. **B.** Damage from Gallery + Barricade at 1.0 lb. + 0.66 lb. ai/ac, respectively on *Echinacea* 'Purple Magnus' at Northland Farms at 4 WAT. Picture A: Luke Case, Picture B: Hannah Mathers.

Hemerocallis was injured at BFN with Biathlon, Tower + Pendulum, Indaziflam at all rates and F6875 at all rates (Table 3). *Hemerocallis* was also injured at Northland Farms with Indaziflam at the 4X rate (Table 3). The injury from Biathlon, Tower + Pendulum and F6875 at 1 and 2X was transitory and no injury was present by the end of the trial (Table 3). However, the injury from indaziflam at all rates (Fig. 10) and F6875 at the 4X rate persisted (Table 3). The F6875 injury at the 4X rate was still apparent in August 2012 or three months after the trial ended (Fig. 11). The products that caused no injury are listed in Tables 3 and 6.



Fig. 10. Damage Indaziflam (left to right) control, 1X, 2X and 4X (800 lb. /ac) on *Hemerocallis* 'Stella d'Oro' at 4 WA2T at Northland Farms. Notice that the new leaves are yellow and drooping down. Picture by: H. Mathers



Fig. 11. (left) Damage on *Hemerocallis* 'Stella d'Oro' from F6875. Picture taken Aug. 12, 2012, three months after the trial ended. From front to back, control, 1X, 2X and 4X. Notice the severe stunting with the 4X rate. Picture by: Hannah Mathers.

Damage also occurred on azalea and viburnum at Spring Meadow from Tower + pendulum (Table 3). The damage on azalea (Fig. 12) was worse than on viburnum (Fig. 13). The products that caused no injury are included in Tables 3 and 6.



Fig. 12. (left) Tower + Pendulum at 21 oz. + 2 qtr. /ac, respectively, on *Azalea* 'Bloom-a-thon Pink Double' (right) vs. control (left) at Spring Meadow Nursery at 2 WAT.

Fig. 13. (left) Tower + Pendulum damage (left) compared to untreated (right) *Viburnum* x 'Red Balloon' at 21 oz. + 2 qtr. respectively at 2 WAT at Spring Meadow Nursery.



Table 3. Phytotoxicity from various herbicides on several ornamental species located at three nurseries near Grand Haven, MI

Sambucus 'Blacklace'

Treatment	Rate/ac	Location	1 WAT ^z	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
FreeHand	150 lb.	BFN	0.0	0.0	0.0	0.0	2.2 **	0.0
FreeHand	300 lb.	BFN	0.3	0.2	0.0	1.8 **	2.6 **	0.0
FreeHand	600 lb.	BFN	0.3	0.2	0.5	0.0	0.4	0.0
Untreated	--	BFN	0.2	0.3	0.0	0.0	0.0	0.0

Berberis 'Crimson pygmy'

Treatment	Rate/ac	Location	1 WAT	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
F6875	0.375 lb. ai	BFN	1.9 **	1.1 **	--	1.2	0.4	0.3
F6875	0.75 lb. ai	BFN	3.0 **	2.5 **	--	1.6 **	1.0 **	0.3
F6875	1.5 lb. ai	BFN	3.7 **	3.5 **	--	2.8 **	2.4 **	0.6
Untreated	--	BFN	0.0	0.0	--	0.5	0.2	0.2

Echinacea 'Purple Magnus'

Treatment	Rate/ac	Location	1 WAT	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
Biathlon	100 lb.	BFN	1.4	2.0 **	1.0	1.8	2.5 **	2.9 **
FreeHand	150 lb.	BFN	0.8	0.7	0.2	1.1	1.1	3.1 **
FreeHand	300 lb.	BFN	0.4	0.2	0.6	1.2	2.3 **	2.0
FreeHand	600 lb.	BFN	1.3 *	0.5	0.5	3.3 **	3.3 **	3.2 **
Untreated	--	BFN	0.5	0.4	0.8	1.5	0.8	0.9

Euonymus 'Emerald and Gold'

Treatment	Rate/ac	Location	1 WAT	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
Gallery + Barricade	1 lb. ai + 0.66 lb. ai	BFN	0.0	0.0	1.0	0.0	0.2	3.0 **
F6875	0.375 lb. ai	BFN	0.2	0.3	0.2	0.6 **	0.8	0.0
F6875	0.75 lb. ai	BFN	0.0	0.2	0.6	0.2	0.3	0.0
F6875	1.5 lb. ai	BFN	0.4	0.1	0.5	1.5 **	1.6 **	0.3
Untreated	--	BFN	0.2	0.1	0.8	0.0	0.0	0.1

Hemerocallis 'Stella d'Oro'

Treatment	Rate/ac	Location	1 WAT	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
Biathlon	100 lb.	BFN	1.9 **	3.9 **	3.8 **	0.5	0.8 **	1.9 **
Tower + Pendulum	21 fl. oz. + 2 qtr.	BFN	5.4 **	5.0 **	3.9 **	0.5	1.5 **	0.3
Gallery + Barricade	1 lb. ai + 0.66 lb. ai	BFN	0.6	0.3	0.0	0.0	0.2	0.4
Indaziflam	200 lb.	BFN	0.8	3.3 **	3.1 **	0.0	0.1	1.5 **
Indaziflam	400 lb.	BFN	1.5 **	3.7 **	3.3 **	1.8 **	2.3 **	3.5 **

Indaziflam	800 lb.	BFN	1.5	**	3.7	**	3.8	**	3.0	**	3.7	**	4.0	**
			5.5		4.9		3.8		1.4		1.7		2.5	
F6875	0.375 lb. ai	BFN		**		**		**		**		**		**
F6875	0.75 lb. ai	BFN	5.9	**	5.2	**	3.7	**	2.6	**	2.9	**	2.9	**
F6875	1.5 lb. ai	BFN	7.1	**	5.6	**	5.3	**	3.9	**	5.1	**	5.7	**
Untreated	--	BFN	0.4		0.0		0.0		0.0		0.0		0.5	

Sambucus 'Blacklace'

Treatment	Rate/ac	Location	1 WAT		2 WAT		4 WAT		1 WA2T		2 WA2T		WA2T	4
FreeHand	150 lb.	Northland Farms	0.0		0.3		0.2		0.3		0.0		0.7	
FreeHand	300 lb.	Northland Farms	0.0		0.1		0.3		0.7		2.8	**	0.4	
FreeHand	600 lb.	Northland Farms	0.0		0.1		1.3	**	2.0	**	2.3	**	2.3	**
Gallery + Barricade	1 lb. ai + 0.66 lb. ai	Northland Farms	0.0		0.8	**	1.1	*	0.0		3.0	**	0.9	
Untreated	--	Northland Farms	0.0		0.1		0.0		0.0		0.0		0.0	

Echinacea 'Purple Magnus'

Treatment	Rate/ac	Location	1 WAT		2 WAT		4 WAT		1 WA2T		2 WA2T		WA2T	4
Gallery + Barricade	1 lb. ai + 0.66 lb. ai	Northland Farms	4.4	**	4.4	**	3.5	**	6.8	**	7.7	**	4.2	**
FreeHand	150 lb.	Northland Farms	0.5		0.5		1.0		1.2		2.3	**	2.0	**
FreeHand	300 lb.	Northland Farms	0.8	**	1.0		2.3	**	1.8	**	4.6	**	2.3	**
FreeHand	600 lb.	Northland Farms	0.3		1.0		2.4	**	1.6	**	2.4	**	3.2	**
Untreated	--	Northland Farms	0.0		0.2		0.1		0.1		0.0		0.0	

Euonymus 'Emerald and Gold'

Treatment	Rate/ac	Location	1 WAT		2 WAT		4 WAT		1 WA2T		2 WA2T		WA2T	4
F6875	0.375 lb. ai	Northland Farms	0.4		0.3		0.3		0.0		0.0		0.0	
F6875	0.75 lb. ai	Northland Farms	0.4		0.5		0.6		0.3		0.0		0.0	
F6875	1.5 lb. ai	Northland Farms	1.1	**	1.6	**	1.3	**	1.5	**	0.0		0.0	
Gallery + Barricade	1 lb. ai + 0.66 lb. ai	Northland Farms	0.2		0.2		0.5		0.2		0.0		0.0	
Untreated	--	Northland Farms	0.2		0.2		0.1		0.0		0.0		0.0	

Hemerocallis 'Stella d'Oro'

Treatment	Rate/ac	Location	1 WAT		2 WAT		4 WAT		1 WA2T		2 WA2T		WA2T	4
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Indaziflam	200 lb.	Northland Farms	0.2	3.2	**	2.7	**	1.6	1.0	1.4
Indaziflam	400 lb.	Northland Farms	0.0	3.4	**	2.2	**	2.5	2.7	2.8
Indaziflam	800 lb.	Northland Farms	0.5	4.3	**	2.8	**	3.7	4.4	5.0
Gallery + Barricade	1 lb. ai + 0.66 lb. ai	Northland Farms	0.5	1.1		0.2		0.4	0.8	0.0
Untreated	--	Northland Farms	0.4	0.3		0.2		0.3	0.0	0.0

Berberis thunbergii SUNJOY Gold Beret ('Talago')

Treatment	Rate/ac	Location	1 WAT	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
FreeHand	150 lb.	Spring Meadow	0.0	0.8	1.3	0.7	1.3	2.8
Untreated	--	Spring Meadow	0.0	1.5	1.9	1.0	0.8	0.0

Rosa x HOME RUN RED ('WEKcibako')

Treatment	Rate/ac	Location	1 WAT	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
Indaziflam	200 lb.	Spring Meadow	0.7	3.1	2.4	0.9	0.0	0.2
Untreated	--	Spring Meadow	0.3	3.4	2.5	0.4	0.0	0.2

Viburnum x RED BALLOON ('Redell')

Treatment	Rate/ac	Location	1 WAT	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
Biathlon	100 lb.	Spring Meadow	0.0	0.3	0.0	0.0	0.0	0.0
Tower + Pendulum	21 fl. oz. + 2 qtr.	Spring Meadow	2.8	3.7	3.7	3.6	3.8	2.9
FreeHand	150 lb.	Spring Meadow	0.3	0.0	0.0	0.2	0.0	0.0
Untreated	--	Spring Meadow	0.0	0.2	0.0	0.4	0.0	0.5

Azalea 'BLOOM-A-THON Pink Double'

Treatment	Rate/ac	Location	1 WAT	2 WAT	4 WAT	1 WA2T	2 WA2T	4 WA2T
Biathlon	100 lb.	Spring Meadow	0.1	0.0	0.0	0.0	0.0	0.0
Tower + Pendulum	21 fl. oz. + 2 qtr.	Spring Meadow	0.0	3.7	3.9	4.1	4.1	4.9
FreeHand	150 lb.	Spring Meadow	0.0	0.3	0.0	0.1	0.0	0.0
Untreated	--	Spring Meadow	0.3	0.0	0.0	0.0	0.0	0.0

z = WAT: weeks after first treatment; WA2T: weeks after second treatment
y = Phytotoxicity visual ratings based on a 0-10 scale with 0 being no phytotoxicity and 10 death with ≤3

commercially acceptable

x = Treatment means followed by *,** are significantly different from the control, based on Dunnett's t-test ($\alpha = 0.10$ and 0.05 , respectively)

Field trials. Due to frost events and cool, wet weather in the early part of the season, we were unable to start the field evaluations until May, 2012. Due to the late start we were only able to evaluate the field trials until 4 WAT. No second applications were performed. Even with the short evaluation time, commercially acceptable weed control was only evident with two products 4WAT, Tower + Pendulum and SureGuard + Surflan (Table 4). The similar control of Tower + Pendulum to SureGuard + Surflan indicates its utility as a replacement product to this industry standard, SureGuard.

Table 4. Treatment efficacy (weed control) in the field at BFN nursery in Michigan, May – July, 2013.

Treatment	Rate/ac	Location	1 WAT ^z		2 WAT		4 WAT	
Biathlon	100 lb.	BFN	7.8 ^y	ab	8.4	bc	5.9	c
	21 fl. oz. + 2 qtr.		9.5		9.7		8.2	
Tower + Pendulum		BFN		a		ab		ab
Indaziflam	200 lb.	BFN	6.8	bc	8.3	c	5.6	c
Indaziflam	400 lb.	BFN	8.0	a	9.0	abc	6.8	abc
Indaziflam	800 lb.	BFN	6.8	bc	8.3	c	6.9	abc
SureGuard + Surflan	12 oz. + 2 qtr.	BFN	9.8	a	9.8	a	8.7	a
F6875	0.375 lb. ai	BFN	8.0	a	8.2	c	6.1	bc
Untreated	--	BFN	5.8	c	6.0	d	3.4	d

z = WAT: weeks after first treatment

y = Efficacy visual ratings based on a 0-10 scale with 10 being complete control, 0 no control and ≤ 7 commercially acceptable.

Treatment means followed by similar letters mean they are not significantly different from each other, based on lsmeans ($\alpha = 0.05$)

Due to frost events early in spring, above commercially acceptable injury persisted on the *Syringa* 'Common purple' for the duration of the trial as evidenced by the control (Table 5) in BFN fields. However, the *Euonymus* 'Compacta' did not have above commercially acceptable injury from frosts (Table 5). Usually products that have high efficacy also have high phytotoxicity. The *Syringa* in this trial supports this generality (Table 5). Even with the high phytotoxicity in the controls the damage caused to the BFN *Syringa* from over-the-top sprays of Tower + Pendulum and SureGuard + Surflan stand out as above commercially acceptable injury (Table 5). On the *Euonymus* the SureGuard + Surflan also caused very high phytotoxicity (7.4) (Table 5) (Fig. 13). Fig. 13 shows almost total kill from the application of SureGuard + Surflan on some *Euonymus* compared to a 4X rate of Indaziflam. The F6875 also caused above commercially acceptable injury 4WAT (3.5) on *Euonymus* (Table 5). F6875 also caused injury on *Syringa* in the field; however, taking into account the high phytotoxicity of the control, we could not confirm the level of injury from the F6875 to *Syringa*. There was no injury from Tower + Pendulum on *Euonymus*. In past SCBGs applications of Tower + Pendulum have caused no injury to *Syringa*, and it may have been possible that the existing injury to the *Syringa* was a causal factor the injury we found in this SCGB. Treatments that caused no injury in field trials are listed in Tables 5 and 6.



Fig. 13. Indaziflam at 800 lbs./ac (foreground) (1st stake- three plants following) , causing no phytotoxicity compared to SureGuard + Surflan at 12 oz. + 2 qtr./ac, respectively (background) (2nd stake – three plants following) on *Euonymus alatus* 'Compacta' at BFN Nursery, Grand Haven, MI, Spring 2012. Picture by: Luke Case.

Table 5. Phytotoxicity from various herbicides on several ornamental species located at Berry Family Nursery, Grand Haven, MI.

Syringa 'Common purple'		Location	1 WAT ^z	2 WAT	4 WAT	
Treatment	Rate/ac					
Tower + Pendulum	21 fl. oz. + 2 qtr.	BFN	4.3 ^y	4.8	7.5	**
Indaziflam	200 lb.	BFN	3.5	3.4	6.1	
Indaziflam	400 lb.	BFN	3.8	3.2	5.4	
Indaziflam	800 lb.	BFN	4.1	4.3	5.0	
SureGuard + Surflan	12 oz. + 2 qtr.	BFN	9.7 **	8.7 **	8.4 **	**
F6875	0.375 lb. ai	BFN	6.5 **	4.7 **	5.0	**
Untreated	--	BFN	3.3	2.9	4.6	

Euonymus alatus 'Compacta'		Location	1 WAT	2 WAT	4 WAT	
Treatment	Rate/ac					
Biathlon	100 lb.	BFN	1.2	0.3	1.8	
Tower + Pendulum	21 fl. oz. + 2 qtr.	BFN	1.5	1.5	1.7	
Indaziflam	200 lb.	BFN	0.9	1.2	2.5	
Indaziflam	400 lb.	BFN	1.7	0.9	2.3	
Indaziflam	800 lb.	BFN	1.9	1.7	2.6	
SureGuard + Surflan	12 oz. + 2 qtr.	BFN	9.5 **	9.3 **	7.4 **	**
F6875	0.375 lb. ai	BFN	2.7	2.2 *	3.5 **	**
Untreated	--	BFN	1.2	0.3	1.5	

z = WAT: weeks after first treatment
y = Phytotoxicity visual ratings based on a 0-10 scale with 0 being no phytotoxicity and 10 death with ≤3 commercially acceptable.
Treatment means followed by *,** are significantly different from the control, based on Dunnett's t-test (α = 0.10 and 0.05, respectively)

Table 6. Summary of all herbicides and crops that experienced **no phytotoxicity** at the three MI sites in 2012.

Herbicide	No phytotoxicity	Comments
Indaziflam	<i>Rosa</i> 'Home Run Red'	
	<i>Euonymus</i> 'Compacta'	Field
Biathlon	<i>Viburnum</i> 'Red Balloon'	1X
	<i>Euonymus</i> 'Compacta'	1X field

	<i>Azalea</i> 'Pink Double'	1X
	<i>Hemerocallis</i> 'Stella d oro'	1 application
FreeHand	<i>Viburnum</i> 'Red Balloon'	1X
	<i>Sambucus</i> 'Black Lace'	(Caution: Make sure it does not hang up at base)
	<i>Azalea</i> 'Pink Double'	1X
	<i>Berberis</i> Sunjoy	1X
Tower + pendulum	<i>Euonymus</i> 'Compacta'	Field
Gallery + Barricade	<i>Hemerocallis</i> 'Stella d oro'	
	<i>Sambucus</i> 'Black Lace'	
	<i>Euonymus</i> 'Emerald & Gold'	
F6875SC	<i>Euonymus</i> 'Emerald & Gold'	

Accomplishing Objectives 3: Further preliminary studies were conducted regarding objective 3 to identify specific weed control approaches for highly specific weed issues in MI nurseries such as mugwort (*Artemisia vulgaris* L) and Yellow nutsedge (*Cyperus esculentus*):

Preliminary Field Trial Results. At Northland Farm in a yellow nutsedge trial, Tower + Pendulum provided the best control in the field with an above commercially acceptable control rating 4WAT (Table 7).

Table 7. Northland Farms, Yellow nutsedge trial.

Treatment	Rate/ac	Taxus	Sedge Control
Biathlon		0.2 ^z	3.0 ^x bc
Tower + Pendulum		0.9 **	7.3 a
FreeHand		0.0	5.3 ab
Indaziflam		0.0	4.0 abc
Untreated		0.0	0.0 c

z = Ratings are based on a 0-10 scale with 0 being no phytotoxicity and 10 death, with ≤ 3 commercially acceptable. Ratings are averaged over 3 dates of evaluation.

Treatment means followed by *,** are significantly different from the control, based on Dunnett's t-test ($\alpha = 0.10$ and 0.05 , respectively).

x = Efficacy ratings are based on a 0-10 scale with 0 being no weed control and 10 perfect weed control with ≥ 7 commercially acceptable. Ratings are averaged over all evaluations.

Efficacy ratings in the same column followed by the same letter are not significantly different based on lsmeans ($\alpha = 0.05$)

At BFN a preliminary postemergence trial in a heavy infestation of mugwort (*Artemisia vulgaris* L) (Fig. 14) four products showed promise for continued trials in 2013, Lontrel[®] (Clorpyralid) (Fig. 15E), Certainty (Sulfosulfuron, Monsanto Corp.) (Fig. 15B), Riverdale[®] Corsair[™] (Chlorsulfuron, NuFarms America Inc., IL) (Fig. 15C) and SedgeHammer (Halosulfuron-methyl, Gowan Co., AZ) (Fig. 15D) versus the control (Fig. 15 A) (Table 8). These four products also provided minimal phytotoxicity (Table 8) at 4 WAT.



Fig. 14. Mugwort or false chrysanthemum (*Artemisia vulgaris*.) is a non-native perennial aster. Mugwort foliage appears similar to common ragweed (*Ambrosia artemisiifolia*) and ornamental chrysanthemums (*Chrysanthemum* spp.). Unlike those weeds, the lower surfaces of mugwort leaves are covered with a dense, silver-white pubescence. Mature *A. vulgaris* stems, which can grow 2 m (6 ft.) tall, yield rankly aromatic flower heads. It disperses in nurseries and landscape plantings primarily by rhizomes transported on contaminated cultivation

equipment and nursery crops. Once established, mugwort rhizomes gradually expand outward, excluding other plants and forming a dense, monotypic stand. It has named one of the 10 most problematic weeds in nurseries of the eastern U.S.

Table 8. Berry Family Nurseries, Mugwort trial.

Treatment	Rate/ac	Buxus	Efficacy
Basagran	2 pt.	0.1 ^z	1.5 ^x cd
V-10233		3.8 **	5.3 b
Pennant Magnum	2 pt.	0.3	0.8 d
Lontrel	1 pt.	1.9 **	8.0 a
Certainty	0.06 lb. ai	2.3 **	7.5 a
F6875	0.375 lb. ai	2.9 **	3.8 bc
Corsair	5.5 oz.	1.8 **	8.3 a
SedgeHammer	0.125 lb. ai	1.2 *	7.8 a
Untreated	--	0.0	0.0 d

z = Ratings are based on a 0-10 scale with 0 being no phytotoxicity and 10 death, with ≤ 3 commercially acceptable. Ratings are averaged over 3 dates of evaluation.

Treatment means followed by *, ** are significantly different from the control, based on Dunnett's t-test ($\alpha = 0.10$ and 0.05 , respectively).

x = Efficacy ratings are based on a 0-10 scale with 0 being no weed control and 10 perfect weed control with ≥ 7 commercially acceptable. Ratings are averaged over all evaluations. Efficacy ratings in the same column followed by the same letter are not significantly different based on lsmeans ($\alpha = 0.05$).

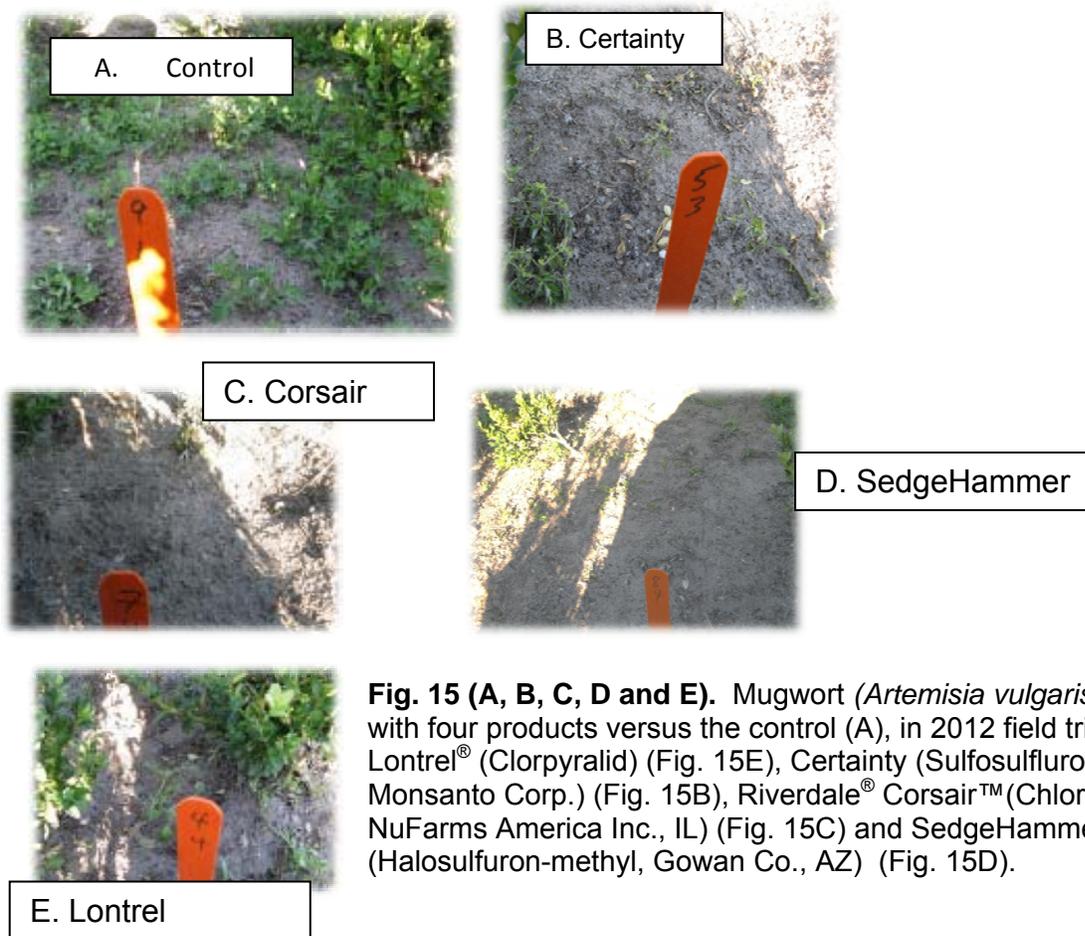


Fig. 15 (A, B, C, D and E). Mugwort (*Artemisia vulgaris* L) control with four products versus the control (A), in 2012 field trials at BFN, Lontrel[®] (Clorpyralid) (Fig. 15E), Certainty (Sulfosulfuron, Monsanto Corp.) (Fig. 15B), Riverdale[®] Corsair[™] (Chlorsulfuron, NuFarms America Inc., IL) (Fig. 15C) and SedgeHammer (Halosulfuron-methyl, Gowan Co., AZ) (Fig. 15D).

BENEFICIARIES

Beneficiaries. Beneficiaries from these trials were the nursery managers and staff that were involved in the trials at the three sites in MI. However, in 2012, 16 extension/ research presentations were also given with results from these trails. Nine of these were in MI benefiting 550 attendees. The remainder were conducted in-Ohio, IN and IA and benefited 2069 attendees from landscape, lawn care, nursery, arboriculture and garden center backgrounds. All of the MI presentations were invited and were for industry organized events. This indicates the value and demand for this information to industry members. All of the presentations in OH, IN and IA were also invited with 65% organized by university, extension or government agencies indicated the high demand for the information from agencies that promote current information to their audiences. One technical report and four contributed articles to technical reports were completed in association with this project. Three papers in proceeding and nine trade articles were published using information obtained from this project. It is estimated that between the 16 presentations that were given and the nine trade articles published we reached over 5000 people in the MI ornamental industry.

LESSONS LEARNED

We started the trials very early in the spring to be representative of normal industry pre-emergence herbicide timing; however, we encountered numerous frost events with somewhat impeded our ability to diagnosis injury at some sites. In the future we will start the trials later in the spring to ensure frost events have past.

CONTACT PERSON

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ADDITIONAL INFORMATION

PROJECT TITLE

Chestnut Growers Inc.-Improving the Quality of Michigan-Grown Chestnuts - FINAL

PROJECT SUMMARY

Michigan is developing a new chestnut industry which means finding the right chestnut cultivars combining the qualities the market will accept with the yields that will sustain growers. The European X Japanese hybrid chestnut cultivar 'Colossal' is a high yielding cultivar that produces large tasty nuts. These are traits valued by both growers and buyers. However, this tree also produces nuts that show an affliction called internal kernel breakdown (IKB) where the kernel of the nut appears rotted and decayed. Up to 30 percent of the 'Colossal' chestnuts on some farms may produce chestnut with symptoms of IKB, while other farms will have no IKB present in 'Colossal' chestnuts. All chestnuts from the cooperative will be bulked, and both healthy and IKB-afflicted chestnuts may be sold by the cooperative.

Michigan chestnut growers, especially Chestnut Growers, Inc. pride themselves on a high quality chestnut product produced in Michigan and sold to consumers. Separation of IKB-afflicted nuts from healthy chestnuts is an imperfect system that can allow as much as 10 percent of the IKB nuts to pass into the supply stream. Interestingly, this chestnut decay problem, while looking similar to other infectious chestnut diseases, does not appear to be associated with a fungal or bacterial infection. Chestnuts grown abroad can be infected with nut pathogens and chestnuts in grown in Europe and states south of Michigan can be infested with weevils. So far, Michigan-grown chestnuts have been free of insects and diseases and except for IKB, the industry should be producing world-class quality chestnuts. Before this can happen the cause of IKB must be found and the problem eliminated or managed. The motivation behind this study was to discover the cause of IKB so this major problem of the nascent chestnut industry can be remedied, if possible.

This project did not build on an SCBGP or SCBGP-FB.

PROJECT APPROACH

Based on the pattern of internal kernel breakdown (IKB) appearing on chestnut farms in Michigan, we hypothesized pollen from certain chestnuts was responsible for the affliction. To test this hypothesis, we added pollen from various pollen sources to the female flowers of the European X Japanese cultivar 'Colossal'. This included pollen from Chinese and European X Japanese hybrid cultivars. In total, more than 1,400 'Colossal' flowers were pollinated by cultivars representing European X Japanese hybrids, yielding 830 nuts. Of these nuts, less than 0.3 percent had IKB, nowhere near the percentage of IKB found on some chestnuts farms in Michigan. In contrast, a total of 1,560 'Colossal' flowers were pollinated by a Chinese chestnut cultivar and 1,322 chestnuts were produced. Of these nuts, more than 28 percent had IKB, similar to the level observed on the farms in Michigan where IKB has been a problem. Therefore, these data strongly suggest pollen is the source of IKB and that Chinese chestnut pollen was the only pollen that incited IKB at levels similar to those observed on Michigan chestnut farms. These data should motivate growers to keep Chinese chestnut cultivars away from the higher yielding European X Japanese hybrids.

Researchers at Michigan State University, technical staff and undergraduate students performed this work at chestnut field plots established in the mid-Michigan area.

GOALS AND OUTCOMES ACHIEVED

To achieve our results, the following actions were taken in each plot: In April the trees were fertilized. Around mid-June, we labeled thousands of female flowers of 'Colossal' trees by flagging the flowers. After flagging they were covered with pollination bags to keep stray pollen off the target flowers until the selected pollen is brought to the flower. At the end of June and early July, pollen is collected from specific cultivars on the day of pollination by removing the mature male flowers (catkins) from the tree, placing them in plastic bags that are sealed tight, stored for the day in portable coolers with ice, and taken to the trees that were to be pollinated. The pollination bags are removed from the target female flowers and within one minute, the pollen, still attached to the catkin, is rubbed on the stigmata of the target flower, tied to the stem near the flower and recovered with the pollination bag. The pollination bags are removed from the female flowers at a time when it the flowers are considered safe from stray pollen. The bags are removed permanently from the flowers as soon as possible to allow the flowers to develop without the encumbrance of pollination bags touching them and blocking the sun. Controls are treated the same way, but no pollen is added to ensure that the pollen we brought to the plots is what caused the nuts to form. The trees are cared for during the summer months by spraying and irrigating as needed. In late August mesh onion bags were placed over each pollinated flower (now called a bur). Within these burs are potential nuts from the pollination event. In order to prevent the nuts from falling free of the labeled flags and losing the data, these bags

will hold the nuts with the burs in a manner that will keep the nuts from falling free. In October, the nuts are collected in the mesh onion bags and stored in a walk-in cooler until the nuts can be split open and observed for signs of IKB.

In addition, in spring 2012, we grafted onto 'Colossal' trees, 'Colossal' scion wood from farms known to produce IKB. These branches successfully grew but did not produce any flowers in 2012. Fruit from these branches will be monitored in future years to see if they follow the patterns associated with IKB from this study.

At the end of the 2011-growing season (October 2011), researchers harvested chestnuts from the cultivar 'Colossal' a European/Japanese hybrid cultivar that had been hand-pollinized by pollen from various cultivars at three different locations in the mid-Michigan area (East Lansing, Eaton Rapids, and Clarksville) during the 2011 growing season. Chestnuts were collected and split in half and observed for symptoms of internal kernel breakdown (IKB). Funding from this grant did not cover the 2011 growing season, but the analysis starting in October 2011, was part of this funding.

Funding from this grant covered the entire 2012 growing season. After a disastrous spring, which included an early season warm up, followed by a devastating frost, most fruit growers in the state were left without a crop. During these early season frost, chestnut flowers are not exposed, but terminal buds that give rise to the flowers are usually killed and therefore flowering is reduced or eliminated. As the season progressed, we found that the European X Japanese cultivar 'Colossal' was producing flowers from its lateral shoots. That we were able to perform these experiments was due to winter hardiness of 'Colossal', the multiple locations in which the experiments were performed and our ability to move pollen from plot to plot. Still, the cultivar 'Okei' and other cultivars we planned to use in our 2012 studies did not produce enough pollen to be included in the 2012 study.

Once the crosses were made in late June, record-breaking heat and drought followed. Because we were able to perform the experiments in field plots with irrigation (although water was shared and pumps were frequently broken due to overuse) we were able to repeat the crosses made in 2011 and one very important cross in 2012 that was not made in 2011. The cultivar 'Labor Day' is considered a Korean chestnut. However, botanically speaking, there is no recognized Korean species of chestnut. Korean chestnuts are either a Japanese chestnut grown in Korea or Chinese chestnut. These Korean chestnuts may play an integral role in Michigan chestnut orchards due to their unique traits. Morphologically, these trees appear more Japanese-like than Chinese and genetic tests will help determine relationships in future tests.

We believe that we have answered the question as to the cause of IKB and it is now up to growers to implement changes to manage the quality of their chestnut production.

We made the minimum necessary crosses to answer the question posed as to the cause of IKB. A full biochemical understanding of IKB could be initiated, but not as part of this proposal, nor are any planned.

Because the European X Japanese hybrid chestnut 'Colossal' is so widely grown in Michigan and because it was the nut IKB was commonly found in, we focused on that cultivar. But there are other European X Japanese hybrid cultivars available and we wanted to see if the pollen source affected them, too. Unfortunately, due to the frost, heat and drought, we were only able to get data from 'Colossal' because we have so many planted in field plots. The other cultivars are limited in number. Our work showed that 30 percent of the chestnuts produced by 'Colossal' when pollinated by Chinese chestnut can be afflicted with IKB. We also wanted to know if Chinese chestnut can get IKB when pollinized by European X Japanese hybrid cultivars.

This cannot be observed using the cultivar 'Colossal' since it is male sterile. Therefore, we wanted to use another European X Japanese cultivar "Precoce Migoule" to pollinize Chinese chestnut. We could not accomplish that in 2012 due to the weather events.

We did include a cultivar called 'Labor Day' which is thought to be Korean. Botanically it must be either a Chinese or Japanese chestnut as there are no Korean chestnuts *per se*. This cultivar did not induce IKB in 'Colossal' therefore 'Labor Day' acts more like the European X Japanese hybrids than the Chinese, which is indirect evidence that perhaps 'Labor Day' has European chestnut germplasm.

It is now clear from these data that the European X Japanese chestnut cultivar 'Colossal' (and probably all cultivars of European X Japanese hybrids) produces approximately 30 percent decayed nuts (called internal kernel breakdown, IKB) when pollinized by Chinese chestnut pollen. We do not know why or understand this completely, but we do know our experiments matched data reported from farms where Chinese chestnut trees pollinate 'Colossal' chestnuts. On farms where 'Colossal' is pollinized by chestnuts other than Chinese, this problem is not found and our data support this finding, also.

IKB is mentioned in the germplasm part of the website several times and the warning in the Handbook is up on the website. This was just based on our 2011 growing season data. The attachment below (IKB for web) came from that Handbook and is on the web. The web currently has warnings but not as obvious as that in the Handbook and we will place the warning on IKB in a more prominent position now that we have data from two growing seasons. AND we have changed the germ plasm chapter and now tell growers that they can grow the Korean cultivar 'Labor Day' with 'Colossal'. Other than verifying the 2011 data, the 'Labor Day' crosses with 'Colossal' was the most important discovery in 2012.

The meetings were mixtures of growers from Michigan and elsewhere, we will be presenting for the first time to the Michigan growers the results of the 2011 and 2012 combined IKB tests. Because of harvest, we do not meet in the fall or winter. We will discuss the results of the 2012 season at the Midwest Nut Producers Council meeting in Clarksville; this meeting is scheduled for March 30. The 2012 results were not harvested by the Michigan meeting during Labor Day or the West Virginia International meeting. The only results that have been published or discussed in public have been the 2011 results. Again, we have not presented the entire data set with both years together, since the data were collected and analyzed in November and December, 2012.

At least 20 member chestnut growers attended the workshop in September, 2012. As far as we know, all (100 %) new growers are planting only hybrids or Chinese but not both. Anyone who obtains information from MSU or purchases germ plasm from suggested nurseries such as Nash Nurseries (Owosso) or Forrest Keeling (Elsberry, MO) will be told about not mixing Chinese with hybrid germ plasm. Dr. Fulbright has met with the staff of both nurseries and has gone over this repeatedly.

Still because the 2011 data were surprising and important, we began telling the nurseries and the growers who were starting new orchards. This would include one grower planting 100 acres near Pawpaw, MI. He was informed and has made provisions for only growing hybrid chestnuts and not Chinese.

BENEFICIARIES

This information will benefit Chestnut growers in Michigan, other Midwest states, North America, Europe, Australia and wherever European X Japanese hybrid chestnuts are grown and

potentially pollinated by Chinese chestnuts. This includes, but is not limited to members of: Chestnut Growers, Inc., Midwest Nut Producers Council, Chestnut Growers of America, American Chestnut Foundation, Northern Nut Growers Association, Michigan Nut Growers Association (and other state Nut Grower Associations).

Michigan State University Researchers have been meeting with the Nursery Industry on an ongoing basis, and the following are the specific events that have occurred over the last year.

- Discussions with Nash Nurseries are ongoing at this nursery which is local, and they work closely with Michigan State University
- Discussions with Forrest Keeling (Feb. 6, 2012); Visit to talk with staff about the 2011 findings and IKB (10 staff people)
- In the June 2012 Northern Nut Growers Association's Annual Report on the 2011 IKB results a letter was written by Professor Fulbright (Preface to the Annual Report).
- Discussions at North American Chestnut Farm Workshop (August 29-Sept. 2, 2012)—General discussions about 2011 data (20 Michigan Chestnut Growers)
- Nash Nurseries (Michigan, sells to Michigan growers)
- Forrest Keeling Nursery (Missouri, sells to Michigan growers)
- Chestnut Hill Nursery (Florida, sells to Michigan growers)
- Washington State Nursery (Washington, sells to Michigan growers)
- Empire Chestnut Nursery (cannot sell to Michigan growers due to Asian Gall Wasp quarantine)

Forrest Keeling Nursery & MSU staff at the booths (over 300 growers visited the booth to discuss growing chestnut tree orchards and preventing IKB).

Great Lakes Expo (Dec. 4-6; two booths next to each other)—The 2012 data were analyzed and they were reported to the sales force who came to the meeting.

Our Michigan State University website www.chestnuts.msu.edu suggests growers purchase cultivars from Forrest Keeling.

Beneficiaries affected by the project's accomplishments and/or the potential economic impact of the project:

'Nevada' pollen results: Pollen from the European X Japanese hybrid cultivar 'Nevada' was placed on 'Colossal' flowers in July 2011 and 2012.

In 2011, of 506 burs collected in October, 405 full nuts were found. The resulting nuts were placed in a nut slicer and split open. After splitting, the kernel of each nut half was closely inspected for signs of IKB. When 'Nevada' was used as a pollen source, no IKB was observed in any of the nuts obtained from 'Colossal'.

In 2012, of 260 burs collected in October, 178 full nuts were found. Upon splitting and inspection, only one nut showed signs of IKB.

Summary: In two years, only one 'Colossal' chestnut showed IKB out of 583 nuts pollinized by 'Nevada' pollen. This is equivalent to less than 0.2 percent and considered negligible and considered zero. Therefore, 'Colossal' chestnuts pollinized with pollen from the cultivar 'Nevada' did not show symptoms of IKB.

'Precoce Migoule' pollen results: Pollen from the European X Japanese hybrid cultivar 'Precoce Migoule' was placed on 'Colossal' flowers in July 2011 and 2012.

In 2011, of 204 burs collected in October 47 full nuts were found. After splitting, the kernel of each nut was closely inspected for signs of IKB. When 'Precoce Migoule' was used as a pollen source, no IKB was observed in any of the nuts obtained from 'Colossal'.

In 2012, of 195 burs collected in October, only 10 full nuts were found. Upon splitting and inspection, no nuts showed signs of IKB.

Summary: In two years, no 'Colossal' chestnuts showed IKB out of 57 nuts that developed from 'Precoce Migoule' pollen. Therefore, 'Colossal' chestnuts pollinized with pollen from the cultivar 'Precoce Migoule' did not show symptoms of IKB. 'Precoce Migoule' pollen is produced in late spring and the time of pollination for these tests was in early July. Those nuts did not set well when hand pollinated and was probably due to overly mature 'Precoce Migoule' pollen. Still no IKB was found in this two-season study. If 'Precoce Migoule' were capable of causing IKB, we should have observed more than 10-20 nuts with IKB of the 57 nuts inspected. Instead we found none.

'Okei' pollen results: Pollen from the Japanese X Allegany chinquapin hybrid cultivar 'Okei' was placed on 'Colossal' flowers only in July 2011.

In 2011, of 287 burs collected in October, 189 full nuts were found. After splitting, the kernel of each nut was closely inspected for signs of IKB. When 'Okei' was used as a pollen source, 2 nuts with IKB were observed in any of the nuts obtained from 'Colossal'.

Summary: In this single year test, 1 percent of the 'Colossal' chestnuts showed IKB, far less than the expected 30 percent found on chestnut farms in Michigan. It is unfortunate that 'Okei' pollen could not be repeated in 2012 due to weather events as this is one of our more commonly planted pollinizing trees. In previous studies, nuts with IKB were shown to have been pollinized by 'Okei' so we believe that 'Okei' cause IKB but at extremely low amounts.

'Benton Harbor' pollen results: Pollen from the Chinese chestnut cultivar 'Benton Harbor' was placed on 'Colossal' flowers in July 2011 and 2012.

In 2011, of 673 burs collected in October, 343 full nuts were found. After splitting, the kernel of each nut was closely inspected for signs of IKB. When 'Benton Harbor' was used as a pollen source, 113 of the nuts obtained showed IKB (33 percent).

In 2012, of 886 burs collected in October, 979 full nuts were found. Upon splitting and inspection, 256 showed the symptoms associated with IKB (26 percent).

Summary: In this two season study, 369 'Colossal' chestnuts had IKB out of 1,322 nuts that developed from 'Benton Harbor' pollen. Therefore, a total of 28 percent of the 'Colossal' chestnuts pollinized with pollen from the cultivar 'Benton Harbor' showed IKB, matching the percent found on certain chestnut farms in Michigan.

'Labor Day' pollen results: Pollen from the "Korean" chestnut cultivar 'Labor Day' was placed on 'Colossal' flowers in July 2012.

In 2012, of 187 burs collected in October, 40 full nuts were found. After splitting, the kernel of each nut was closely inspected for signs of IKB. When 'Labor Day' was used as a pollen source, 1 nut showed IKB (2.5 percent). This finding was similar to the controls indicating that 1 nut was not significantly different than the unpollinized controls.

Summary: In this single season study, 1 'Colossal' chestnut had IKB out of 40 nuts studied. This is a low number of total nuts and will have to be tested again in 2013. However, if 'Labor Day' were capable of causing IKB in 'Colossal' at the same level observed on farms or as 'Benton Harbor', we would have expected 8-12 nuts to show IKB, not 1. Still, 40 nuts is not a large sample number and this needs to be repeated.

LESSONS LEARNED

As mentioned throughout this report, the weather dealt us serious setbacks. An early spring/late winter warming trend set up the chestnut terminal buds for a mid-April frost. This was followed by extreme heat and drought. Yet, we were able to obtain most of our data and we were able determine the cause of IKB.

Chestnuts are grown on three continents (Europe, Asia and North America) and have been in cultivation for two millennia. The nine recognized species of chestnut interbred, yet, this is the first time that a problem such as IKB has been reported. In the end, we are pleased that there is an answer. It may take a while to take corrective actions in the orchards, but many new orchards are now being planted and these data have been instrumental in helping prevent IKB in these new orchards.

In the past, we found IKB only in normal looking chestnuts that were harvested along with healthy chestnuts. Other than floating, there was no difference in the appearance of the chestnuts. In 2012, we noticed something very different. The IKB-afflicted nuts were the first to shrivel and fall from the burs. It appears obvious, that in times of heat and drought stress, the chestnuts with compromised or diseased kernels does not fill out completely and fall as shriveled nuts and it was easy to discern healthy from IKB-afflicted chestnuts.

We were able to determine that the cultivar 'Colossal' was able to produce chestnuts after a server frost if a pollen source is available. This was new information.

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ADDITIONAL INFORMATION

[Buy Chestnuts from Chestnut Growers, Inc. http://www.chestnutgrowersinc.com/](http://www.chestnutgrowersinc.com/)
[Chestnuts http://chestnuts.msu.edu/](http://chestnuts.msu.edu/) <http://www.chestnuts.msu.edu/>

Portions of these findings were presented at the North American Chestnut Farm Workshop held in Jackson, Michigan, August 30- Sept 2, 2012; and at the 5th International Chestnut Symposium held September 4-8, 2012 in Morgantown, WV.

[Making chestnuts profitable for Michigan farmers http://agbioresearch.msu.edu/news/enews-winter-2012/chestnuts-michigan-farmers.html](http://agbioresearch.msu.edu/news/enews-winter-2012/chestnuts-michigan-farmers.html)

A manuscript entitled: "Kernel Breakdown Appears When Hybrid *Castanea* Cultivars Are Pollinized by *C. mollissima* is from the International Meeting in West Virginia. This international presentation made at the meeting in West Virginia was the same presentation that was made in Michigan. For the Michigan North American Chestnut Farm Workshop, we have taken the information from a hardcopy, grower handbook and turned this information into a grower-based web site www.chestnuts.msu.edu.

This is a Game Changer and an Important Discovery

We have recently found that a type of kernel rot, not associated with a mold or insect, is found in about 30% of the nuts from 'Colossal' trees when those trees are pollinized by Chinese chestnut. This had been plaguing the commercial chestnut industry in Michigan and now that its cause has been determined we strongly suggest keep Chinese cultivars from pollinizing 'Colossal'. At this time we are not sure if this affliction will show up in all European/Japanese hybrids and if all Chinese chestnuts cause it. To be safe we suggest keeping European/Japanese hybrid and Korean (Japanese) cultivars 500 to 1000 feet away from sources of Chinese chestnut.

Internal Kernel Breakdown (IKB)



This is not a rot caused by a fungal infection. This is internal kernel breakdown (IKB). This is caused when certain cultivars pollinate other cultivars. So far, we know that IKB will appear in about 30% of the nuts when Chinese chestnuts pollinize the cultivar 'Colossal'. Don't plant Chinese and EuropeanXJapanese hybrids in the same orchards.

Healthy chestnuts



PROJECT TITLE

Michigan State University - Quality Assurance & Increased Cherry Utilization - FINAL

PROJECT SUMMARY:

Being the largest tart cherry producing state, Michigan has a big role in the tart cherry industry throughout the USA. According to USDA/National Agricultural Statistics Service (NASS) report, (June 2010) Michigan produced 140 million pounds of tart cherry which represents approximately 72% of the whole US production of tart cherry. Cherries are thus a very distinguishable fruit for Michigan for local markets, regional economics, tourism, as well as international trade.

Some problems appear after the produce is harvested which yields a considerable amount of loss and profit decrease for both grower and processor, and may not guarantee the desired final product quality. Plum curculio presence and damage and remaining pits or pit fragments are major concerns for the tart cherry industry. For the industry to maintain and expand market opportunities there must be assurance there is no presence of these undesirable features. Although the current technology yields a high accuracy in eliminating non-desired fruits, it also has false positive results increasing the losses and decreasing processor profit. A promising X-

ray computed tomography technology is proposed to improve the efficiency of the sorting system due to its high quality and unique 2-D and 3-D images. This project provides key steps

in the form of preliminary concept studies and coalition of key partners toward bringing X-ray CT scanning technology to address major cherry and other specialty crop industry challenges.

Additionally, the demand for decreasing the extensive usage of pesticides already exists based on food safety and environmental concerns. With this decrease in ability to fully control insects in the field, the reliance on postharvest detection methods will increase. Thus, effective postharvest sorting impacts either directly or indirectly, the economic and environmental sustainability of the industry.

PROJECT APPROACH:

Tart cherries possessing cherry internal defects of whole pits, or varying sizes of pit fragments, and with varying degree of internal insect damage/infestation from plum curculio were imaged under computed tomography (CT). Image characteristics including x-ray absorbance and shape features were visually and quantitatively compared against ground truth validation to determine the potential for CT to detect varying severity and/or sizes of defect material. Results showed defective tissue could be statistically differentiated from good tissue, thus, successfully demonstrating the capability of CT imaging in aiding internal quality evaluation of cherries. Additionally, a unique approach was developed to establish cherry “phantoms” using agarose and sucrose that resulted in artificial cherries having very close density properties to that of tart cherry and that could subsequently be used for extended studies beyond the short fresh cherry season. These phantoms also allow for, and act as, standards for collaborative studies.

GOALS AND OUTCOMES ACHIEVED:

Internal Defect Studies - Sample preparation and sample fruit measurements

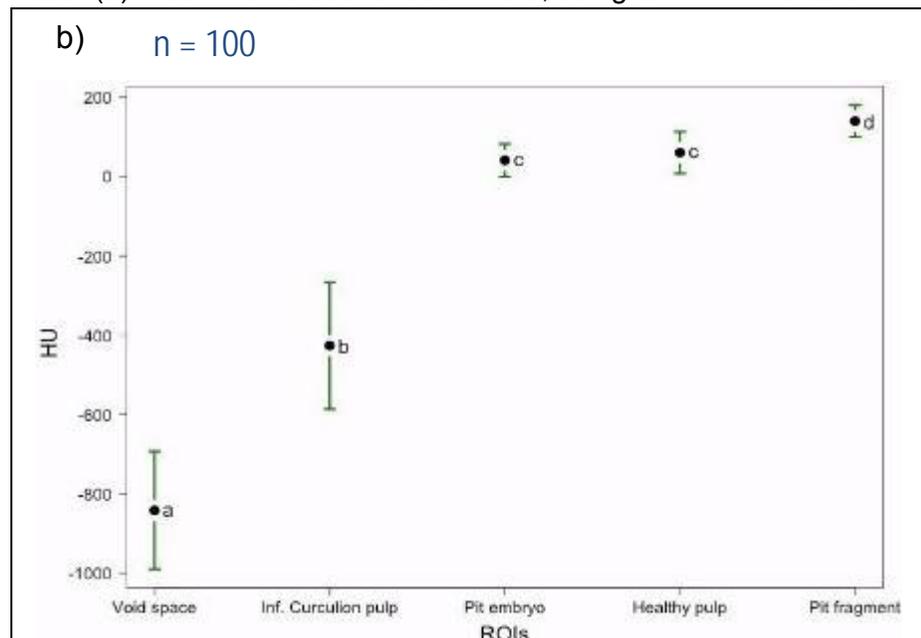
A total of 530 physiologically mature tart cherries were obtained from various Michigan orchards. These cherries were collected, exteriorly assessed, and pre-classified for their expected range of plum curculio infestation. Samples were then transported to Michigan State University ~ Department of Biosystems and Agricultural Engineering.

Samples were immediately stored in zip-lock bags at 4 °C. One day later, CT scans were conducted. Fresh sample examples can be observed in Fig. 1.

Fig. 5. (a) Regions of interest (ROIs) acquired from cherry 2D CT image slices. (b) Mean HU values for each ROIs, using ten 1-mm² circular regions. Values followed by the same letter are not significantly different between each other at P = 0.05 (ANOVA) (Tukey multiple comparison of means) - R V2.10.0

(<http://cran.r-project.org/>). Vertical bars represent the sample standard deviation.

HU-values comparing the different ROIs were analyzed using one-



factor analysis of variance (ANOVA). Significance difference between ROIs means was determined using the Tukey post-hoc multiple comparisons of means test at the 95% family-wise confidence level ($P = 0.05$) (Fig. 5(b)).

Discussion and conclusion

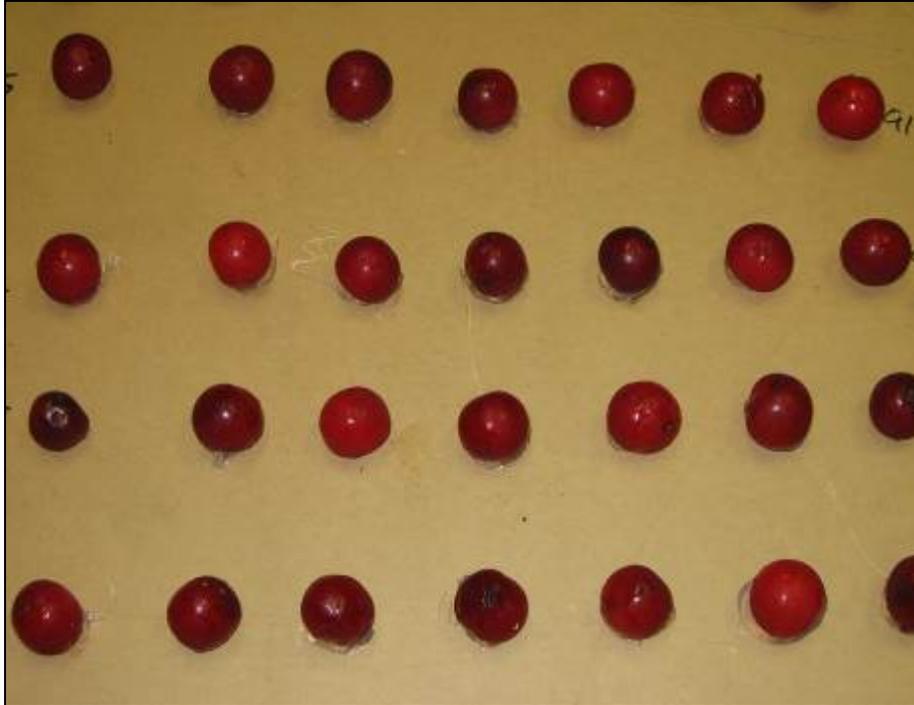


Fig.1. Fresh tart cherry sample examples

In vivo CT imaging scans

In CT a transverse 2D-image or slice, as seen in Fig. 2a, is reconstructed using information from more than one 2D projection image, acquired at different angles. Data from one CT imaging procedure can be reconditioned to be observed in various planes, known as multi-planar imaging; or even observed volumetrically, creating a 3D image (Fig. 2b), by merging the information from several 2D slices. Because of the intrinsic contrast and high resolution of CT, differences between materials that diverge in physical density by about 0.5% can be differentiated. In CT the difference in physical density of materials is visualized by changes in image intensity, and it is expressed in 'Hounsfield-Units' (HU) (or 'CT-number').

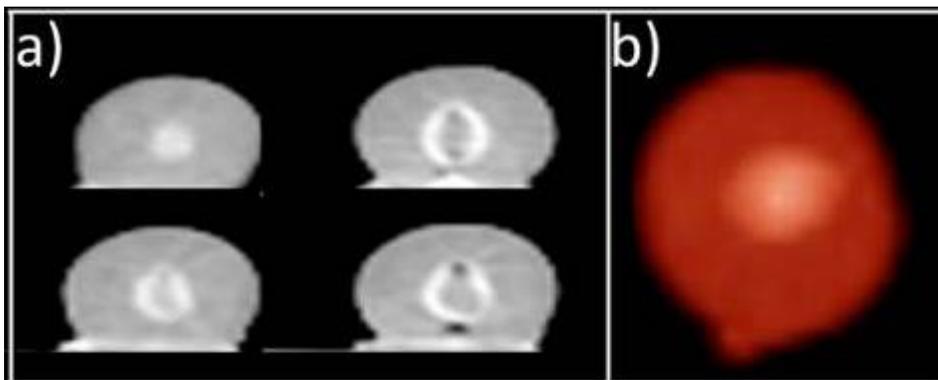


Fig. 2. Computed tomography (CT) tart cherry images. (a) Set of 2D CT gray scale slices. (b) 3D CT image reconstructed from several 2D CT gray-scale slices and rendered using color.

Tart cherry CT scans were performed on a GE BrightSpeed™ RT 16 Elite, multi-detector CT instrument (General Electric Healthcare, Buckinghamshire, United Kingdom), located in the Department of Small Animal Clinical Sciences at Michigan State University. Scanning parameters and CT equipment specifications were concluded from studies on other commodities and from preliminary studies (Voltage-120kV; Current-240mA; slice thickness-0.625mm). CT scanning was performed by placing and securing cherries onto a whole polyethylene sheet, placed on the CT scanner table, as shown in Fig. 3.

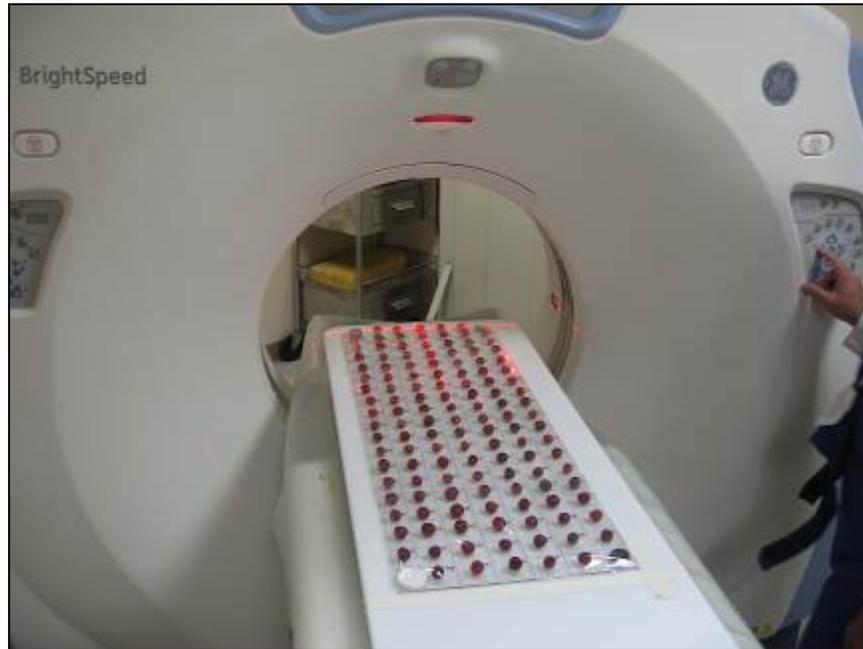


Fig. 3. Measuring arrangement of the GE (GE Healthcare, Buckinghamshire, England, Great Britain) BrightSpeed™ RT 16 Elite CT scanner used in the study.

Visual based cherry curculio infestation assessment

After CT scanning, each fresh tart cherry was transversely sliced in half using a sharp hand knife. Internal faces between each slice were then qualitatively assessed, and a single overall rating using a visual scale from 0 to 5 (index) was given to each tart cherry. This index represents a single subjective quantifying rating that describes cherry curculio infestation. Zero (0) represents a completely healthy tart cherry with no apparent curculio infestation, while 5 represent a completely infested tart cherry. An example of the curculio infestation quality index, from this experiment, can be seen in Fig. 4.

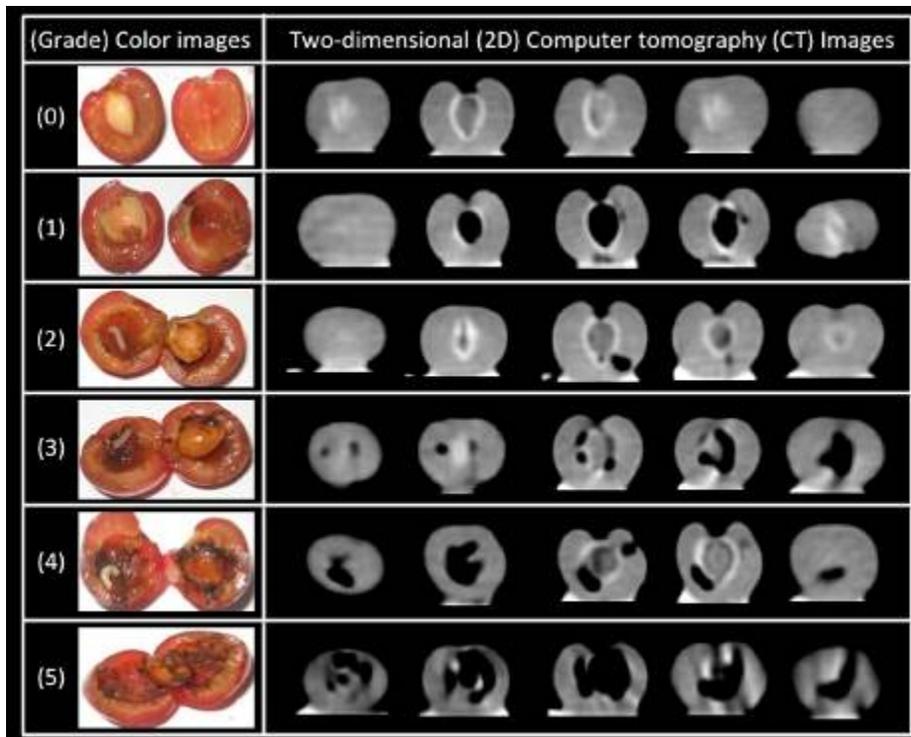


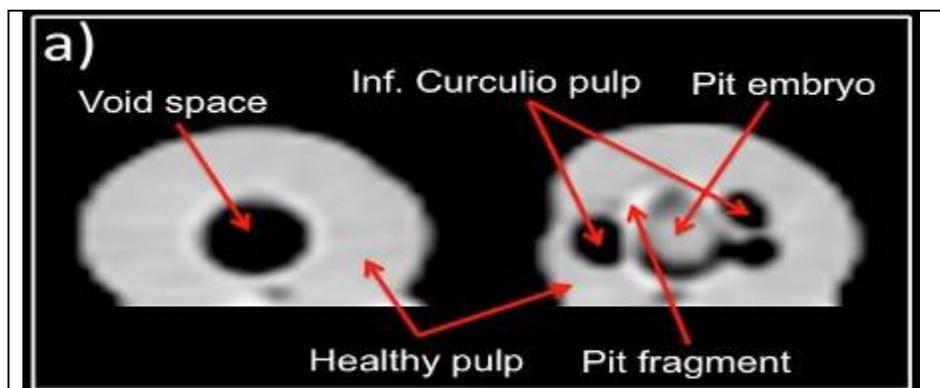
Fig. 4. Example of the curculio infestation quality index with its corresponding 2D CT images

In addition, figure 4 includes a representative example of cross-sectional CT 2D-images of fresh tart cherries for each curculio infested quality index. In these images, non-infested (healthy), and infested tissue can be viewed. These images proved useful when judging internal quality, and to accurately resolve the HU-values of corresponding CT images/tissues.

HU-value inference using fresh tart cherry curculio infestation assessment

HU-values from 2D CT images were acquired from tart cherry slices from five different regions of interest (ROIs), as seen in Fig. 5. In total, one hundred random repetitions per ROI from dissimilar 2D transverse images were obtained. Each measurement included the mean HU-value of a 1-mm² circular region.

Figure 4 offers preliminary results of what can be inferred about fresh tart cherry quality, using the CT-images. As can be observed, it is easy from the CT images to visually distinguish between tart cherry infested curculio pulp, and healthy pulp. In



addition, when infested tissue is embedded between healthy non-infested pulp, a significant difference in HU value can be visually observed. Tissue that is healthy in 2D CT images

appears as a light gray intensity. Tissue that is infested with curculio in 2D CT images appears as a dark gray intensity to black.

Figure 5 shows mean HU-values with its corresponding standard deviation bars, acquired from different ROIs. Not all of the ROIs are significantly different from each other ($P = 0.05$). Analyzing the statistical difference between HU-values from the different ROIs revealed four differentiable groups using CT. This enabled us to separately categorize ROIs. Group one contains natural void spaces (including empty pit embryo), group two infested curculio cherry, group three the pit embryo and healthy pulp; and group four pit fragments. Significant changes, spread, and high variability of HU-values, based on the ROIs infested levels, indicated an obvious change in HU-value across the ROIs. In other words, HU-values significantly change from different ROIs. In addition, changes in curculio levels, in the same tart cherry and between cherries are easily discernable. It is important to mention that these results also indicate that the HU-values can be used as an index to segregate and group tart cherries, based on their tissue density. This approach/technology can also perform a spatial analysis of the whole tart cherry tissue, thus showing the presence of affected tissue regions, or the presence of foreign objects (e.g. pit fragment). These scenarios might have positive implications in processing, where curculio infested tart cherries, and tart cherries with foreign objects can be eliminated.

In conclusion, using HU measurements alone show that CT technology can be used as a novel technique that will be able to visualize and measure macroscopic changes in tart cherry tissue. In addition, the data presented in this study is essential for developing classification algorithms to sort tart cherries based on their internal characteristics. It can be affirmed that HU-values obtained from preliminary CT images can be used as a reference to determine the presence of infested curculio tart cherries and tart cherries with foreign objects, like pit fragments.

Therefore, preliminary results indicate that CT might be a useful technique to develop future prediction models of tart cherry quality. Nonetheless, results clearly indicated, that in addition to raw HU-values, other methods related to image processing, feature extraction, and pattern recognition, would be a requirement and have excellent potential, to aid the development of future sorting algorithms. All these will be necessary to accurately and automatically separate tart cherries based on their quality level.

Cherry Phantom

Design and development

A set of cherry phantoms were designed and fabricated specifically for the purpose of routine quality assurance measurements on a CT system, and pit detection studies. These phantoms must simulate the fresh cherry tissue characteristics (i.e. density), need to be easy to design and shelf-stable, while providing quantitative and accurate information related to CT system performance. In addition, the results must be comparable and reproducible over time. To achieve all of these necessary requirements, we proposed a set of phantoms, each implanted with different pit fragment sizes. Size similar to the average size of a fresh tart cherry was chosen for the cylindrical phantoms. The material used to develop the phantoms, in consultation with material scientists, was agarose. Figure 6 provides a top view of a set of phantoms, showing different size embedded pit fragments. These phantoms make it possible to assess multiple image-quality parameters, compare pit detection techniques, and compare different CT scanners.

Different agarose concentrations as well as additives (e.g. sucrose) will produce a gel with different densities. Previous studies showed that the density of the cherry tissue flesh equals $1.043 \text{ g}\cdot\text{cm}^{-3}$ (0.006), as seen in Figure 7. Density of several agarose concentration phantoms are also included in Figure 2, showing density similarities with cherry tissue flesh. As it can be

seen the density of a 12 % agarose gel (12W) is not significantly different than fresh cherry tissue flesh, making it an ideal material to mimic real cherry tissue. To mimic pit fragments and pits, real pit fragments of different maximum sizes (1, 2, 4 and 4.75 mm and whole pits – 8 mm) were embedded in the approximate centroid of the phantoms, before agarose gelation, as seen in figure 6.

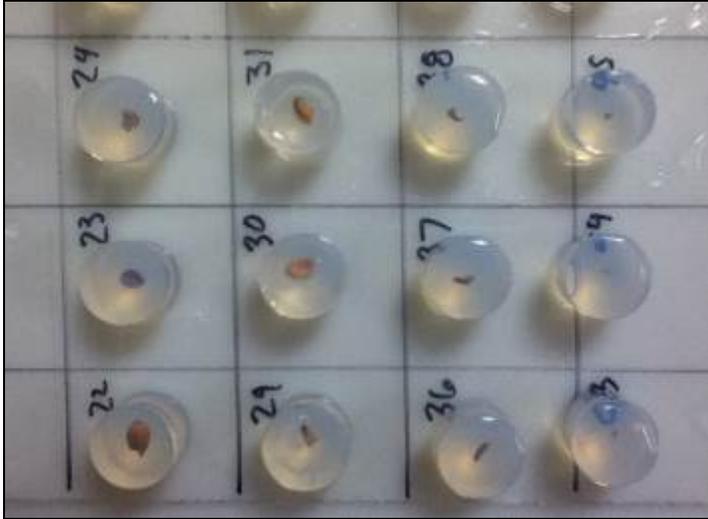


Figure 6. Agarose phantoms with different embedded pit fragments

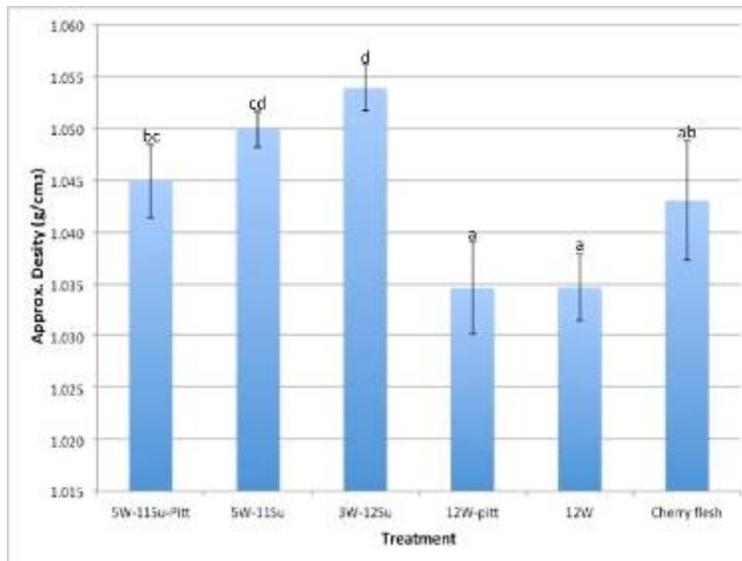


Figure 7. Agarose phantoms and fresh cherry flesh tissue density. Bars followed by the same lower case letter are not significantly different at $P = 0.05$ (Analysis of variance (ANOVA) with post-hoc Tukey multiple comparison of means).

Cherry phantom CT images

In CT a transverse two-dimensional (2D) image or slice, as seen in figure 8a and 8c, is reconstructed using information from more than one 2D projection image, acquired at different angles in the same way as noted in the internal quality section above. Again, data from one CT

imaging procedure can be reconditioned to be observed in various planes, known as multi-planar imaging; or even observed volumetrically, creating a three-dimensional (3D) image (figure 8b and 8d).

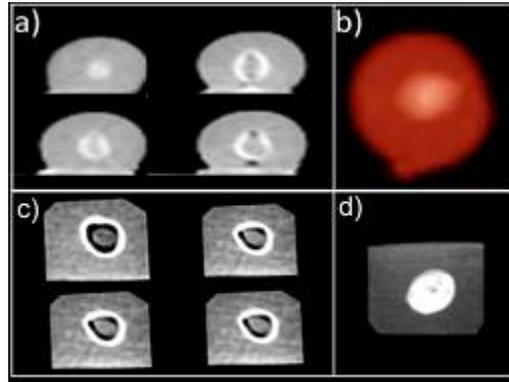


Figure 8. Computed tomography (CT) images of: (a) Set of 2D CT gray scale slices of a fresh cherry. (b) 3D CT image of a fresh cherry reconstructed from several 2D CT gray-scale slices and rendered using colors. (c) Set of 2D CT gray scale slices of a cherry phantom. (d) 3D CT image of a cherry phantom reconstructed from several 2D CT gray-scale slices.

An example of two-dimensional (2D) CT images of a phantom, which accurately mimics the internal characteristics of fresh cherries, can also be seen in figure 8. This phantom and the others are capable of providing quantitative and accurate measurements of multiple parameters related to the performance evaluation of CT system, as exemplified in figure 9 (phantom pit segmentation). The design of these phantoms allows CT imaging to be repeated on a regular basis, as part of routine studies. This will also allow the creation of a robust method of detecting pits and pit fragments in whole cherries.

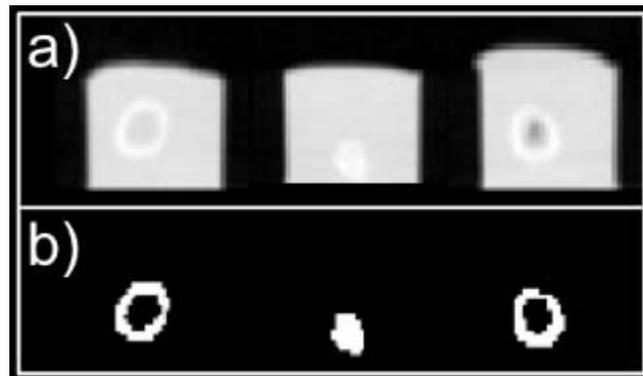


Figure 9. (a) Computed tomography (CT) images of phantoms containing pits and (b) segmented pits using a global threshold of 120 HU.

Conclusions

The CT imaging system provides high-resolution and high-contrast images of the internal structure and components of fresh cherries and created cherry phantoms. In this study shelf-stable phantoms, which are capable of providing quantitative and accurate measurements of pit presence in cherries, were created. The design of these phantoms allows measurements to be

repeated on a regular basis, as part of routine and continuous studies. The same phantom design can also be applied to other applications.

CT is a fast, non-invasive procedure that has the potential to be adapted for quality evaluation and inline sorting. In general, this study indicated that CT has a high potential for nondestructively evaluating internal components of fresh cherries, which are attributes associated with cherry quality (e.g. pit presence).

In future studies, sorting algorithm speed, equipment cost and characteristics, as well as other methods related to image processing, feature extraction and pattern recognition will be useful for the development of reliable sorting algorithms and CT sorting systems. More studies must be pursued to evaluate the accuracy of sorting algorithms and inline classification.

These findings on the short-term demonstrate CT as a very positive tool/concept for important needs in internal defect detection while also providing groundwork and some design criteria toward longer-term goals of automated inline inspection and sorting which will require specialized hardware development.

The purpose/objectives/goals of this project were, and accomplishments against them are:

- 1) Investigate X-ray computed tomography for improving the classification of healthy tart cherry and insect-infected tart cherry after harvesting.

This was successfully accomplished by demonstrating the ability to differentiate different postharvest tissue densities, created by good and damaged tissues internal to cherries, with CT which would allow for the segmentation step needed in a classification routine or system.

- 2) Investigate X-ray computed tomography for improving the identification of cherry that include pits or pit fragments after harvesting.

Similarly to #1 above, results demonstrated the ability to detect pits with CT information and produce an image with information to identify cherries with pits or pit fragments using density and/or image processing spatial information.

- 3) Identify commercial level research and development collaborators and partners to form a complete team to bring this technology into commercial application.

Over the duration of this project the investigators have worked to some degree with four commercial or research and development institutes involved in development of high-speed and lower cost CT hardware technology and their interest in investigating the technology for applications in the food or raw product domain. The results of this project have helped enhance the interest by these entities and continued collaboration is planned as the hardware and physics to bring this to commercial application much come from these CT specialized entities with the help of projects and information, such as reported here, that link the food/biology aspect to the technology.

- 4) Identify specialty crops beyond cherry where internal discoloration is a challenge and thus where this technology would be applicable.

Additional specialty crops have been investigated including chestnut, cucumber, pineapple, and more recently, carrots. Each additional study has demonstrated good potential for CT, which is

important in supporting the cherry application as commercial development is only likely to draw interest, and move forward, if multiple applications can be identified.

BENEFICIARIES:

The primary or clearest beneficiary of this project's accomplishments is the cherry (tart) industry overall, as a new concept toward solving a long plaguing problem inhibiting market expansion, that being pit or pit fragment presence in processed cherries, was hypothesized and demonstrated. Similarly, a new issue for the industry is postharvest internal presence of insects (or their damage) in cherries, due much in part to environmental regulation banning of historically common and effective in-field control chemicals during production. This project addresses this challenge and demonstrates a means leading toward sorting for final product quality. Without solutions for the cherry industry challenges, both growth and sustainability of this \$32 million raw product sales industry, along with its tangential importance, could be in jeopardy.

Secondarily, but in parallel, this project could be considered to have helped the food industry as a whole move toward having a new concept for food quality / food safety detection and drawing interest toward such from new CT technology development entities. The technology developers do not understand the needs of the food industry nor the biology of the challenges and products and thus, projects such as this help bridge, link, and bring awareness.

LESSONS LEARNED:

The project staff was very pleased with the results, the outcomes, and the excellent data set collected as part of this project. A lesson learned is the challenge that exists in trying to maintain the interest of the potential commercial development entities in projects and opportunities such as this when they are primarily profit driven. It is hard to demonstrate strong profit potential for new technology in the food industry, especially in the raw product end of things. This is why working on this concept of technology and demonstrating potential across multiple commodities is very important.

The unexpected outcome of developing a cherry phantom to allow for expanded study related to pit detection, as a result of this study, was very positive. As opportunity presents itself to continue study on this application, and/or a potential new commercial collaboration surfaces, studies can immediately be undertaken without the need to wait for cherry season.

One goal, although not specifically listed, that we had hoped to achieve and are currently working on, is the development of pattern recognition and object (pit fragment) detection routines based on spatial characteristics of objects within images to supplement the image intensity (density) characteristics. This will be accomplished in the next few months.

ADDITIONAL INFORMATION:

Publications directly and indirectly related to this study are in various stages of finality and development process. We have additionally developed collaborative interest on this project and concept with two academic individuals at a university in Turkey.

PROJECT TITLE

Peterson Farms-Winter Wastewater Spray Irrigation Feasibility Study - FINAL

PROJECT SUMMARY

Peterson Farms, Inc (PFI), located in Shelby Township, Oceana County, Michigan (Figure 1), received a Specialty Crop Block Grant (grant number 791N2200139) to perform this study in October 2011 and contracted Lakeshore Environmental, Inc. (LEI) of Grand Haven, Michigan to execute the work plan outlined in the grant. Due to exceptionally warm weather during the 2011/2012 winter season, PFI and LEI obtained a no cost time extension to continue the work through January 30, 2013 with the Final Performance Report due on or before March 1, 2013. Many of Michigan's specialty crop processors use land application via surface irrigation practices as a wastewater treatment mechanism. Wastewater treatment can be a challenge during winter months due to environmental regulations that generally discourage surface irrigation during extended periods of sub-freezing air temperatures because of certain environmental concerns (i.e.: soil frost conditions, etc.). With an increasing number of food processors becoming year round operations, it is imperative that issues of winter irrigation be addressed. This study was designed to directly address the environmental concerns surrounding winter irrigation and generally evaluate the feasibility of land-applying wastewater via spray irrigation during periods of extended below-freezing air temperatures.

It was hypothesized that snow cover on irrigation fields can insulate the underlying soils and minimize the affect of sub-freezing air temperatures on the subsoil environment. Additionally, it was hypothesized that wastewater discharged with a low-magnitude, high-frequency irrigation schedule can be treated by soil microorganisms when biochemical oxygen demand (BOD) loading rates exceed 50 pounds per acre per day (the state's default loading rate). Snow can provide a porous and insulating medium in the irrigation fields, facilitating the infiltration of dissolved wastewater constituents to the subsoil while concurrently promoting the fractional melting and effective separation of high-strength wastewater.

To test the above hypotheses, an experiment was conducted in which concentrations of metals, organics, and oxygen demand in soil pore water samples were evaluated to quantify the treatment efficiency of a land-application wastewater treatment system. To supplement chemical data, the experiment involved the collection of soil moisture and temperature data, which was used as indicators of wastewater infiltration and the insulating effect of overlying snow. Furthermore, for the purpose of this study, meteorological information was also logged at the study plot to track rainfall (and irrigation), temperature, and relative humidity.

The purpose of this study is to evaluate the efficiency of a land application (via spray irrigation) wastewater treatment system during winter and non-winter months. The experiment was designed to test the validity of the premises presented above in the specific context of Michigan specialty crop wastewater. The project generated data that helped make a science-based determination of appropriate hydraulic loading rates, BOD loading rates, irrigation scheduling, and general irrigation management during extended periods of sub-freezing air temperatures. This project did not build on any other previously funded projects.

PROJECT APPROACH

PFI contracted LEI to assist in executing this grant study. In November 2011, the study plot was installed in wastewater irrigation Field 7, within the radius of a single irrigation gun. The study plot consisted of two "zones"; each of which occupied one-quarter of the gun's irrigation area. The goal of the study was to maintain snow cover on Zone A throughout the winter months (when freezing conditions exist/permit) and leave Zone B unmanaged for comparison purposes.

Four Campbell Monoflex porous cup lysimeters were installed in each zone at depths of 1', 4', 8', and 20' below ground surface (BGS) for the collection and analysis of soil pore water. Additionally, a network of soil moisture and temperature sensors were installed in each zone at depths of 1', 4', and 8' BGS. Precipitation and irrigation events, air temperature, and relative humidity in the vicinity of the study were recorded and monitored.

Photos taken at various times throughout the study are included in the attachments. Figure 3 details the layout of the study plot. (See the full 267 page report at: [Lakeshore Environmental | Specialty Crop Block Grant Projects](http://www.lakeshoreenvironmental.com/scbgprojects) <http://www.lakeshoreenvironmental.com/scbgprojects>
Grant Number: 791N2200139-10207-2011 **Title:** *Winter Wastewater Spray Irrigation Feasibility Study February 2013.*

Lysimeter sampling and soil sensor download occurred each month. A total of 12 samples were collected over the course of this study, all of which were submitted to Bio-Chem Laboratories of Grand Rapids, MI for analysis. Wastewater irrigation was controlled and recorded by Mr. Mike Nienhuis of Snider Farms, contracted by PFI to manage wastewater application. Representative wastewater samples were collected weekly and monthly and analyzed for parameters indicative of land application wastewater treatment. Many of these same parameters were analyzed in the soil pore water samples.

The study was designed such that in the event of low/no natural snowfall, LEI would make snow using freshwater from onsite. In order to properly produce artificial snow, the sustained air temperature must be well below freezing (32°F). Such weather conditions were not observed during the 2011/2012 winter season, nor during the 2012/2013 season through the conclusion of the study (January 30, 2013).

Due to the unusually warm winter weather conditions, LEI was not able to draw definitive conclusions on all of the goals outlined in the grant agreement. LEI did everything possible to create environmental conditions that would allow for conclusions on each hypothesis, however natural conditions at the site intervened.

GOALS AND OUTCOMES ACHIEVED

The goals of this study were:

1. ***Demonstrate that snow cover on irrigation fields can insulate the underlying soils, minimizing the effect of sub-freezing air temperatures.***
 - a. GOAL INCONCLUSIVE: Due to unusually warm winter conditions, LEI was unable to maintain snow on the study plot and was therefore unable to draw a definitive conclusion in response to this hypothesis.
 - b. Temperature sensors installed in the study plot showed that frost never occurred to the depth of 1' BGS in either zone. The minimum soil temperature observed at 1' BGS was 32°F in early-2012.
 - c. Onsite observations of frost were rare throughout the study. The greatest frost thickness observed was approximately 1-2 inches, present in both zones of the study.
 - d. LEI believes that snow cover on irrigation fields can insulate soils and minimize the effect of sub-freezing air temperatures, however natural conditions during the study timeframe did not allow for specific conclusions to be drawn.
2. ***Demonstrate that wastewater discharged with low-magnitude, high-frequency irrigation schedule can be treated by soil microorganisms when biochemical oxygen demand (BOD) loading rates exceed 50 pounds per acre per day.***
 - a. GOAL ACHIEVED: The data summarized in this report indicated that wastewater treatment occurred in the soil, even when BOD loading rates

exceeded 50 pounds per acre per day. BOD loading rates for the study plot area ranged from 21 to 255 pounds per acre per day during winter irrigation months with no lasting negative effect on the soil pore water or groundwater in the area. On a larger scale, Field 7 (in which the study plot was located) reached a daily BOD loading rate of nearly 350 pounds per acre per day and a maximum 7 day trailing mean BOD loading rate of over 150 pounds per acre per day. This wastewater was treated by soil microorganisms and did not cause metals mobilization as proven by soil pore moisture analysis, discussed below.

- b. Some concentrations of metals (iron and manganese) were detected in soil pore water samples collected at 1' BGS. At 4' BGS, very little to no metals were detected in the pore water at concentrations above laboratory detection limits. Samples collected from 8' and 20' BGS showed no detectable metals concentrations through the duration of the study. Incidentally, recent groundwater sampling in the area did not show evidence of metals mobilization in the area.
 - c. The analytical results of the soil pore water samples indicated that treatment of the wastewater occurred in approximately the first four feet of soil.
3. ***Snow can provide a porous and insulating medium to irrigation fields, facilitating the infiltration of dissolved wastewater constituents to the subsoil, and promoting the fractional melting and effective separation of high-strength wastewater.***
- a. GOAL INCONCLUSIVE: Due to unusually warm winter conditions, LEI was unable to maintain snow on the study plot and was therefore unable to draw a definitive conclusion in response to this hypothesis.
 - b. LEI attempted to make snow at the study on several occasions with very limited success.
 - c. The 2011/2012 winter season was exceptionally warm with very little natural snowfall and air temperatures unfavorable for making artificial snow. LEI obtained a no cost time extension through the beginning of 2013 with the hope of better, more typical winter weather conditions in the 2012/2013 winter season. At the conclusion of the study, weather conditions had remained atypical with relatively warm air temperatures and little natural snowfall.
 - d. LEI believes snow can provide a porous and insulating medium to promote irrigation during winter months, however natural conditions during the study time frame did not allow for specific conclusions to be drawn.

PERFORMANCE MONITORING: WASTEWATER/LYSIMETER SAMPLING

Graphs summarizing analytical results from lysimeters located at 1', 4', 8', and 20' BGS are included in Appendix A. Discussion of specific analytical parameters is below.

COD, TOC, TIN:

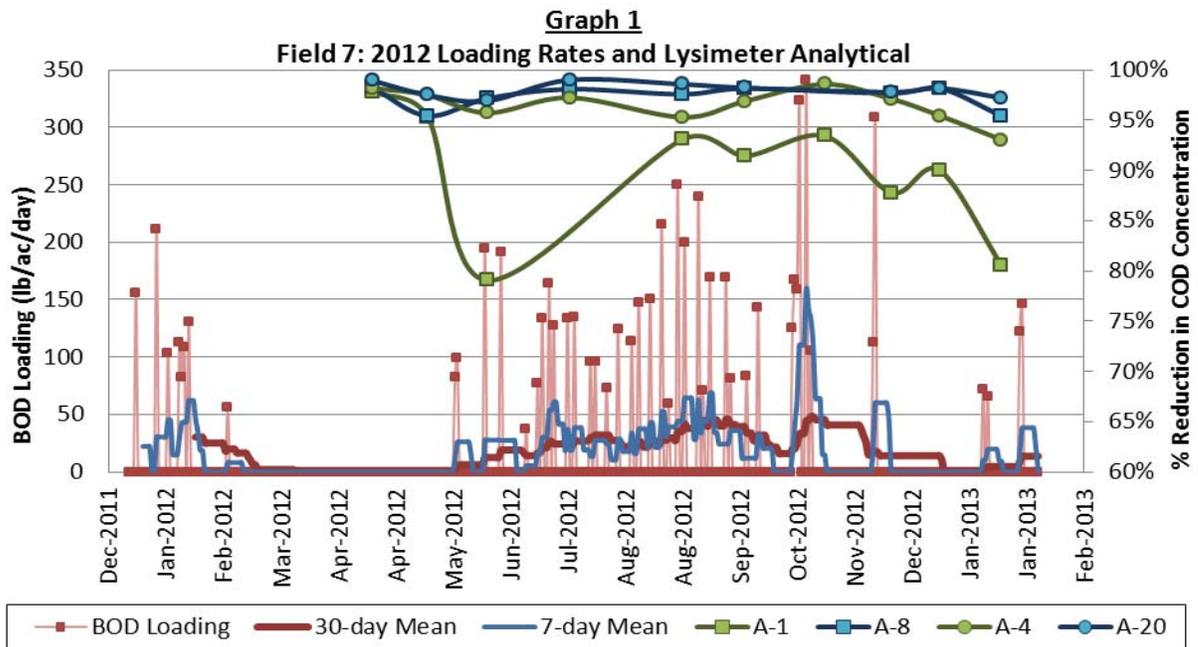
This study confirmed that soil microorganisms are effective in treating wastewater discharged according to a low-magnitude, high-frequency irrigation schedule, even during winter months and periods of heavy BOD loading. The soil was able to reduce chemical oxygen demand (COD) by 80% or more at only 1' BGS. At the greater depths of 4', 8', and 20' BGS, removal was over 90%. Below, a brief table demonstrates the COD concentrations throughout the study in Zone A. Both zones showed similar results, so for simplicity only Zone A is shown below. COD concentration decreased with each sampling depth and was often below laboratory detection limits in the 20' BGS lysimeter.

Table 1: COD Concentration Comparison (mg/L)												
	Jan-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13
WW: COD	*	*	1,600	1,200	420	2,500	1,400	1,400	1,400	900	1,100	720
A1: COD	22	25	35	56	88	**	97	120	92	110	110	140
A4: COD	19	28	29	30	18	69	66	44	20	26	50	<50
A8: COD	12	21	28	55	12	48	34	26	<5	21	<20	33
A20: COD	12	25	17	30	13	25	<20	<25	<5	<20	<20	<20

* Wastewater was not analyzed for COD during this sample round

** Lysimeter produced an insufficient sample or was dry at time of sample. No data available

A slight decrease in effectiveness, translating into slightly higher COD concentrations in the lysimeter samples, was observed in the fall and winter season of 2012 (leading into 2013). This correlated with both decreasing air temperatures and increased BOD and hydraulic loading rates which occurred through the month of October. Even with the increase in concentration in the soil pore water, treatment at 1' BGS sill resulted in a minimum of 80% reduction. Samples collected at 4', 8', and 20' maintained a minimum of 90% reduction. The same is true with concentrations of total organic carbon (TOC), an indicator of water quality. These analytical results were a strong indication that treatment occurred within the first one to four feet of soil.

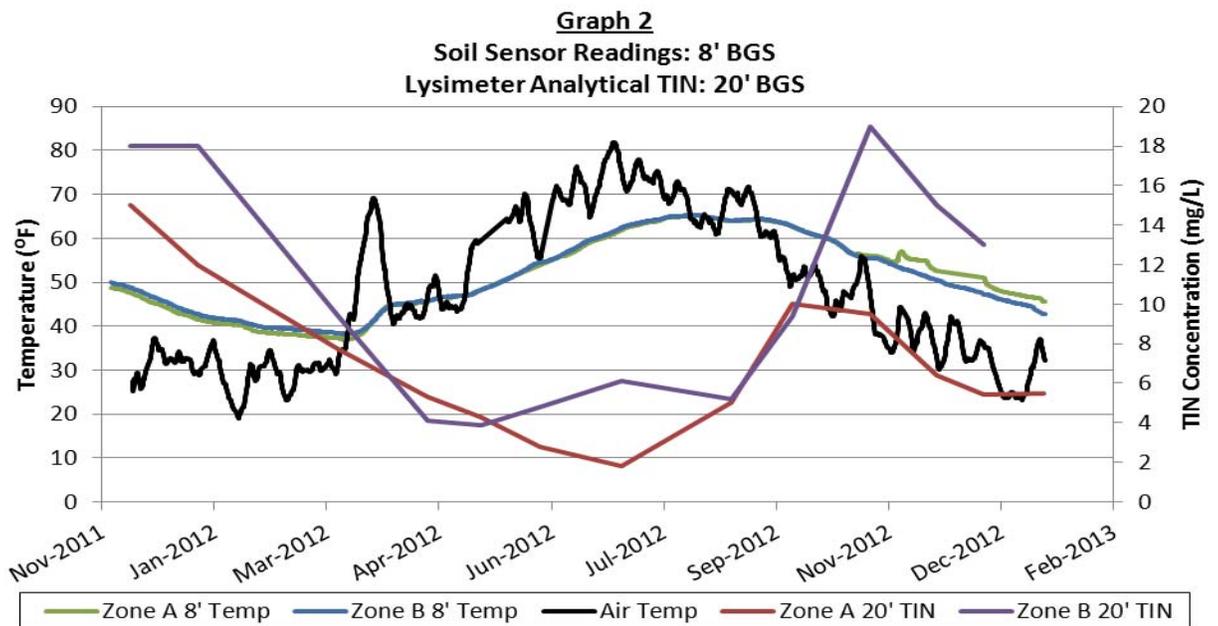


Wastewater production at PFI was down slightly in 2012 compared to previous years as a result of poor crop production due to a catastrophic fruit crop; this in turn resulted in a less consistent wastewater stream. The apparent decrease in efficiency observed in the graph shown above near June 2012 was due to an exceptionally low COD concentration in the effluent (420 mg/L). This “dip” in the efficiency graph above is not due to a lack of treatment, but rather a lower concentration in the effluent and therefore a lower percentage of reduction.

Wastewater influent concentrations of total inorganic nitrogen (TIN; the sum of nitrate, nitrite, and ammonia) were consistently very low and well within effluent limitations set by the DEQ. Samples collected from the lysimeters in both study zones contained detectable

concentrations of TIN, often due to elevated nitrate. Samples collected from each 20' BGS lysimeter showed TIN concentrations higher than those taken from shallower lysimeters, often exceeding 10 mg/L during fall and winter months. From April through August, TIN was present at a concentration near 5 mg/L. During periods of cooler temperatures, TIN rose above 10 mg/L, sometimes near 20 mg/L. This field (Field 7 at PFI) has historically shown elevated nitrate concentrations in the groundwater, so the presence of nitrate in the 20' BGS lysimeters was not surprising. This field is in the process of recovering from previous over-irrigation practices and standard reduction-oxidation (redox) chemistry in groundwater suggests that an increase in nitrates is indicative of improving conditions in the subsurface. Redox chemistry shows that an increase in nitrate in groundwater will be soon followed by a decrease in mobilized metals (especially iron and manganese). Because of the history of this location, the return of nitrate was not seen as a negative reaction to land applied wastewater.

The following figure illustrates TIN concentrations in the 20' lysimeters compared to air and 8' soil temperatures.



Metals - The concentration of key metals, specifically iron and manganese, was also monitored throughout the course of this study. The presence of these metals is typically associated with degrading soil conditions related to the presence of organic material in the land applied wastewater, as well as anaerobic soil and groundwater conditions. Soil pore water samples collected from the 1' BGS lysimeters showed some detectable concentrations of iron and manganese, particularly in late-2012. This was likely due to the increased loading rates applied to the study area in October 2012. Although samples collected from Zone A typically showed greater concentrations of these metals than those collected from Zone B, the results do not correlate to artificial snow making events and were therefore deemed to be due to natural conditions within the field.

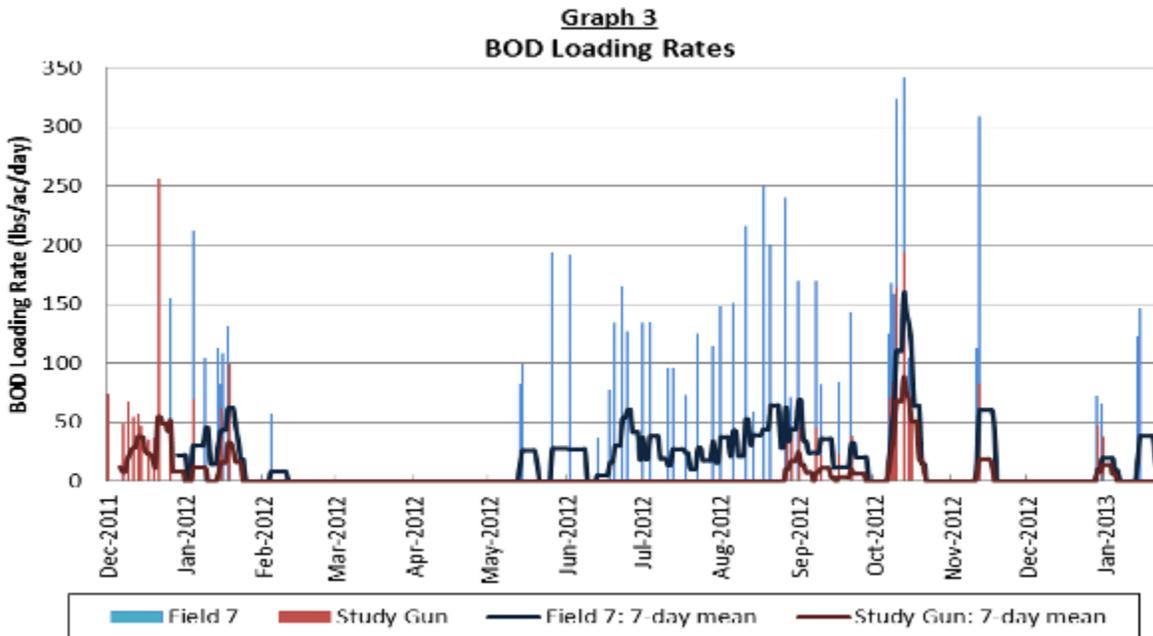
Pore water samples collected from 4' and 8' BGS did not contain iron above laboratory detection limits until the final sample collected on January 15, 2013. Samples collected from 20' BGS did not contain metals concentrations above laboratory detection limits throughout the entire study. These analytical results strongly indicate that treatment occurred within the

soil, even during times of heavy BOD and hydraulic loading. A large majority of the wastewater treatment occurred within the first four feet of soil, and was almost completely treated of wastewater organic material by 20' BGS.

Incidentally, groundwater samples were collected from the vicinity of the study in accordance with PFI's groundwater discharge permit. Groundwater in this area of PFI is located at approximately 30 to 40 feet BGS and did not show evidence of metal mobilization during the most recent groundwater sampling round.

BOD Loading - BOD and hydraulic loading rates to the area varied throughout the study. The heaviest loading period occurred in late-2012, mostly during the month of October. During that time, the greatest BOD loading rate to the study area in a single day was 194 pounds per acre per day. This was preceded and followed by BOD loading rates that consistently exceeded 50 pounds per acre per day. The reduction of water quality indicators COD and TOC, coupled with the lack of metals in soil pore water collected from the deep lysimeters is proof that wastewater discharged on a low-magnitude, high frequency schedule can be treated by microorganisms when BOD loading rates exceed 50 pound per acre per day.

Graph 3, below, demonstrates BOD loading rates to the study gun specifically, during winter months (red), as well as BOD loading to the entire field (blue) throughout the study duration. Seven day trailing means of both data sets is also shown; demonstrating BOD loading rates during the study reached over 150 pounds per acre per day during a seven day stretch.



PERFORMANCE MONITORING: SOIL ENVIRONMENTAL LOGGING

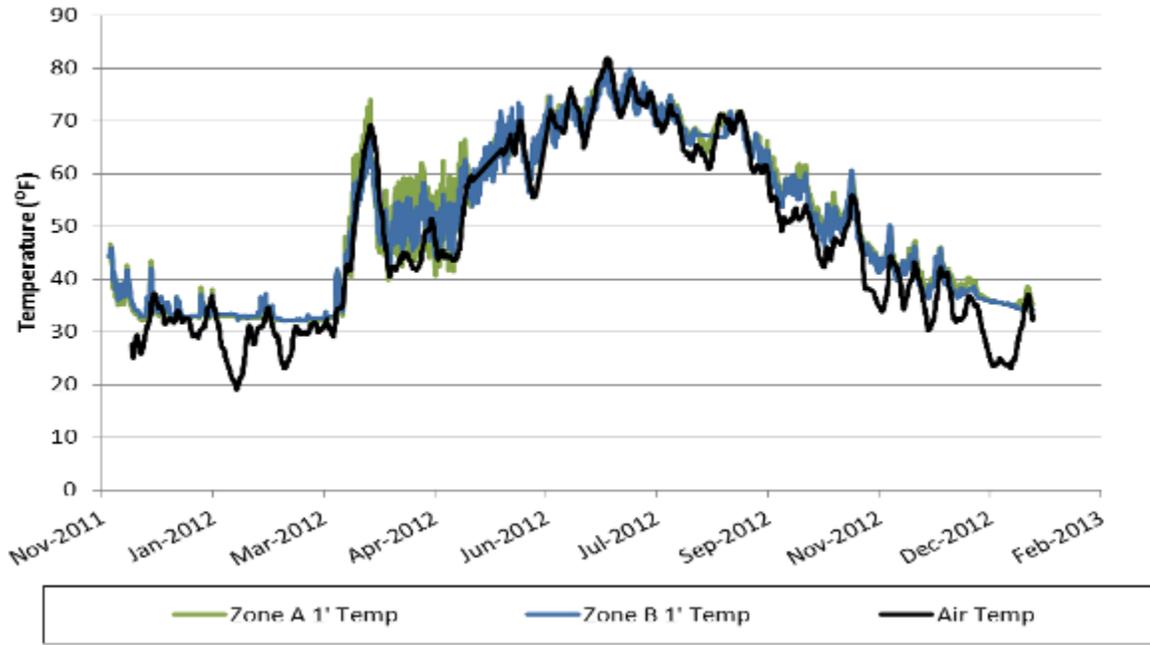
A network of soil moisture and temperature sensors were installed in each zone at depths of 1', 4', and 8' BGS. Precipitation and irrigation events, air temperature, and relative humidity in the vicinity of the study were also recorded and monitored.

Temperature

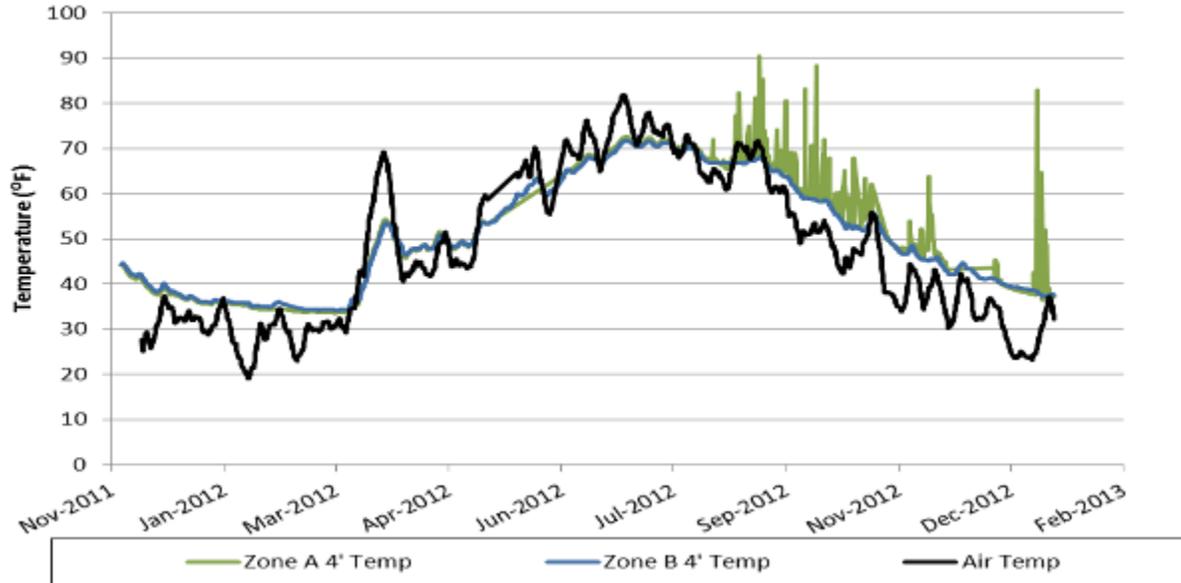
Temperature sensors in the soil allowed us to monitor and identify deep frost conditions at the study plot. The temperature sensors located at 1' BGS showed a minimum temperature

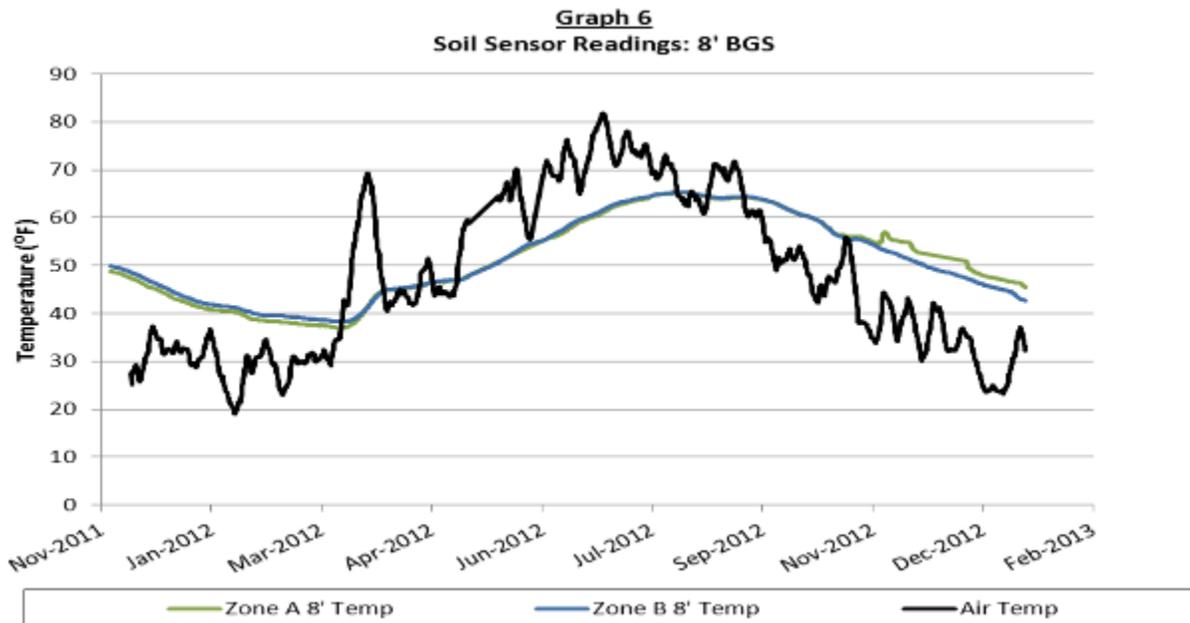
of 32°F, indicating that the ground never froze in either study zone. The greatest frost thickness observed during site visits was approximately 2 inches in each zone. Graphs 4-6, below, illustrate the soil temperature at each depth compared to air temperature.

Graph 4
Soil Sensor Readings: 1' BGS



Graph 5
Soil Sensor Recordings: 4' BGS





In summary, subsurface temperature reactions to ambient air temperatures decreased with depth. The sensors at 1' BGS reacted very closely to changes in air temperature while those at 4' reacted slower and those at 8' even slower. The spikes observed in the Zone A 4' BGS Temperature readings (Graph 5) did not appear to correlate with any natural or intentional conditions and were likely attributable to equipment malfunction or installation issues.

As previously stated, the 1' BGS temperature readings indicated that thick frost never occurred at the study, in either zone. Therefore, the effectiveness of snow to insulate the ground and prevent freezing was not able to be conclusively determined.

Soil Moisture

Soil moisture sensors allowed us to monitor soil reaction to irrigation and precipitation events. Graphs 7 and 8 illustrating the soil moisture at 1' and 4' BGS, compared to precipitation or irrigation events captured by the onsite rain gauge, are below.

Graph 7
Soil Sensor Readings: 1' BGS

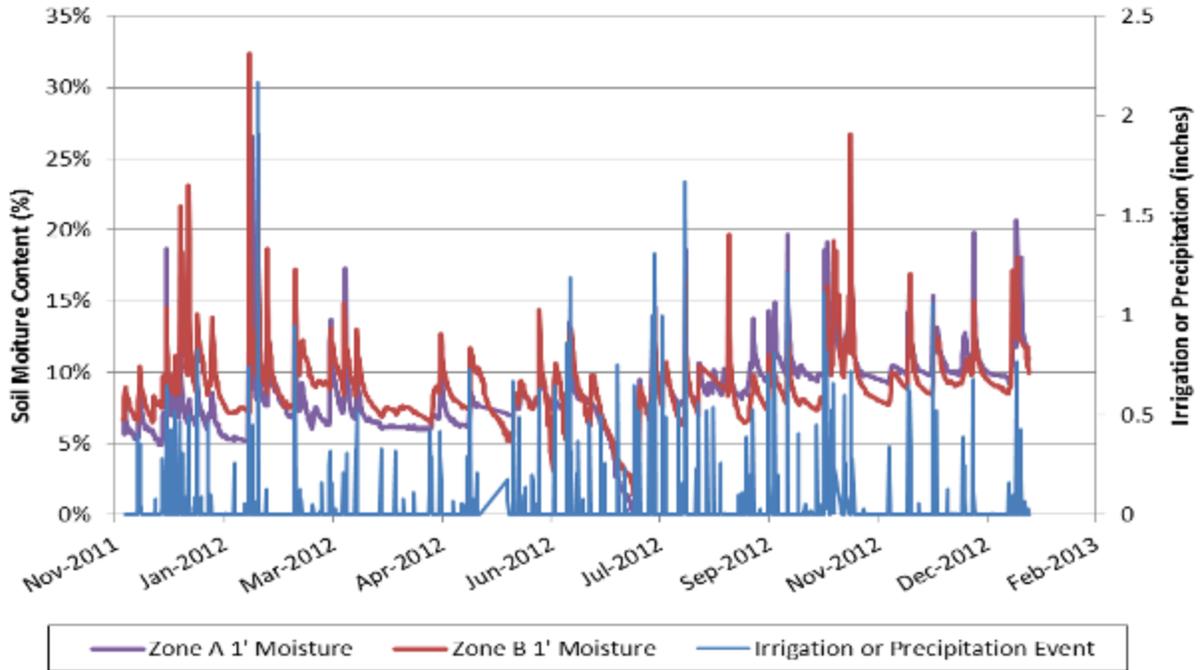
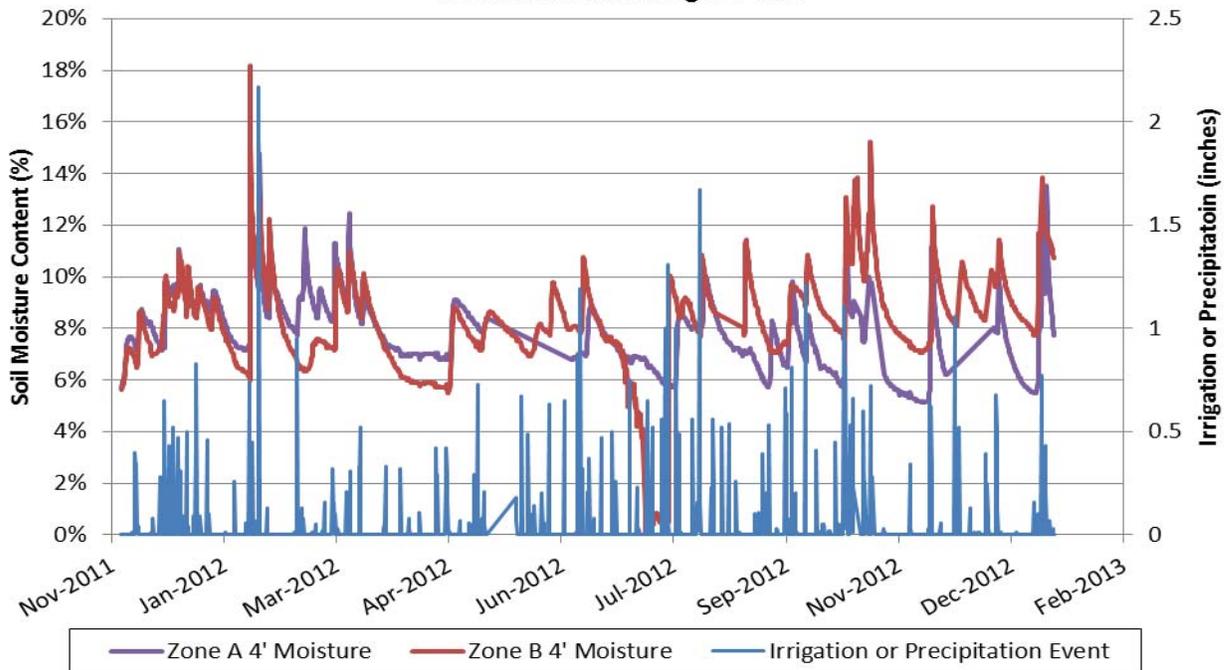


Chart 8
Soil Sensor Recordings: 4' BGS



The spikes observed in the soil moisture sensor readings directly correlated to precipitation and/or irrigation events in the study area. The observed recovery time was consistently between one and two days, with the soil moisture largely returned to normal after just one day but not quite stable at typical moisture levels. By two days following an irrigation event, the soil

was observed as stable at moisture levels similar to those prior to the event and was therefore deemed “recovered”.

The sensors at 1’ BGS showed an almost instantaneous soil moisture reaction to an irrigation event. On occasion, soil moisture levels at 1’ BGS exceeded what are expected to be complete saturation levels of 20% moisture. This occurred more often during the fall and winter months, when air temperatures were less than 45°F (approximately). During periods of cooler air temperatures, and therefore cooler soil temperatures, the reaction of the soil moisture to an irrigation event appeared to be greater in magnitude. The observed recovery time of the soil moisture remained consistent, which indicated that the lower temperatures did not negatively affect the ability of the water to infiltrate the ground or affect the ability of the soil micro-organisms to treat the applied wastewater during periods of cooler temperatures. LEI theorizes that this increase in reaction time/magnitude is attributable to soil surface tension conditions and the absence of plants/foilage at the surface to slow the infiltration of water or provide evapotranspiration in the root zone.

Soil moisture reactions at 4’ BGS were observed shortly after precipitation and/or irrigation events with a less dramatic moisture increase than seen in 1’ BGS sensors. The recovery time remained at approximately two days (or less) with a more gradual decline to stable moisture levels. Soil moisture readings at this depth rarely exceeded 15% moisture and never reached full saturation levels.

The soil moisture sensors at 8’ BGS experienced the most difficulty throughout the study. Due to several factors, these sensors were not reliable and often dropped in and out of function (mechanical failure, moisture in connectors, cut wires, etc.). Therefore, the graph of the sensors at this depth was not included in this report. During the times when the sensors appeared to be functioning properly, a similar pattern of soil moisture response was observed. The response at 8’ BGS was less than that at 4’ BGS and much less than the 1’ BGS. The recovery time was longer than two days and the soil moisture rarely approached 10% moisture.

The soil moisture sensor data further indicated the soil’s ability to handle land application discharge, even during periods of cooler temperatures. On occasion, the first foot of soil reached saturation due to an irrigation event, but this did not translate to greater depths below ground surface.

Although natural weather conditions did not allow for typical frost or freezing conditions, LEI believes that snow cover can insulate underlying soils in order to maintain temperatures similar to those observed during this study, therefore minimizing the effect of sub-freezing air temperatures and allowing for wastewater irrigation during winter months.

BENEFICIARIES

All Michigan specialty crop food processors have the potential to benefit from this study. As of 2010, the Michigan Department of Agriculture & Rural Development (MDARD) reported that there were 1,588 licensed food processors in the state; of those 963 were small processors. The MDARD further reported that our production (washing, packing, and processing by extension) of blueberries, cherries, cucumbers (pickling), potatoes (for chips) leads the nation. Other crops such as asparagus and Christmas trees bring Michigan to third in the nation. While Christmas trees don’t require wastewater for processing, all of the other products do.

The Michigan Department of Environmental Quality (DEQ) estimated that of the over 1,500 food processors mentioned above, 110 land-apply wastewater for treatment. This estimate is likely very low when accounting for the hundreds of smaller processors and packing houses that have

“slipped through the cracks” of state permitting. Furthermore, there are over 150 wineries in the state that use and discharge water through various means; these industries may not be included in the DEQ’s number.

The safe and effective discharge of food processing wastewater is elemental to the operation of most of these industries, especially those located in rural areas without access to publically-owned treatment works. This discharge is especially difficult during the winter months, when wastewater irrigation/discharge is generally discouraged. With an increasing number of facilities becoming year round operations, the ability to discharge process wastewater during winter months is quickly becoming a necessity. The results of this study indicated that, with proper management, high-strength wastewater discharge during winter months may be a successful and effective treatment method for food processor wastewater.

-The results were shared with the GR District office of the DEQ and Peterson Farms management (approximately 50 people).

-The results have been shared with the Executive Administrator of the Michigan Food Processor’s Assn. (MFPA - approximately 24 members of specialty crops). MFPA will also continue share information at future meetings: 2013 MFPA Annual meeting (usually around 150 people).

-Additional dissemination will occur as LEI meets with MDARD stakeholders. We hope to secure presentation space or a speaking role at the “Michigan Food Processing & Agribusiness Summit”, in Grand Rapids in May of 2013.

The SCBG Project website manages an average of five hits per month. LEI’s website experiences around 300 unique visits per month.

The dissemination of the information gathered and presented in this study will be accomplished through actively presenting/sharing/promoting the findings to Michigan Food Processors via the Michigan Food Processor Association (MFPA), Michigan State University, DEQ and MDARD. These key stakeholders, along with LEI and other environmental consultants, effectively propagate successful treatment and management technologies through the principals of services marketing and (as in the case of our governmental stakeholders) public service. Research of this nature represents building blocks for the advancement of the science of wastewater treatment and the protection of our state’s groundwater resources.

LEI will track the number of people that participate in the presentations at the MFPA annual meeting and the number of visitors to LEI’s Specialty Crop Block Grant Program website found at: <http://www.lakeshoreenvironmental.com/scbgprojects>

This information will be maintained internally and provided to the MDARD/USDA upon request.

LESSONS LEARNED

1. Weather: The study was designed to be conducted during a “typical” Michigan winter. The 2011/2012 and 2012/2013 winter seasons (up to the conclusion of the study) were unusually warm with significantly less than normal snowfall through the duration of this study. Additionally, in order to make artificial snow the air temperature must be significantly less than 32°F. Near 20°F or below was found to be best for making artificial snow. These temperatures were a rare occurrence over the course of this study and snow making was often unsuccessful. These issues made it difficult, if not impossible, to address all the hypotheses presented in the grant proposal.
2. Plot Selection: Successful wastewater land application techniques and in-situ soil monitoring with electronic environmental sensors is achieved in native, undisturbed soils or soils that are properly compacted and free of organic debris.
3. Soil Data Sensors: Some problems occurred during the study regarding the soil sensors and data logging stations.

- a. While planting the field in early-2012, the farming equipment accidentally caught on the sensor cords and pulled multiple sensors out of the ground. Some sensors remained intact and simply needed to be placed back in the ground; however others were severed and needed repair or replacement.
- b. The Zone A 8' moisture sensor and Zone B 8' moisture sensor were both significantly damaged and needed repair. Zone A 8' was replaced with a new sensor, while the Zone B sensor was spliced and repaired onsite. In order to achieve the 8' depth, an extension cable was needed in each zone.
- c. Following repair/replacement, these sensors were the least reliable during the study. Zone B 8' moisture (repaired) signal dropped in and out of communication with the logger throughout the remainder of the study, causing gaps in the data. Zone A 8' moisture (replaced) caused the batteries on the logger to drain unusually fast, which also caused data gaps on occasion.
- d. For successful soil monitoring, LEI recommends that sensors of adequate length be purchased and installed so that extensions are not needed.
- e. Additionally, LEI learned that the cords of the soil sensors were weak and susceptible to cuts and breakage. LEI recommends that cords be encased in "armor flex" or corrugated tubing for protection.

Achievements:

1. This study demonstrated that soil microorganisms are effective at reducing the concentrations of chemical oxygen demand (COD) and total organic carbon (TOC) that is present in the wastewater stream, even during winter months.
2. This study demonstrated that soil microorganisms were effective at removing concentrations of metals detected in the soil pore water. Samples collected from 1' BGS contained detectable concentrations of iron and manganese, however, samples collected from the lysimeters at greater depths did not contained metals at concentrations above laboratory detection limits.
3. Analytical results indicated that the majority of wastewater treatment occurred in the first four feet of soil.
4. The reduction of the concentration of water quality indicator parameters COD and TOC, coupled with the lack of metals concentrations in the deep lysimeters is proof that wastewater discharged on a low-magnitude, high frequency schedule can be treated by microorganisms when BOD loading rates exceed 50 pound per acre per day.
5. This study was unable to determine the effectiveness of snow cover to insulate soils and minimize the effects of sub-freezing air temperatures.
6. This study was unable to determine the effectiveness of snow to provide a porous and insulating medium on irrigation fields to facilitate the infiltration of wastewater constituents to the subsoil.
7. This study provided additional information pertaining to the appropriate use and installation methods of soil data sensors and logging devices.
8. This study provided additional information regarding the technical feasibility of snowmaking with devices that used compressed air and diffusion nozzles.

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ADDITIONAL INFORMATION

Readers of this report are encouraged to review the Final Performance Report on file with the Michigan Department of Agriculture, Michigan Food Processors Association, Peterson Farms, Inc., and Lakeshore Environmental, Inc.

Additional information can also be obtained by viewing the Lakeshore Environmental, Inc. website at www.lakeshoreenvironmental.com/SCBGProjects available after March 1, 2013.

Analytical Lab Reports

Note: Additional wastewater samples were collected by Peterson Farms in accordance with their groundwater discharge permit. These laboratory reports have not been included with this report, but are available upon request.

PROJECT TITLE - National Grape Cooperative-Implementation of Grape*A*Syst Program to Enhance the Competitiveness of MI Juice Grape Industry - FINAL

PROJECT SUMMARY

This grant was used to facilitate the completion of the Grape*A*Syst Program workbook and development of a Sustainability Action Plan by National Grape Cooperative grower members. The Grape*A*Syst Program is a collaborative effort between National Grape Cooperative, Michigan State University and the Michigan Department of Agriculture & Rural Development to provide Michigan's grape industries with a resource for implementing and measuring sustainable production practices.

This grant provided additional resources to National Grape for implementation of the Grape*A*Syst sustainability program to its grower members. This grant enabled the completion of the Grape*A*Syst Program and development of a Sustainability Action Plan by 100%, or 296 Michigan National Grape Cooperative juice grape growers under contract with Welch's (Obj. 1). As a result of the combined efforts by National Grape Cooperative and its partners, approximately 87 Michigan grape growers are now participating in the Michigan Agriculture Environmental Assurance Program (MAEAP) verification process (Obj. 2). Exact participation in the MAEAP program is unknown to privacy of information.

Consumers are becoming more concerned about how their food is produced and major food retailers are now requiring suppliers to demonstrate sustainability as part of their production process from field to table. National Grape is committed to providing a sustainability program that enhances the competitiveness of Michigan's grape industries in the global marketplace, and this grant provided resources in support of this initiative.

PROJECT APPROACH

To assist Michigan grape growers with completion of the Grape*A*Syst Program and develop of an action plan (Obj. 1). National Grape Cooperative provided one-on-one assistance to its grower members by meeting with individual growers to complete the workbook, record scores, and complete an action plan for improving the sustainability of their farm. Paul Jenkins, the project leader for the development of the Grape*A*Syst Program at Michigan State University, assisted National Grape Cooperative with the completion the project objective and requirements

outlined in the grant agreement. Dr. Roger Brook, Running Water Publishing, worked on development of an online database and website for completing the Grape*A*Syst Program and Action Plan. National Grape made the program mandatory for its grower members in 2011, and 100% of its grower members completed the workbook in 2012. The development of an online system was determined to be an important step in getting growers through the program on an annual basis. MAEAP verification criteria represents the highest level of sustainability for certain production practices in the Grape*A*Syst Program. Completion of the Grape*A*Syst Program exposes growers to the benefits of MAEAP, and gives them a head start in the cropping system verification process. Through the engagement of growers in the Grape*A*Syst program, grower participation in the Michigan Agriculture Environmental Assurance Program is expected to increase (Obj. 2).

GOALS AND OUTCOMES ACHIEVED

Performance toward meeting our goals and outcomes was measured by the number of grape growers who completed the Grape*A*Syst Program workbook, generated scores, and completed the Sustainability Action Plan. By the end of the second year of this program, 296 of Michigan juice grape growers (100% of National Grape Cooperative members) completed the Grape*A*Syst Program and developed a Sustainability Action Plan (Obj. 1). As a direct result of funding by the Michigan Specialty Crop Block Grant Program, 100% of Michigan juice grape producers have now completed the program. The work completed in 2012 exceeded our target goal for completion of this workbook by the end of the third year of this program. As a result of the combined efforts by National Grape Cooperative and its partners, approximately 87 Michigan grape growers are now participating in the Michigan Agriculture Environmental Assurance Program (MAEAP) verification process (Obj. 2). The number of growers pursuing MAEAP verification is approximate due to confidentiality of data.

BENEFICIARIES

The beneficiaries of this work are National Grape Cooperative, its grower members, and its wholly-owned subsidiary Welch's. Consumers are becoming more concerned about how their food is produced and major food retailers, such as Walmart, are requiring suppliers to demonstrate sustainability as part of the overall process from field to table. In order to become a preferred supplier, companies like National Grape/Welch's must have a sustainability program in place with their growers. The project benefits the above named groups by providing resources to remain competitive in the marketplace. Approximately 296 National Grape grower members farm approximately 12,000 acres of Concord and Niagara grapes in Michigan. Juice grape production represents over 80% of all grape production in Michigan, and the benefits and impact of this work extends to the families, communities, processing facilities, and local economies where juice grapes are grown.

LESSONS LEARNED

Sustainability continues to be an important topic, and remains a top priority for Michigan juice grape producers. While it was rather easy to work with the "early adopters" during the first year of this program, working with growers on a voluntary basis has proven difficult at times. National Grape decided to make the program mandatory in 2011, but this was still met with opposition by a large number of growers. Regardless, National Grape Cooperative was able to successfully implement 100% compliance with its members. For National Grape, this is a business decision and it is a decision that will help keep our industry competitive in the national market. Growers are becoming more accepting of the program over time, and many people view the program very differently once they have gone through it. Growers are learning not only how to become more sustainable, but also how to grow better quality grapes. The program also

enables growers to be proactive in their management decisions, achieve the desired outcomes, and avoid potential problems.

CONTACT PERSON

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ADDITIONAL INFORMATION

Grape*A*Syst website: <http://grapeasyst.org/>

As a result of this grant, and the successful implementation of the Grape*A*Syst sustainability program by National Grape and its partners, Michigan is now the lead for National Grape's national sustainability effort. Mr. John Jasper of the Michigan office has been named the lead for this national program, and Grape*A*Syst is the model that will be used by its grower members. National Grape has made the program mandatory for its grower members and is in the process of building a national online database and website for completing the program.

PROJECT TITLE - MSU Plant Pathology-Enhancing the Competitiveness of Small Fruit Crops by Monitoring and Diagnosing Virus Infections – FINAL

PROJECT SUMMARY

Blueberries and grapes are high-value fruit crops in Michigan, which is the top blueberry-producing and the fourth largest grape-producing state in the United States. In recent years, several exotic diseases have been detected in blueberry fields in Michigan, including blueberry scorch and blueberry shock, both of which are caused by plant viruses. In addition, a new disease called 'bronze leaf curl', the causal agent of which is unknown, was found to be spreading in older Michigan blueberry fields. These diseases can cause serious losses by reducing fruit yield and quality and may even kill blueberry plants in some cases. To develop appropriate management strategies, we need to improve our understanding of the identity and biology as well as the prevalence and means of spread of the causal pathogens. In addition, there is a need to determine the causes of grapevine decline and virus-like symptoms which are becoming more prevalent in Michigan vineyards. Without a clear understanding of the cause of observed symptoms, it will be impossible to properly manage these problems and losses in fruit quality and vine longevity are common where these virus-like symptoms occur. The overall goal of this project was to improve our understanding of the identity and prevalence of virus and virus-like diseases of grapes and blueberries in Michigan. The specific objectives were to: 1) Identify causal agents of virus-like symptoms and grapevine decline in Michigan, 2) Establish in-state DNA-based testing capability for grapevine virus and phytoplasma diseases, 3) Monitor blueberry scorch and shock viruses in Michigan blueberry fields, and 4) Identify the cause of blueberry bronze leaf curl. In the long term, this knowledge will lead to improved management and increased longevity of vineyards and blueberry plantings, thereby improving the economic competitiveness of these specialty crops in Michigan.

PROJECT APPROACH

- 1) *Identify causal agents of virus-like symptoms and grapevine decline in Michigan*

Under this objective, Diane Brown-Rytlewski (MSUE) assisted in collecting virus samples and Jerri Gillett (MSU Small Fruit Pathology laboratory assistant) conducted all the laboratory tests. Samples were taken from 20 commercial and research vineyards with vines of virus-like symptoms in the major grape-growing areas of Michigan. Fresh petiole and leaf samples (about 175 samples total) were collected from August to October for virus detection. Plant samples were tested using ELISA kits (from Agdia Inc., Indiana, and Bioreba, Switzerland) for the following viruses: Grapevine leafroll-associated viruses (GLRaV-1, GLRaV-2, GLRaV-3, GLRaV-4-9), Grapevine fleck virus (GFkV), Grapevine virus A (GVA) and B (GVB), Arabis mosaic virus (ArMV), Grapevine fanleaf virus (GFLV), Tobacco ringspot virus (TRSV), Tomato ringspot virus (ToRSV) and Peach rosette mosaic virus (PRMV). Additional petiole samples were frozen for later determination of phytoplasma infection. The following viruses were detected in the samples: GLRaV-3, GLRaV-1, PRMV, TRSV, and ToRSV. A majority of samples contained GLRaV-3, which is also common in other states. Furthermore, we believe we have observed new and unique virus-like symptoms in 'Niagara' grapes that have not been described anywhere else. Samples were sent to Dr. Bob Martin at the USDA-ARS in Corvallis for further study. In addition, a Chardonnay vineyard in Southwest Michigan with a high incidence of leafroll symptoms was chosen to study the spatial distribution of viruses within the vineyard. Samples were taken from vines located 10 vines apart in 10 rows that were 85-90 vines long. Almost 900 vines were also visually rated for disease severity. Two viruses were commonly detected in the vineyard: GLRaV-3 and TRSV. Almost all vines that showed visual symptoms, ranging from mild to severe, were found to be infected by GLRaV-3. Even vines that appeared healthy had the virus in some cases. New plants used to replace dead vines also showed evidence of infection. Furthermore, there was evidence of mealybugs, which are known to be leafroll virus vectors, under the bark of the vines. This may explain the rapid rate of infection in this vineyard; the grower had indicated that within the span of several years, the vineyard had become almost entirely infected. TRSV was also found this vineyard and mixed infections with GLRaV-3 resulted in very severely symptomatic, stunted vines. TRSV is a common cause of vine decline and death in Michigan vineyards and is spread by dagger nematodes. Since the viruses are widespread and the vines cannot be cured, the grower will be advised to remove the vines and to either fumigate or grow grass cover crops for multiple years to eliminate viruliferous nematodes. Another option will be to plant new vines on nematode-resistant rootstocks. These methods of control merit further research in Michigan. The survey also illustrates the importance of virus-tested planting material and supports the efforts of the National Clean Plant Network, which will also have medium- and long-term benefits for Michigan growers once virus-tested planting material becomes widely available.

2) *Establish in-state DNA-based testing capability for grapevine virus and phytoplasma diseases.*

A PCR (polymerase chain reaction) protocol for general detection of phytoplasmas was obtained from Dr. Margarita Bateman at USDA-APHIS. Jerri Gillett, research assistant in the MSU Small Fruit Pathology lab, and Elizabeth Dorman of the MDA Pest and Plant Pest Management Division attended a workshop entitled "Real-time PCR Workshop for Applied Plant Pathologists" which was led by Dr. Paul Vincelli at the University of Kentucky from January 22-25, 2013. The focus of the workshop was the identification of plant pathogens utilizing regular and real-time PCR on nucleic acid that had been extracted from plant samples. Sessions in the workshop covered the nucleic acid extraction process, the basics of each PCR system and when to use them, interpreting results, proper internal standards, and also troubleshooting problems. The workshop was limited to eight participants and included a mixture of lectures and intensive hands-on laboratory experience. In spring 2013, we will test grape leaf samples that were frozen at -20°C in 2012 for the presence of phytoplasmas using PCR. Using the same samples, we will also evaluate specific PCR primers for Rupestris stem-pitting virus, which cannot be detected with ELISA. Furthermore, we have initiated a

research collaboration with Dr. Robert Davis, a grape phytoplasma expert at the USDA-ARS in Beltsville, for further characterization of grape phytoplasma strains in Michigan.

3) *Monitor blueberry scorch and shock viruses in Michigan blueberry fields.*

With the help of this grant, we provided free diagnostic support for virus detection to Michigan blueberry growers in 2012 as in previous years and were able to continue monitoring for Blueberry shock virus and Blueberry scorch virus, which had been initially detected in Michigan in 2009, followed by an eradication effort which appears to have been successful for blueberry shock virus. We tested leaf samples from six blueberry fields of growers who reported unusual symptoms. Tests were conducted using Agdia ELISA kits for six viruses: Tobacco ringspot virus (TRSV), Tomato ringspot virus (ToRSV), Blueberry shoestring Virus (BSSV), Blueberry leaf mottle virus (BLMV), Blueberry Scorch Virus (BLScV) and Blueberry shock virus (BShV). Neither blueberry scorch virus nor blueberry shock virus were detected in any of the samples, but we did detect TRSV, ToRSV, and BSSV in some of the samples. In one relatively young 'Draper' field, infection with TRSV and ToRSV was so severe that the grower was advised to destroy the planting because these viruses are vectored by dagger nematodes present in the soil. Assistance with field sampling was provided by Mark Longstroth and Carlos Garcia from MSU Extension in Van Buren and Ottawa Counties, respectively, while Jerri Gillett conducted all the laboratory analyses.

4) *Identify the cause of blueberry bronze leaf curl*

We sent symptomatic plant material from various blueberry fields with bronze leaf curl symptoms to Dr. Robert Martin at the USDA ARS in Corvallis, Oregon, who conducted total RNA extraction in an effort to detect known and unknown viruses. DsRNA extracted from symptomatic leaves was cloned and partially sequenced suggesting a novel virus in the genus Closterovirus in affected plants. Based on similarity to known virus groups, the virus is likely to be transmitted by insects such as mealybugs, scale or whiteflies. Detection primers were developed, yielding amplicons of the new virus only from symptomatic plants and one non-symptomatic plant from an infected field. A closterovirus, designated Blueberry virus A, from highbush blueberries in Japan recently has been sequenced and the entire genomic sequence is available in GenBank (accession # NC_018519.1, Isogai and Yoshikawa). Sequence comparisons between the U.S. and Japanese isolates showed 99% identity at the amino acid level, suggesting the same virus is present in Michigan and Japan. In Michigan, symptoms were most prevalent in 'Jersey', 'Elliott', 'Bluecrop', 'Rubel', and 'Pemberton'. In Japan, the virus has been detected in the cultivars 'Spartan', 'Sierra', 'Bluecrop' and 'Coville' and there were no symptoms associated with virus infection (M. Isogai, personal comm.). This suggests the possibility that the symptoms observed in Michigan may be due to mixed infections. Symptomatic tissue was also processed for examination in a transmission electron microscope (TEM) to visualize virus particles; these samples await examination. ELISA and PCR tests for *Xylella fastidiosa* (a xylem-bound bacterium) have not yielded any positive results. Furthermore, the stem tissue looks green and healthy which is not indicative of fungal or bacterial infection and only common fungi or bacteria were isolated from symptomatic stems. In 2013, we will continue to collaborate with Dr. Martin in studying the diversity of the detected Closterovirus by sampling numerous fields over a wide geographic area in Michigan. This is necessary to develop a reliable diagnostic test. We will also attempt aphid and bud graft transmission of the virus from diseased to healthy plants in our laboratory.

GOALS AND OUTCOMES ACHIEVED

Significant contributions of the project are the provision of correct disease diagnoses to Michigan grape and blueberry growers, which helps in making management decisions with respect to affected plantings. In addition, tests on the spatial distribution of virus-infected vines will help in understanding virus spread and epidemiology. The discovery of a new closterovirus

in Michigan blueberries improves our understanding of the etiology of bronze leaf curl disease, which has baffled growers and consultants and is frequently mistaken for herbicide injury. Overall, the project has helped growers as well as researchers and extension personnel understand the role of viruses in plant decline and other virus-like symptoms in grapes as well as blueberries. Results have been presented at various grower meetings during the growing season as well as the 2012 American Society of Viticulture and Enology meeting and the Great Lakes Expo. Extension meetings that we presented results at:

Area-of-expertise Fruit Team Summer Fruit Tour, Aug 15-16, 2012, Benton Harbor, MI: about 25 extension agents and growers; Trevor Nichols Field Day, Sep. 25, 2012, Fennville, MI: about 35 chemical company reps, growers, commodity representatives. Blueberry workshop, Springfield, MO, Oct. 19-20, 2012: 60 growers. Great Lakes Expo, Dec. 4-6, 2012 Grand Rapids, MI, grape session: about 80 growers.

A grape virus factsheet is being prepared and will be published through MSU Extension in the spring of 2013. The progress is that a draft has been completed; but due to the unusual weather in 2012 which extended our field activities, we were not able to complete.

The data we collected in this project will be used as “seed data” to attract national funding. Our diagnostic surveys have also identified sites that may be potential research sites for future project. While we achieved most of our goals for this project and established valuable collaborations, we still need to complete testing of grape samples for the presence of phytoplasmas but with the training received by the MSU Small Fruit Pathology research assistant, this is set to be completed this spring. If phytoplasmas are detected, we will send DNA samples to the USDA-ARS lab in Beltsville for strain determination. We conducted surveys in 20 instead of 30 proposed sites. We did an in-depth sampling in a test case vineyard, which provided us valuable information on local spatial distribution and spread of the most important grape viruses in Michigan, GLRaV-3 and tobacco ringspot virus. We focused our efforts on serological (ELISA) assays rather than old-fashioned indicator plant bioassays for the sake of efficiency. We will also complete the electron microscopy analysis of the blueberry bronze leaf curl samples, as well as graft and aphid transmission experiments in the spring and summer of 2013.

Infected blueberry fields we estimated losses of 1% (low level of virus incidence, a vine here and there) to 50% in the worst cases. In grape vineyards, we have observed similar losses. Cost savings in terms of local diagnosis: on average \$200 per vineyard, up to \$2,000 per grower for samples tested locally. That did not include driving out and taking the samples, which could have cost another \$200 per trip.

In the grape and blueberry surveys, we tested plant samples for up to 12 different viruses and saved growers anywhere from \$100 to \$2,000 in testing expenses compared to costs of similar tests by commercial diagnostic laboratories.

In the blueberry fields surveyed, the estimated yield loss ranged from a trace to 1% up to 15%, with the most severe case a planting with a joint infection of Tomato ringspot virus and Tobacco ringspot virus, both nematode-transmitted viruses. Since the planting was still young, the actual fruit loss was relatively low but the infection represents a huge setback to the growers who have invested a lot of money in establishing the beds and installing irrigation. The planting will never thrive, and infected plants need to be removed. The cost of fumigating this field would be \$3,000 per acre, but the field is even too small to interest commercial fumigators. The only option for these growers would be to plant cover crops for at least two years or grow another crop that is not susceptible to these viruses.

The average yield loss for vineyards in the grape virus survey in 2012 was estimated at 5% and ranged from a trace in vineyards with a low incidence of virus symptoms to about 30% in both fruit yield and quality (brix) reduction in the most severely infected vineyard (a 2.5- acre Chardonnay vineyard with an 86% infection rate of Grapevine leafroll virus 3 (GLRaV-3) and a 13% infection rate of Tomato ringspot virus). The financial loss in the latter vineyard was estimated at about US \$7,000 (not counting potential losses due to lower quality of wine made from these grapes) in 2012. As the viruses continue to spread, probably via mealybugs and soilborne nematodes, and vines decline on this farm, losses will increase over time. The recommendation is to remove the entire vineyard and fumigate the soil, which would cost \$3,000 per acre; added costs for new vines (at least \$6,000/acre) and a loss of harvest income (up to \$50,000/acre) should also be factored in for the time needed to reestablish the vineyard. An alternative would be to plant a cover crop for at least two years with strict broadleaf control or to plant vines on nematode-resistant rootstocks. Either of these options would add additional costs as well and an additional two years delay in reestablishing the vineyard. In short, virus infections can be very costly and are best avoided by planting virus-tested stock (if available).

BENEFICIARIES

The main beneficiaries of this research project are Michigan grape and blueberry growers and nurseries. Researchers and extension agents also benefit by increasing awareness and visual diagnostic skills as well as understanding of the cause and spread of virus-like symptoms in small fruit plantings. While it is difficult to estimate the long-term economic and environmental impacts of this project through improved yield, fruit quality and longevity of plantings, the diagnoses conducted as part of this project has already directly saved Michigan growers thousands of dollars in testing expenses. Early diagnosis and intervention will save growers years in fruitlessly managing non-productive plantings and vineyards and will prevent spread of virus diseases from infected to healthy plantings. Furthermore, the research efforts on bronze leaf curl have already partly clarified the situation by implicating a possible new virus in the disease symptoms. We are optimistic that we have nabbed the culprit. Further research will benefit Michigan blueberry nurseries by development of a detection method for the bronze leaf curl agent for evaluating mother blocks in the MDA virus-tested nursery program. This will safeguard new plantings within and outside of Michigan derived from Michigan-grown planting material. The project also resulted in valuable collaborations with virus and phytoplasma experts in different parts of the US, which will benefit Michigan small fruit production through effective research collaboration.

There are about 455 grape growers (288 in SW Michigan, 110 in NW Michigan, 57 in the rest of Michigan), 600 blueberry growers (most in West Michigan: 290 have <9 acres and 18 have >200 acres), and at least 12 blueberry nurseries in Michigan (of which 5 sell virus-tested plants). We are not aware of registered grape nurseries in Michigan.

LESSONS LEARNED

We have learned new sampling and diagnostic techniques and increased our virus research capabilities through this project. We have also strengthened collaborative research connections with colleagues nationwide. We have had some difficulties with approach and splice grafts for studying virus transmission in blueberries and will attempt bud grafts next. We will need to learn additional PCR protocols for detection of new grape viruses which have recently been described in other states in the Midwest. Furthermore, we believe we have seen unexpected and unique virus-like symptoms in 'Niagara' grapes that have not been described anywhere else and remain undiagnosed for the time being.

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ADDITIONAL INFORMATION

Extension publications:

1. Schilder, A. M. C., and Brown-Rytlewski, D. 2013. Virus and Viruslike Diseases of Grapes. Grape Facts: Michigan State University Extension Fact Sheet (in preparation, to be published in May, 2013).
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http://www.michiganwines.com/page.php?menu_id=51
3. Schilder, A. 2012. Last chance to participate in grape virus diagnostic survey. Michigan Grape and Wine Newsletter 2 (13): 5.
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6. Schilder, A. 2012. Grape virus diagnostic support during the 2012 growing season. MSU Extension News for Agriculture (<http://news.msue.msu.edu/news/category/fruit>). Posted on 15 May, 2012. [MSU Extension http://msue.anr.msu.edu/news/archive/info/fruit/2012/05/P10](http://msue.anr.msu.edu/news/archive/info/fruit/2012/05/P10)

Research and Extension Presentations

1. Schilder, A. 2013. Integrated Disease Management for Vineyards (oral presentation). Midwest Grape and Wine Conference, St. Charles, Missouri, Feb. 9, 2013.
2. Schilder, A. M. C., and Gillett, J. M. 2012. Grapevine and blueberry viruses in Michigan. State report (oral presentation and written report), WERA-20 research meeting, Sept. 17-19, 2012, Clemson, SC.
3. Schilder, A. M. C., and Gillett, J. M. 2012. Diagnosis of grapevine virus diseases in Michigan vineyards (poster). American Society for Enology and Viticulture- Eastern Section Meeting, Traverse City, July 16-18, 2012.
4. Schilder, A., and Gillett, J. M. 2012. Sleuthing disorders of grapevines: the role of viruses and trunk pathogens (oral presentation), Great Lakes Expo, Grand Rapids, Dec. 4, 2012.



Fig. 1. Tobacco ringspot virus causing stunting and decline in Riesling grapevine (top left), Tomato ringspot virus “ringspot” symptoms on grape leaf (bottom left), Grapevine leafroll virus causing characteristic reddening of leaves with green veins (top right), and Peach rosette mosaic virus causing weeping growth habit and vine decline in Concord grapevine (photographs by A. Schilder).

PROJECT TITLE - MSU - Plant Pathology-Control of Plant Parasitic Nematodes with Rotation Crops - FINAL

PROJECT SUMMARY

Plant-parasitic nematodes can severely damage roots of fruit and vegetable crops. For example, in Michigan, nematodes play an important role in black root rot, a disease complex that plagues older strawberry fields and diminishes yields to the point that the planting becomes economically unsustainable. Nematodes feeding on strawberry roots can weaken the plants and provide wound sites for penetration by root-rotting fungi. Various plant-parasitic nematodes have been found in strawberry fields affected by black root rot, including *Pratylenchus penetrans* (root lesion nematode), *Meloidogyne hapla* (Northern root knot nematode), and *Longidorus elongatus* (common needle nematode). Continual strawberry cropping allows nematodes and other plant pathogens to build up to deleterious levels. Nematodes can also greatly hamper establishment of young plants and reduce longevity of the plantings. The lack of availability, high costs and environmental concerns associated with chemical fumigation for control of plant-parasitic nematodes have spurred interest in effective alternate management practices such as crop rotation. While many rotation crops are available, information regarding their potential to control nematodes is either conflicting or lacking. This study was conducted to test a variety of rotation crops which can be easily sourced and are adapted to Michigan’s climate for their nematode-suppressive ability under both controlled and field conditions. We also investigated tarping of crop residues to enhance biofumigant effects. The overall goal of the project was to provide small fruit and vegetable growers in Michigan with environmentally friendly nematode control options, resulting in immediate benefits which enhance the competitiveness of Michigan specialty crop producers.

PROJECT APPROACH

1) Evaluate crop rotation sequences for suppression of black root rot and plant parasitic nematodes.

This trial was conducted on a commercial strawberry farm in Hudsonville, MI. Roger Sysak and Randy Smith (Small Fruit Pathology field research assistants) and Jerri Gillett (Small Fruit Pathology research assistant) conducted the trials in collaboration with the grower and undergraduate assistants. Fred Warner (MSU nematode diagnostician) conducted the nematode analyses. Six rotation crop sequences were established in 2009 in a former strawberry field that had suffered from black root rot and was infested with plant-parasitic nematodes (particularly needle nematodes) in Hudsonville, Michigan (Table 1). The control consisted of a fallow treatment with tilling to control weeds. A randomized complete block design was used with small plots (6 x 10 ft) with four replications (Fig. 7). The rotation sequences were completed in 2011. In spring 2012, plots were individually rototilled and the rototiller was cleaned between plots. Strawberries (cv. Honeoye) were planted in each plot (10 bare-root plants each) as indicators of how well plant parasitic nematodes were controlled in the

prior crop rotation sequences. Weeds were managed with strips of weed cloth on both sides of the plants and hand-weeding, and plants were watered by hand as needed. Soil samples were taken from each plot before planting strawberries and analyzed for plant-parasitic nematodes by the MSU Diagnostic lab. In early August, we assessed plant height and diameter as well as number of runners in each plot. Observations were also made on weed density in the areas in each plot that were not covered by weed cloth. In addition, samples were taken of the top four inches of soil in each plot and placed in aluminum trays in the greenhouse to determine weed pressure. At the end of August, we dug up six representative plants to visually assess size and fibrousness of the root system on a 1-5 scale and root weight. In addition, soil samples were taken in June and soil and root samples in August for nematode analysis according to established procedures. All data were analyzed with ANOVA followed by mean separation using Fisher's Protected LSD in the StatGraphics program. Data were transformed as needed after variance checks.

Table 1. Rotation crop trial, with crops planted in small plots in a former strawberry field with nematode problems in Hudsonville, MI from 2009-2011. Rye was used as a cover crop each winter in annual crops. In 2012, strawberries were planted as indicators of soil health status.

Trt	Year 1 (2009)	Year 2 (2010)	Year 3 (2011)
1	Fallow with tilling	Fallow with tilling	Fallow with tilling/ Rye
2	Alfalfa	Alfalfa	Alfalfa/ Rye
3	Oats-June clover/ Rye	Oilseed radish/ Rye	Oilseed radish/ Rye
4	Broccoli/ Rye	Broccoli/ Rye	Broccoli/ Rye
5	Broccoli/ Rye	Pumpkin/ Rye	Sweet corn/ Rye
6	Sweet corn/ Rye	Pumpkin/ Rye	Broccoli/ Rye
7	Rapeseed/ Rye	Pearl millet/ Rye	Mustard/ Rye

The number of nematodes increased between May and August 2012. The most numerous nematodes were ring nematodes, but needle, lesion, spiral and root knot nematodes were also present (these nematodes had been problematic at the site before the rotation treatments were established). There were significant treatment effects on most nematodes as well as total nematode counts (Fig. 1). At the end of the experiment, needle nematodes (which are the most damaging nematodes) were highest in the fallow treatment, followed by the oilseed radish rotation and continuous alfalfa, and lowest in the two pumpkin rotations. Lesion nematode numbers in the soil and roots were low overall and not significantly different between the treatments. Ring nematode was highest in continuous alfalfa and lowest in the fallow treatment. Strawberry root health ratings were not significantly different, although the fallow and the continuous broccoli treatment showed relatively poorer root health than the other treatments. Rotations significantly affected plant height but not plant diameter or weight even though trends were visible. The fallow and continuous broccoli treatments had the smallest plants, whereas the rapeseed/pearl millet/mustard and the sweet corn/pumpkin/broccoli rotations had the largest plants overall (Fig. 2). Tarping of cole crop (broccoli and oilseed radish) residues increased plant size slightly, but this difference was not statistically significant (Fig. 3).

Weed emergence in soil samples was lower than expected, which may have been due to high temperatures in the greenhouse during the time of the study. Purslane was the most common weed, followed by carpetweed and grasses. The fallow and continuous broccoli rotations had

the most broadleaf weeds (11.8 and 12.3, on average, respectively), followed by the broccoli/pumpkin/ sweet corn (9.3), and sweet corn/pumpkin/broccoli and oilseed radish rotations (both 3.3). The rapeseed/pearl millet/mustard rotation and continuous alfalfa averaged 2.8 and 2.3 broadleaf weeds, respectively. However, the differences were not statistically significant due to high variability. In the field, weed stand was measured in July and was fairly uniform. Broadleaf weeds include common lambsquarter, smooth pigweed, common purslane, and Pennsylvania smartweed. Weed pressure may have been lower than normal due to drought conditions, as only strawberries were watered. Total weed count ranged from 25 per plot in the rapeseed/pearlmillet/ mustard rotation to 29 in the fallow treatment, and differences were not statistically significant. Oilseed radish was observed to improve soil structure and aeration due to production of big, deep taproots.

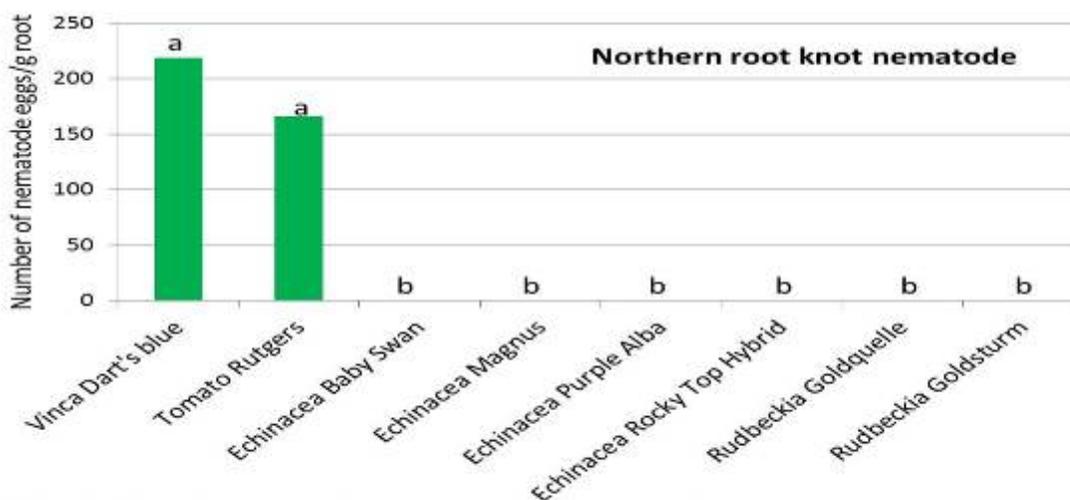


Fig. 6. Number of northern root-knot nematode eggs per gram of roots of inoculated potted plants allowed to grow for 10 weeks in autoclaved sand.

GOALS AND OUTCOMES ACHIEVED

In this project, we have shown through field and greenhouse experiments that rotation crops can be effective at reducing plant-parasitic nematodes in the soil. We have observed that some rotation crop species and cultivars within a species are more effective than others. Furthermore, some species may suppress some nematodes while increasing other nematodes. That is why it is important to screen for susceptibility to multiple important nematode species. Both lesion and root-knot nematodes have been found in strawberry roots for instance, and the best rotation crops would suppress multiple species. This project has led to improved recommendations with respect to the suitable rotation crops for strawberries. For instance, even though leguminous crops are beneficial for soil building and nitrogen fixation, we now recommend against having leguminous crops immediately precede strawberries. From previous field observations, it may not be advisable for instance, to plant strawberry right after soybeans or alfalfa. Instead, if a legume is used, it would be best done earlier in the rotation sequence. Compared to the fallow treatment, we saw the most improvement in strawberry plant height in the sweet corn/pumpkin/ broccoli (tarp) and the rapeseed/pearl millet/mustard rotations. The potted plant trials suggest that some mustard cultivars may not be appropriate as cv. Kodiak, for instance, is capable of supporting both lesion nematode and northern root-knot nematode reproduction.

Among the rotation crop options, there are several vegetable crops that could provide additional cash income to growers (e.g., broccoli, pumpkin, sweet corn or even ornamental flowers). We do not advise a fallow period, certainly not more than one year as this may result in soil erosion and would require continuous weed control. Marigolds have been long known to suppress root lesion nematodes, and we have shown that they are also suppressive to northern root knot nematode in potted-plant trials. However, French marigolds performed better than African marigolds in this respect. It is advisable not to grow any rotation crop more than one year in a row as we observed somewhat higher overall nematode numbers in the broccoli/broccoli/broccoli plots than in other broccoli rotations. Plastic tarping of broccoli and oilseed radish residues may promote biofumigant effects by retaining cyanide gas for a longer period; gas production was observed by “ballooning” of the tarps while residues decomposed. A more thorough analysis of the cost-benefit ratio of tarping is needed in light of potential increased plastic waste, however. The use of effective rotation crops may reduce or eliminate the need for expensive and toxic fumigants for nematode control. At least two and preferably three years of rotation crops between strawberry crops are recommended.

Within the time frame of this project, measuring the reduction in soil fumigants used and increases in crop health and yields, proposed activity was somewhat premature. We are still sharing the data with growers and encouraging adoption of rotation crops. Growers have expressed interest, and the grower on whose farm we did the trial has eagerly awaited the results. He sold the rotation crops produced in our plots (broccoli, pumpkin and sweet corn) at his farm stand has been able to assess the market for these products. We will monitor fumigant (and alternatives) use for strawberries via a questionnaire at future strawberry field meetings.

The fact sheet is still in progress and will be printed in July/August 2013. Information on management of black root rot and nematodes will also be included in the “Pocket Guide for IPM scouting in Strawberries” which is currently in preparation and will be available by the Great Lakes Expo in December 2013.

We underestimated the time required for getting the project results out to the growers and for growers to adopt the techniques – it may be several years before growers will adopt these practices. Grower questionnaires will be given out at the Great Lakes Expo each year for three years, starting in December 2013.

BENEFICIARIES

The main beneficiaries of this project are Michigan strawberry growers. We anticipate that the results will immediately benefit strawberry growers in Michigan, with growers of other crops (e.g., fruit crops, vegetables and nursery crops) also benefiting as the information is shared via MSU extension and other channels. Competitiveness of specialty crop growers will be enhanced by improving plant establishment and lowering crop losses due to nematode injury, enhancing the economics of specialty crop production in Michigan.

About 250 strawberry growers in Michigan will benefit from this project.

Results of the study have been shared with about 200 growers at the Great Lakes Expo in December, 2012. We will also share the data with about 50 growers at a field meeting in summer of 2013 in coordination with Bob Tritten in Southeast Michigan.

LESSONS LEARNED

The main problem we experienced in 2012 was extreme heat and drought, which required frequent trips (1.5 hours each way, 2x a week) to monitor and water the plants by hand. The

extreme environmental conditions may have also affected strawberry growth and nematode counts. We would have preferred to observe the strawberry plants another year to take them through a fruit production cycle and measure yield, but the grower needed the land for other purposes so the experiment was terminated after the first season. In addition, differences might have been greater if a continuous strawberry plot could have been included for comparison. Our weed assays in the greenhouse may have been influenced by the high temperatures during the summer – growth chambers would have been preferable but none were available at the time. We also learned that root lesion nematodes are rather sensitive to the extraction procedures for inoculation of potted plants. In future experiments we will plant seeds directly into soil that is naturally and predominantly infested with lesion nematodes.

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ADDITIONAL INFORMATION



MORSE MARKETING - Boot Camp for Financial and Business Literacy Training for Specialty Crop Farmers FINAL

Project Summary

MMC and Greenstone Farm Credit have identified the need for specialty crop producer training in financial planning such as cash flow analysis and appropriate risk management strategies in order to ensure the sustainability of their operations. Specialty crop farmers who sell into local food systems such as food hubs, farmers markets, and CSAs have benefitted through

interactive direct training intended to simplify concepts and provide templates for their own budgeting and analysis. Training occurred through workshops directly targeted at specialty crop producers that facilitate connections to mentors through state, national networks, and to local resource providers, such as Greenstone Farm Credit. These workshops by design focused on improving the competitiveness of specialty crop growers by designing tools and resources targeted to specialty crops, the training materials and workshops were specifically geared towards the size, scope, business practices and appropriate risk management tools for specialty crop growers.

New and beginning farmers entering the specialty crop industry need to learn proper business planning and risk management practices for growing specialty crops. Proper financial planning, cash flow analysis, risk mitigation and methods to avoid costly errors by mitigating crop risk with the substantial swings in recent weather patterns are among the top challenges for specialty crop producers as they seek to sell to emerging local food system markets, which highlights the importance of the project to rural economic development.

This project sought to address the identified need of improving the competitiveness of specialty crop growers by directly engaging these food producers along the farmer-food hub supply chain. Using newly developed materials with outreach and education strategies, this project specifically aimed to assist specialty crop producers by:

- 1) Delivering educational materials and addressing critical knowledge gaps among specialty crop producers that increase financial skills proficiency.
- 2) Administering six in-person workshops introducing these new resources to 180 specialty crop farmers (estimated 30 growers at each workshop). Five food hubs and one statewide conference partnered with MMC and Greenstone Farm Credit to co-host these proposed workshops, inviting specialty crop producers who currently supply the hub and also those who are considered stakeholders, but want to understand the market better.
- 3) At the above mentioned statewide conference (the Northern Michigan Small Farm Conference in Traverse City), MMC and Farm Credit partnered with the MSU-Center for Regional Food Systems, Michigan Food & Farming Systems, and the U.P. Food Exchange to provide an additional module on Good Agricultural Practices (GAP) certification. This module included facts and figures about the GAP certification process, as well as risk management methods to improve the competitiveness of specialty crop food producers.
- 3) Ensuring that the materials developed in this project continue to educate specialty crop producers beyond the grant period, all materials (One Page Financial Plan, among others) have been posted online at www.foodshedguide.org, www.morseconnections.com, and other relevant state and national websites.

A variation of this project was submitted to and funded by the USDA-Risk Management Agency; that project focused on specialty crop growers supplying food hubs in the Northeast United States. This project built on the successful outcomes of that effort. The previous project received strong evaluations from participants, thus the belief that a similar, customized program in the state of Michigan would be a success as well. This grant proposal also focused primarily on specialty crops growers, as compared to all producers that supply regional food systems. This singular focus created the opportunity to concentrate on the specific needs of specialty crop growers in acquiring the skills to access new markets.

Project Approach

There were a total of six workshops: Northern Michigan Small Farm Conference (Traverse City), Washtenaw Food Hub (Ann Arbor), Allen Market Place (Lansing), Plum Street Market Garden (Detroit), Webinar (U.P. Food Exchange), and Kinexus (Benton Harbor). The attendance and evaluation results were very positive (see attached evaluation results). There were significant improvements in the responses from before the workshop and after as to whether or not the specialty crop farmers were planning to complete a One Page Business Plan. In addition, we learned early on that the farmers were interested in deeper dives and more intricate information on financial planning and food safety; discussing high level topics and simply scratching the surface was not as valuable. Using that knowledge, we amended the curriculum of the workshop to discuss more advanced topics. These specialty crop farmers are smart, and they needed solutions.

The challenges we found were simply due the seasonality of the growing season. Getting farmers out of the field and into a 3-4 hour workshop in the middle of the summer is very difficult. However, we worked as hard as we could to appease their schedules and had strong attendance from specialty crop farmers at these workshops.

Goals and Outcomes Achieved

Throughout the workshop series, MMC has collected a total of 52 evaluations. The evaluation results completed by the farmers demonstrated their increased willingness (14% are more likely) to complete a business plan after completing this workshop. Reasons that the farmers are likely to engage in business planning included: better access to loans and capital (44%); increased financial literacy (54%); and reduced financial risk (40%). Farmers also identified they gained new knowledge (33%) of the types of resource providers to contact for questions on financial literacy and food safety, after completing this workshop. In addition, we learned that attendees would like to attend more of these types of workshops and are requesting topics on specific areas of focus, such as the "Assessment and Feasibility of Purchases of Equipment and Acquiring Capital", a deeper dive and more intensive training. (see evaluation results attached).

Another key finding was that the food hubs have been very willing to operate as co-hosts to assist MMC with these workshops. Promotion about the workshops to the specialty crop farmers was done, by MMC, through statewide Food Hub network listserv and by the food hubs to their own listserv. It was also identified that these workshops served as a vehicle for specialty crop farmers to strengthen the relationships with other farmers, the food hub, and the resource providers.

Lastly, specialty crop farmers requested that MMC develop a listserv of boot camp workshop attendees; this will allow MMC to pass on relevant information that can be forwarded to them related to new resources, tools, websites and other announcements on financial and business literacy and food safety practices. As of September 30, 2014, MMC has developed a listserv and will begin sharing information to the specialty crop farmers and other attendees, in this manner. Also, www.farmbiztrainer.com, a farmer resource website developed by Farm Credit, Originz, and MMC has been updated with new tools and resources, specific to this project.

Beneficiaries

The first workshop was held on Saturday, February 1, 2014, at the Northern Michigan Small Farms Conference, in Traverse City, Michigan. The second workshop was held on Monday, May 5, 2014, at the Washtenaw Food Hub in Ann Arbor, Michigan, and the third workshop was held on Friday, June 27, 2014, at Allen Market Place in Lansing, Michigan.

The fourth workshop was held on Friday, September 5, 2014 at the Plum Street Market Garden in Detroit, MI (hosted by Keep Growing Detroit). The fifth workshop was held on Monday, September 22, 2014 via webinar, but hosted by the U.P. Food Exchange and Michelle Walk of MSU-Extension in the U.P. The sixth workshop was held on Tuesday, September 23, 2014 at Kinexus in Benton Harbor, Michigan.

Overview of Workshops

Northern Michigan Small Farms Conference - Traverse City, Michigan - February 1, 2014
Michigan resource providers gave insights of successful ways specialty crop farmers are increasing access to new markets, through improved business practices and tools. Also, specialty crop farmers, from the upper peninsula of Michigan, presented an update on how they are developing and testing a quality management system to comply with food safety standards at less expense. Lastly, co-conveners from the Michigan Food Hub Network shared the latest information on food hubs in Michigan and across the country, and how specialty crop farmers are supplying these new markets.

Washtenaw Food Hub - Ann Arbor, Michigan - May 5, 2014

The workshop held at the Washtenaw Food Hub, on May 5, 2014, began with a tour of the Washtenaw Food Hub giving specialty crop farmers the opportunity to see how a food hub operates and to learn more about how they could supply a food hub with their products. Through the afternoon workshop, several resource providers presented an overview of resources for specialty crop growers related to connecting to new markets, financial training and access to capital, and food safety. Buyers from the Whole Foods, Busch's Market and the Washtenaw Food Hub discussed ways farmers can supply fruits and vegetables to their markets. Financial and lending resource providers included Farm Credit and a Crowd funding consultant. Both of these resource providers discussed the type of information they will need when working with a farmer on a business plan and a potential loan. The Food Safety resource provider, from Michigan State University Extension, gave an overview of Good Agricultural Practices (GAP) and reasons why specialty crop farmers would want to become GAP certified. There was also open time for networking and round table discussion to answer questions from the farmers.

Allen Market Place Food Hub - Lansing, Michigan - June 27, 2014

The workshop held at Allen Market Place, on June 27, 2014, began with a tour of the Allen Market Place Food Hub giving specialty crop farmers the opportunity to see how a food hub operates and to learn more about how they could supply a food hub with their products. This workshop included an overview and some detailed information on Good Agricultural Practices (GAP). Also, part of the workshop included open time for questions of the Food Safety resource provider, from Michigan State University Extension, delving into reasons why it is important to become GAP certified and ways to get this certification. The second part of the workshop included financial training on cash-flow analysis and other financial tools and resources, conducted by two representatives from Farm Credit. Again, there were interactive discussions between the farmers and resource providers.

Plum Street Market Garden (Keep Growing Detroit) - Detroit, Michigan - September 5, 2014

The workshop held at the Plum Street Market Garden, on September 5, 2014, was designed to get urban farmers outside and in the garden for the workshop. It was a beautiful day without a cloud in the sky; unfortunately for the attendees, it was also the hottest day of the year as temperatures rose into the 90s by midday. Nevertheless, we had 22 urban farmers from the city of Detroit attend who appreciated the unique location. The workshop began with Phil Tocco of Michigan State University Extension going over the basics of food safety while planting, growing

and harvesting product from the field. The discussion became an open forum for the attendees to discuss inherent challenges to growing in the city of Detroit (lack of water, brown fields, etc), and how this can be rectified. Phil then took the attendees on a tour of the garden and evidenced how the farm manager is keeping up with GAP certification through a specialized tour. At the end of the workshop, Ashlee Minnick of Greenstone Farm Credit gave a short presentation on how Greenstone can aid the attendees with access to credit and loans, if needed. This workshop, by design and request of KGD, was focused on food safety and GAP certification rather than financial planning. There were interactive discussions between the farmers and resource providers (See Attached Agenda, List of Attendees, and Evaluation Results).

U.P. Food Exchange and MSU-Extension – Webinar - September 22, 2014

The workshop was held in the evening via webinar format in order to reach all interested farmers in the Upper Peninsula at one time. The platform was hosted on Michelle Walk's Adobe Connect chat room courtesy of MSU Extension. All attendees were logged on in time for the webinar to start right at 6:00 PM. The first speaker was Ann Harrington of Greenstone Farm Credit. Based out of Escanaba, Ann discussed financial literacy and budget planning for individual farms as well as the steps to take to gain access to credit with Greenstone. The second presentation had Natasha Lantz and Michelle Walk speak about the U.P. Food Exchange, which in a nutshell, is a large online food hub for U.P. growers and buyers. In addition to details about selling to the U.P. Food Exchange, Natasha also discussed in detail their current "Group GAP Pilot, a partner with USDA, and the logistics for how it could work in other areas. After the presentations, there were several questions answered by the presenters evidencing an engaged audience (See Attached Agenda, List of Attendees, Evaluation Results, and Webinar Link).

Kinexus - Benton Harbor, MI - September 23, 2014

The workshop was held at the Kinexus office in downtown Benton Harbor. Tim Slawinski and Byron Beerbower from MDARD's Food Safety division conducted the food safety presentation and discussion. The second presentation featured Jacob McManus from Greenstone Farm Credit's Berrien Springs office. Jacob's portion featured insights on budget planning in addition to cash flow management. The workshop was well received for a budding network of stakeholders and many of the topics discussed at the end included how to get a food hub started in the area, and the steps needed in order to make that happen. (See Attached Agenda, List of Attendees, and Evaluation Results).

There is also a significant economic impact directly related to these workshops as many of these growers are now selling into the food hubs, and did not prior to the workshop (15%). Moreover, the specialty crop growers are much more ready to become GAP certified and sell into larger markets, if they so choose (16%). This increases the likelihood that their farm is sustainable in the long term.

Lessons Learned

The biggest lessons learned is to better accommodate the specialty crop farmers by holding these workshop in a more accommodating time of the Year (October – March) in order to better attract farmers to attend. Nevertheless, we were very impressed with the high level of knowledge that the farmers brought to the session. They are ready for the next step in financial and business literacy training and food safety certification. These farmers are incredibly interested in getting connected to the appropriate resource providers to scale up.

One challenge that is tough to overcome with this type of workshop series is that all of the farmers in attendance bring a slightly different backstory and experience level to the table. Being able to appease all of their needs and not talking too high level for one farmer, but not talking too simple for another is difficult. However, by the second workshop, we re-designed our workshop curriculum to hit the core of the specialty crop farmers in attendance.

One goal that was not achieved with as high of a rate as we hoped included the number of folks who reached out to Greenstone Farm Credit after the workshop. This may be due to the fact that they are simply not in a need of a financial loan at this time. However, we hope that in the future these farmers continue to build their relationship with the local Greenstone representative so that if and when they need to acquire financial assistance, it's a very easy process and does not take them away from their field in order to get their financials in order.

The general feedback and evaluation results did show that the workshops were very popular, and we heard mostly positive comments from the attendees. We've identified that we have filled a niche in the industry that provides both financial literacy training but food safety advice as well. It is not often that these two skills are presented in the same place, and we think that was one of the biggest reasons why this workshop series was so well rated on the evaluation forms. The workshops held in Traverse City, Ann Arbor and Detroit were very well attended and evidenced very positive evaluations. The webinar/workshop in the Upper Peninsula and workshop in Benton Harbor ended up having lower attendance due to those regions still being in the process of building their farmer network. Regardless, the evaluations received from the last two workshops were still quite positive.

Based on the project application expected outcomes, we anticipated the following results:

Developing bankable business plans and practices for their existing specialty crop farm enterprise that include cash flow analysis and identification of risk mitigation strategies that take advantage of new crops and new market channels such as food hubs. This will in turn improve their competitiveness in the industry (GOAL).

- Based on evaluation of a similar workshop program, the target is that over 20% of specialty crop growers in attendance at the workshops to complete a one page business plan in the next year (TARGET). We are not aware of a benchmark for either of these metrics (BENCHMARK) Actual results will set the benchmark. However we will develop one by the completion of these workshops (PERFORMANCE MEASURE).
- Actual Results: Attendees responded with a rating of 3.63 out of 5 that they planned to complete a Business Plan before the workshop; attendees responded with a rating of 4.33 out of 5 that they planned to complete a Business Plan after the workshop (14% increase)

Applying business planning tools and budgeting methods that will allow for expansion of existing specialty crop farm operations and enterprises, specifically those that sell identity-preserved crops or value-added product. Specialty crop growers will have the opportunity to take advantage of strong local food systems partners including food hubs (GOAL).

- The target is for over 20% of specialty crop growers that are in attendance at the workshops to add one new buyer/market in the next year (TARGET). We are not aware of a benchmark for this metric (BENCHMARK) However we will develop one by the completion of these workshops (PERFORMANCE MEASURE).
- Actual Results: Attendees responded with a rating of 2.98 out of 5 that they were likely to sell product into a food hub before the workshop; attendees responded with a rating of

3.75 out of 5 that they were likely to sell product into a food hub after the workshop (15% increase); In addition, attendees responded with a rating of 3.12 out of 5 that they were likely to connect with value-added buyers and other local wholesalers before the workshop; attendees responded with a rating of 3.75 out of 5 that they were likely to connect with value-added buyers and other local wholesalers after the workshop (16% increase)

Attending and participating in the workshops to work through relevant specialty crop examples of financial performance (GOAL).

- The target is for over 180 total farmers to attend the six workshops (TARGET). The benchmark is an estimated 30 specialty crop growers attending each workshop based on past projects with similar methods (BENCHMARK). The workshops will improve profitability among specialty crop producers (PERFORMANCE MEASURE).
- Actual Results: Traverse City Workshop (RSVP Attendees: N/A), Washtenaw Food Hub Workshop (RSVP Attendees: 40), Allen Market Place Workshop (RSVP Attendees: 30), Keep Growing Detroit Workshop (RSVP Attendees: 23), U.P. Food Exchange Webinar (RSVP Attendees: 30), and Kinexus Workshop (RSVP Attendees: 6). Total: 129 RSVP Attendees with 52 Farmer Evaluations Completed and 9 Non-Farmer Evaluations Completed

Contact Person

Marty Gerencer, Principal, Morse Marketing Connections, LLC
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Additional Information

As of late August, there were excess funds available in the budget due to a low number of farmer scholarships requested. In order to utilize these funds, MMC proposed to provide two Michigan specialty crop farmer case studies that highlighted successful stories on small farming in Michigan. Nancy Nyquist, MDARD, approved development of the two case studies as an effective use of remaining funds, and learning tool for specialty crop farmers. The two case studies focused on:

- McLaughlin Grows Urban Farm (Muskegon)
- 9 Bean Rows (Suttons Bay)

Both case studies will be published on www.farmbiztrainer.com for permanent reference. The case studies will also be made available to the Bootcamp for Farmers listserv and other Michigan farmer networks (Both Case Studies are below).



**“Connecting Specialty Crop Farmers with New Markets and Food Hubs:
Risk Mitigation and Food Safety Options”
Monday, September 5th, 2014 – Farmer Workshop
at the Plumb Street Market Garden, 2202 Third Street, Detroit, MI**

In this workshop, financial and food safety experts will share successful ways specialty crop farmers are opening doors to new markets, like food hubs, through improved financial readiness and food safety practices.

Registration for this workshop is free of charge.

Please RSVP by Friday, August 22nd, 2014: <https://www.surveymonkey.com/s/8J9DRPD>

Agenda:

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| <u>Welcome and Introductions</u> | 10:00 – 10:15 AM |
| <ul style="list-style-type: none">• Ashley Atkinson, Keep Growing Detroit• Marty Gerencer, Morse Marketing Connections | |
| <u>Risk Mitigation and Food Safety Options for Reaching New Markets</u> | 10:15 – 11:30 PM |
| <ul style="list-style-type: none">• Phil Tocco, MSU Extension• This presentation will introduce the concept of risk with regards to producing a safe, quality product, then cover specific tactics growers might use to reduce risks on their farms. Specific linkages will be made to assessment of risk and how it influences development of a food safety plan. The talk will be focused on tools you can use right now to reduce your risk and help you demonstrate a commitment to safe, quality food. | |
| <u>GAP Certification Overview</u> | 11:30 AM – 12:00 PM |
| <ul style="list-style-type: none">• Phil Tocco, MSU Extension• NRCS Colleague | |
| <u>Wrap-up and Evaluations</u> | 12:00 – 12:15 PM |
| <ul style="list-style-type: none">• Ashley Atkinson, Keep Growing Detroit | |

Note: Participants coming from more than 30 miles may request a travel scholarship for funds to reimburse mileage. For more information or any questions, contact Chad Gerencer at chad@morseconnections.com or 231-740-4056.

Project Partners:

Keep Growing Detroit, Eastern Market, Morse Marketing Connections, Michigan State University – Center for Regional Food Systems, Michigan Food & Farming Systems (MIFFS), Michigan State University – Extension, Farm Credit Council, Greenstone Farm Credit, and Wallace Center at Winrock International

This project is funded with support from USDA Specialty Crop Block Grant, through Michigan Department of Agriculture & Rural Development (MDARD).

If you are a Farmer/Producer

Number of forms filled out **16**

Question	Average Value	% Change*
How likely were/are you to sell product into a food hub?		
Before	2.63	
After	3.81	23.75%
How likely were/are you to connect with value-added buyers, institutional buyers, or local wholesalers?		
Before	3.31	
After	4.06	15.00%
I am aware of organizations to whom I can turn to for financial assistance and credit inquiries?		
Before	2.50	
After	3.88	27.50%
How likely were/are you to complete a BUSINESS plan for your operation?		
Before	2.88	
After	3.81	18.75%
How likely were/are you to become GAP or MEAP certified?		
Before	2.19	
After	3.56	27.50%
If you are more likely to engage in BUSINESS planning, check off the reasons you are more likely to do so?		
Better access to loans and other capital	3.00	18.75%
Increased financial efficiency	6.00	37.50%
Ability to compare my business with others (benchmarking)	5.00	31.25%
Reduced financial risk	4.00	25.00%
Increased time efficiency	5.00	31.25%
Increased diversification	6.00	37.50%
Other (specify)	0.00	0.00%

If you are not a Farmer/Producer

Number of forms filled out **0**

Question	Average Value	% Change*
How likely were/are you to sell product into a food hub?		
Before	0.00	
After	0.00	0.00%
How likely were/are you to connect with value-added buyers, institutional buyers, or local wholesalers?		
Before	0.00	
After	0.00	0.00%

I am aware of organizations to whom I can turn to for financial assistance and credit inquiries?		
Before	0.00	
After	0.00	0.00%
How likely were/are you to complete a BUSINESS plan for your operation?		
Before	0.00	
After	0.00	0.00%
How likely were/are you to become GAP or MEAP certified?		
Before	0.00	
After	0.00	0.00%
If you are more likely to engage in BUSINESS planning, check off the reasons you are more likely to do so?		
Better access to loans and other capital	0.00	0.00%
Increased financial efficiency	0.00	0.00%
Ability to compare my business with others (benchmarking)	0.00	0.00%
Reduced financial risk	0.00	0.00%
Increased time efficiency	0.00	0.00%
Increased diversification	0.00	0.00%
Other (specify)	0.00	0.00%

Approximately 35 people attended the Specialty Crop Workshop in the Upper Peninsula.



**“Connecting Specialty Crop Farmers with New Markets and Food Hubs:
 Financial and Food Safety Options for Scaling Up”**
**Tuesday, September 23, 2014 – Farmer Workshop at Kinexus,
 499 W. Main St, Benton Harbor, MI 49022**

In this workshop, financial and food safety experts will share successful ways specialty crop farmers are opening doors to new markets, like food hubs, through improved financial readiness and food safety practices.

Agenda:

- | | |
|-----------------------------------------------------------------------------------------------------------------------------|----------------|
| <u>Pre-Meeting Networking and Refreshments</u> | 1:00 – 1:15 PM |
| <u>Introductions and Workshop Overview</u> | 1:15 – 1:30 PM |
| <ul style="list-style-type: none"> • Dan Peat, Kinexus • Chad Gerencer, Morse Marketing Connections | |

<u>Food Safety Options for Reaching New Markets</u>	1:30 – 2:30 PM
<ul style="list-style-type: none"> • Tim Slawinski, MDARD • Byron Beerbower, MDARD 	
<u>Break & Networking</u>	2:30 – 2:45 PM
<u>Access to Capital and Cash Flow Analysis</u>	2:45 – 3:45 PM
<ul style="list-style-type: none"> • Jacob McManus, Greenstone Farm Credit 	
<u>Wrap-up and Evaluations</u>	3:45 – 4:00 PM
<ul style="list-style-type: none"> • Dan Peat, Kinexus 	

Note: Participants coming from more than 30 miles may request a travel scholarship for funds to reimburse mileage. For more information or any questions, contact Chad Gerencer at chad@morseconnections.com or 231-740-4056.

Project Partners:

Kinexus of Benton Harbor, Morse Marketing Connections, Michigan State University – Center for Regional Food Systems, Michigan Food & Farming Systems (MIFFS), Michigan State University – Extension, Farm Credit Council, Greenstone Farm Credit, and Wallace Center at Winrock International

This project is funded with support from USDA Specialty Crop Block Grant, through Michigan Department of Agriculture & Rural Development (MDARD).

If you are a Farmer/Producer		
Number of forms filled out		2
Question	Average Value	% Change*
How likely were/are you to sell product into a food hub?		
Before	2.50	
After	4.00	30.00%
How likely were/are you to connect with value-added buyers, institutional buyers, or local wholesalers?		
Before	3.00	
After	4.50	30.00%
I am aware of organizations to whom I can turn to for financial assistance and credit inquiries?		
Before	3.50	
After	4.50	20.00%
How likely were/are you to complete a BUSINESS plan for your operation?		
Before	5.00	
After	5.00	0.00%

How likely were/are you to become GAP or MEAP certified?	Before	5.00	
	After	5.00	0.00%
If you are more likely to engage in BUSINESS planning, check off the reasons you are more likely to do so?			
Better access to loans and other capital		0.00	0.00%
Increased financial efficiency		0.00	0.00%
Ability to compare my business with others (benchmarking)		0.00	0.00%
Reduced financial risk		0.00	0.00%
Increased time efficiency		0.00	0.00%
Increased diversification		0.00	0.00%
Other (specify)		0.00	0.00%

If you are not a Farmer/Producer

Number of forms filled out **2**

Question	Average Value	% Change*
How likely were/are you to sell product into a food hub?		
Before	3.50	
After	3.50	0.00%
How likely were/are you to connect with value-added buyers, institutional buyers, or local wholesalers?		
Before	3.00	
After	4.00	20.00%
I am aware of organizations to whom I can turn to for financial assistance and credit inquiries?		
Before	3.50	
After	4.50	20.00%
How likely were/are you to complete a BUSINESS plan for your operation?		
Before	2.50	
After	4.50	40.00%
How likely were/are you to become GAP or MEAP certified?		
Before	3.50	
After	4.00	10.00%
If you are more likely to engage in BUSINESS planning, check off the reasons you are more likely to do so?		
Better access to loans and other capital	2.00	100.00%

Increased financial efficiency	1.00	50.00%
Ability to compare my business with others (benchmarking)	0.00	0.00%
Reduced financial risk	2.00	100.00%
Increased time efficiency	0.00	0.00%
Increased diversification	0.00	0.00%
Other (specify)	0.00	0.00%

MMC / MDARD Boot Camp Workshop Series Project
Case Studies, September 2014

9 Bean Rows



Overview

Mission: The 9 Bean Rows mission is to increase the availability and access to locally grown and handcrafted artisan foods year round.

Their Story: In 2008, **Nic and Jen Welty** began their second season of Community Shared Agriculture (CSA) farming at Black Star Farms, just south of Suttons Bay, MI. They installed a wood-fired pizza oven in the Black Star Farms market (the Hearth and Vine cafe) and added artisan breads to their lineup of produce. That fall, they started their own small farm in Omena (north of Suttons Bay) and called it 9 Bean Rows. The 9 Bean Rows 11 acre farmstead, while modest in size, is filled with wild and cultivated edibles. There are ramps, blackberries, red raspberries, apple trees, choke cherries, asparagus, rhubarb, table grapes, garlic, walnut trees, sugar maples, and a forest full of edible wild mushrooms. There is also a spring-fed pond. Jen and Nic added a 144 x 34 foot passive solar hoop house to extend their growing season, and Nic continues to use the hoop house located at Black Star Farms.



Since those humble beginnings the bakery has expanded to a new location on a second farm purchased in 2013. This new venue includes a retail farm stand for bakery and produce sales. Paul Carlson, a friend who previously ran Black Star Farm's café, joined the Weltys in 2013 to help establish the 9 Bean Row Restaurant in what had been the old firehouse in Suttons Bay. Renovated on the cheap with lots of sweat equity and creative décor, the café quickly garnered rave reviews for its food, local ingredient sourcing, and recognition as the best new restaurant in the region by [Traverse Magazine](#) and [Northern Express](#) – two local magazines.

Business Structure

The 9 Bean Rows brand is structured as a cluster of related Limited Liability Companies (LLC) tailored to meet business needs.

9 Bean Rows, LLC is the original incorporation established in 2009 and is the home for the farm and serves as the asset holding company. The farm produces products for marketing and sales

to a CSA, a number of farmers markets in the Leelanau /Traverse City area, and to a range of wholesale markets that include its sister companies – the bakery and restaurant.

Two other LLCs, Roux 9 and Boulangerie 9, have been incorporated in recent years as operating companies for the bakery and restaurant respectively (see *chart in Finance section, below*). Both rent their facilities from the 9 Bean Row, LLC that hold the title on the buildings they operate from. Both do business under the 9 Bean Row brand.

The 9 Bean Row, LLC's members are Nic and Jen Welty. As 9 Bean Rows explores other ventures, it begins those initiatives under the initial LCC structure, establishing new discrete units as they prove viable or when legal or licensing requirements predicate. For example, the restaurant had to be structured as a separate legal entity for reasons including the ability to secure a liquor license for the establishment. The chef partner in the restaurant owns a small share in Roux 9, LLC and his compensation is structured with ownership and other incentives to grow the business. Establishing the various LLCs also allows for better tracking and management of the specific enterprise, including valuing the sales transaction between each of them, ensuring a way to manage each unit for profitability. There is also a benefit of remaining clustered under the 9 Bean Row brand and having common ownership, as they can offset each enterprise's cash-flow needs based on seasonality and sales, while still being managed as a discrete businesses –very important in the early years of these beginning farm and value-added enterprises.



In 2013, 9 Bean Rows issued W-2s to 32 people– primarily part-time help in the restaurant and in the other ventures. Altogether, this equated to ten full-time equivalent jobs, a small but significant contribution to the rural Leelanau economy that also serves as a training ground for other prospective food entrepreneurs. Much of this expanded workforce is a result of the value-added growth beyond the farm base – through the establishment of the bakery and restaurant.

Markets Served

9 Bean Rows serves a wide range of local markets as part of its strategy to provide fresh local food year-round to their community. The farm produce is sold through a CSA, farmers markets, and wholesale channels. 9 Bean Rows also sells to its sister bakery and restaurant. The wholesale channel reaches to other foodservice and retail users in the region, including schools when in season. They sell both cultivated crops and a range of wild edibles harvested on the farm. The bakery operates its own retail location that also sells 9 Bean Row produce and beginning in 2014, CSA members can add “Breaking Bread” option that provides one loaf weekly. The restaurant, on the main street of Suttons Bay, is well positioned to attract tourists, cottagers, and local residents year-round. Nic also provides advice and services (hoop-house construction, production, marketing) to other local-foods entrepreneurs – a complimentary income stream to the farm operations.

The common branding has served the various ventures well, leveraging recognition of 9 Bean Rows into new channels effectively.

One product that 9 Bean Rows markets is Mixed Salad Greens to a number of channels that include direct sales and wholesaling through the regional distributor Cherry Capital Foods. This

approach to market provides several outlets and associated income streams from the product. Below is an illustration of 9 Bean Row's participation in this regional food value chain¹.



This model is very different from a traditional lineal go-to-market approach, and illustrates the importance of being both creative in the approach and building trust relationships with others in the supply and value chain to achieve success.

Advisors

Nic is a graduate of the Carnegie Mellon Tepper School of Business where he had participated in a number of business plan competitions – great training and experience to bring to the 9 Bean Rows. Since the age of ten, Nic has also been engaged in growing Atlantic Giant Pumpkins and other giant vegetables (http://www.bigpumpkins.com/htgwccgpii/nic_welty.pdf), cultivating his “green thumb”. This background positioned him well in the food entrepreneur space.

Nic also relies on his father for guidance, leveraging his years of experience running the family farm.

The Welty's came to Leelanau to work at Black Star Farm and gain some experience before starting 9 Bean Rows. Don Coe at Black Star has been an important mentor (see sidebar).

The Welty's are also well networked into the local food community in the region and statewide including the Grand Vision Food & Farming Network <http://www.thegrandvision.org/food-farming-network>, and the Grand Traverse Foodshed Alliance. Nic also serves on Michigan Food and Farming System (www.miffs.org) Council and has relationships with Michigan State University (MSU) and MSU Extension including the MSU Student Organic Farm at the MSU Center for Regional Food Systems. These networks provide both a learning forum for 9 Bean Rows and an opportunity for the Welty's to contribute to the broader development of thriving and successful local food farm enterprises.

Food Value Chain

9 Bean Rows continues to expand and meet market opportunity in the Traverse City region. Cherry Capital Foods, a key wholesale customer, is building a new distribution center in 2014 that includes half dozen suites for supplier business co-location. 9 Bean Rows will locate its

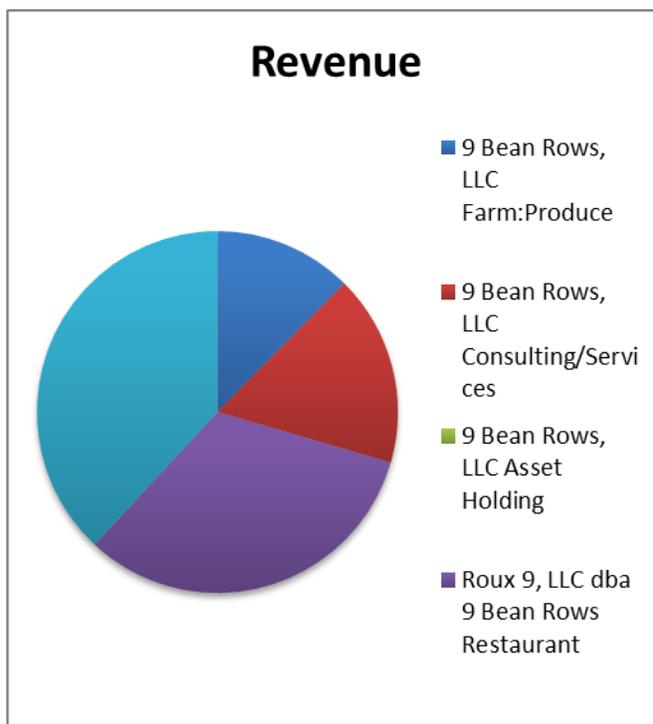
¹ Food Value Chain Analysis, Grand Traverse Regional Food Hub Pilot Project, Final Report, Prepared by Heather Hirschtritt with support from Susan Cocciarelli. February 28, 2014

produce processing facility in one of those spaces – allowing for direct “through the wall” delivery to Cherry Capital for broader distribution.

Finance

Income Streams: In 2014, the 9 Bean Row branded cluster will exceed half a million dollars in sales from the various enterprises. The revenue channels include:

- 9 Bean Rows, LLC that operates the farms and produces the produce and bakery products, provides consulting and services to other local-food entrepreneurs, and also serves as the asset-holding company from which other ventures rent/lease facilities. The asset-holding arm of the LLC is revenue neutral at this time, with income covering depreciation, and the prospect of accruing future asset appreciation.
- Roux 9, LLC a separate entity doing business as 9 Bean Rows Restaurant (allowing it to hold a liquor license)
- Boulangerie 9, LLC – doing business as 9 Bean Row Bakery.



Approach to Business: Behind this simple organization are five years of sweat equity, creative capitalization from a number of sources, and trust relationships that have fostered this growth. The 9 Bean Rows name is derived from Yates’ poem “*The Lake Isle of Innisfree*”, “...a small cabin build there, of clay and wattles made: Nine bean-rows will I have there, ...and I shall have some peace there”. The Welty’s have not strayed far from Yates’ vision, building small as they started, but expanding as the opportunity arose!

9 Bean Rows was incorporated in 2009, a year after starting the CSA garden and hoop house on the site of Black Star Farms (www.blackstarfarms.com) - where Nic had previously been farm manager. Black Star has a track record of incubating complimentary value added food and hospitality ventures. That year Nic rented the land and hoop house under an arrangement that had them pay only a percent of revenue. Initial working capital was provided by the pre-sale of CSA shares. Jen Welty also leased the Black Star ovens for the early-morning hours to launch the bakery, completing her baking before the Black Star culinary staff’s day began. This creative arrangement allowed 9 Bean Rows to launch with minimal capital outlay. Nic was an astute manager, keeping costs low by determining that he could grow amazing vegetables without the need of a tractor or other power equipment – leveraging soil, compost, mulch, water, sunlight and a lot of sweat equity both on the production and marketing side to establish the business and brand.

Asset Capitalization: Hoop houses are key to 9 Bean Row’s season extension production strategy in the Leelanau climate and they now have three on the farm. The first hoop house at Black Star was financed in part through the MSU Hoop houses for Health program, as well as

some volunteer construction labor. By its second year, 9 Bean Rows assumed ownership of the Black Star hoop house and financed the building of the second structure with funds borrowed from family members. The third structure was partially financed with NRCS funds in partnership with Northern Michigan Community Action Agency where the Welty's had established an Individual Development Account (IDA) that provided matching funds for small business start-up and expansion.

By year three, having some success in the marketplace, both the bakery and farm needed to expand. That year Nic's father had sold the home farm in Ohio, and invested some of the process as a part owner in a second 14- acre farm purchased in 2012. That financing is structured to repay Nic's father – as a partial contribution to his retirement income.

The restaurant building was purchased in 2013 with a combination of bank financing, a SBA loan. The building needed a lot of sweat equity to clean up the existing kitchen and make the front of house venue ready for opening, but this minimized costs. Several customers of the 9 Bean Row Farmers Markets stepped up as angel investors with fixed rate 10-year loans to cover the liquor license related costs and an operating/working capital fund.

Working Capital: The pre-sale of CSA shares are an important working capital source for the farm. By year-two, 9 Bean Rows had established enough of a track record to qualify for a Small Business Association (SBA) working capital loans and 504 loans. This allowed them to establish wholesale account and manage cash-flow for the net-30 day or longer terms till they received payment. Astute management and good planning have allowed 9 Bean Rows to retain the working capital revolving credit needed for ongoing operations. Nic uses a self-developed real-time tracking app on his smart-phone to track yields, sales, margins and profits to ensure he is fully informed on the status and progress of the various enterprises.

Key Learning

Plan well and manage costs. Early on, it's important to invest sweat equity as a way to minimize expense, become profitable and build real equity. Also important is to leverage branding and marketing across new market channels to get quick recognition and grow new businesses.

Links

Visit the 9 Bean Rows website to keep current on the development of the farm and related businesses: www.9beanrows.com

Nic and Jen's work and 9 Bean Rows were recently featured in National Geographic Magazine –September 2014: <http://news.nationalgeographic.com/news/2014/09/140919-aging-american-farmers-agriculture-photos-ngfood/>

Food Safety for Farmers Workshop

Plum Street Market Garden - Friday, September 5th

Approximately 28 people attended the Food Safety for Farmers Workshop

Financial and Food Safety Webinar
Monday, September 22nd

Agenda
6:00 -8:30 PM

6:00 Introductions and Workshop Overview

Michelle Walk, MSU Extension
 Marty Gerencer, Morse Marketing Connections

- 6:15 Financial Readiness
 - Business Plan
 - Loan Applications
 - Cash Flow
 Ann Harrington, Greenstone Farm Credit Services

 - 7:00 U.P. Food Exchange
 - Reaching new markets
 - Food Safety
 Michelle Walk, MSU Extension
 Natasha Lantz, Marquette Food Co-op

 - 7:30 Other Resources

 - 8:00 Questions and answers

 - 8:30 Adjourn
-

If you are a Farmer/Producer

Number of forms filled out 6

Question	Average Value	% Change*
How likely were/are you to sell product into a food hub?		
Before	3.33	
After	3.67	6.67%
How likely were/are you to connect with value-added buyers, institutional buyers, or local wholesalers?		
Before	3.00	
After	3.50	10.00%
I am aware of organizations to whom I can turn to for financial assistance and credit inquiries?		
Before	3.00	
After	4.67	33.33%
How likely were/are you to complete a BUSINESS plan for your operation?		
Before	4.00	
After	4.83	16.67%
How likely were/are you to become GAP or MEAP certified?		
Before	4.17	

	After	4.33	3.33%
If you are more likely to engage in BUSINESS planning, check off the reasons you are more likely to do so?			
	Better access to loans and other capital	5.00	83.33%
	Increased financial efficiency	5.00	83.33%
	Ability to compare my business with others (benchmarking)	5.00	83.33%
	Reduced financial risk	4.00	66.67%
	Increased time efficiency	6.00	100.00%
	Increased diversification	4.00	66.67%
	Other (specify)	0.00	0.00%

If you are not a Farmer/Producer

Number of forms filled out		0	
Question		Average Value	% Change*
How likely were/are you to sell product into a food hub?	Before	0.00	
	After	0.00	0.00%
How likely were/are you to connect with value-added buyers, institutional buyers, or local wholesalers?	Before	0.00	
	After	0.00	0.00%
I am aware of organizations to whom I can turn to for financial assistance and credit inquiries?	Before	0.00	
	After	0.00	0.00%
How likely were/are you to complete a BUSINESS plan for your operation?	Before	0.00	
	After	0.00	0.00%
How likely were/are you to become GAP or MEAP certified?	Before	0.00	
	After	0.00	0.00%
If you are more likely to engage in BUSINESS planning, check off the reasons you are more likely to do so?			
	Better access to loans and other capital	0.00	0.00%
	Increased financial efficiency	0.00	0.00%

Ability to compare my business with others (benchmarking)	0.00	0.00%
Reduced financial risk	0.00	0.00%
Increased time efficiency	0.00	0.00%
Increased diversification	0.00	0.00%
Other (specify)	0.00	0.00%

Approximately ten people attended the Specialty Crop Workshop on September 18, 2014.

Workshop evaluations 10/7/14

If you are a Farmer/Producer

Number of forms filled out		52	
Question		Average Value	% Change*
How likely were/are you to sell product into a food hub?	Before	2.98	
	After	3.75	15.38%
How likely were/are you to connect with value-added buyers, institutional buyers, or local wholesalers?	Before	3.12	
	After	3.90	15.77%
I am aware of organizations to whom I can turn to for financial assistance and credit inquiries?	Before	2.52	
	After	4.17	33.08%
How likely were/are you to complete a BUSINESS plan for your operation?	Before	3.63	
	After	4.33	13.85%
How likely were/are you to become GAP or MEAP certified?	Before	2.71	
	After	3.50	15.77%
If you are more likely to engage in BUSINESS planning, check off the reasons you are more likely to do so?	Better access to loans and other capital	23.00	44.23%
	Increased financial efficiency	28.00	53.85%
	Ability to compare my business with others (benchmarking)	20.00	38.46%
	Reduced financial risk	21.00	40.38%
	Increased time efficiency	26.00	50.00%
	Increased diversification	20.00	38.46%
	Other (specify)	0.00	0.00%

If you are not a Farmer/Producer

Number of forms filled out 9

Question	Average Value	% Change*
How likely were/are you to sell product into a food hub?		
Before	2.00	
After	2.22	4.44%
How likely were/are you to connect with value-added buyers, institutional buyers, or local wholesalers?		
Before	2.11	
After	3.22	22.22%
I am aware of organizations to whom I can turn to for financial assistance and credit inquiries?		
Before	2.78	
After	4.00	24.44%
How likely were/are you to complete a BUSINESS plan for your operation?		
Before	3.11	
After	4.22	22.22%
How likely were/are you to become GAP or MEAP certified?		
Before	2.22	
After	2.67	8.89%
If you are more likely to engage in BUSINESS planning, check off the reasons you are more likely to do so?		
Better access to loans and other capital	7.00	77.78%
Increased financial efficiency	5.00	55.56%
Ability to compare my business with others (benchmarking)	3.00	33.33%
Reduced financial risk	5.00	55.56%
Increased time efficiency	4.00	44.44%
Increased diversification	2.00	22.22%
Other (specify)	0.00	0.00%

MMC / MDARD Boot Camp Workshop Series Project
Case Studies, October 2014



McLaughlin Grows (Community enCompass)

Overview

McLaughlin Grows is an organic urban farm located in the McLaughlin Neighborhood of Muskegon, Michigan.

When Community enCompass, a non-profit neighborhood development organization began exploring the idea of community gardens, several area businesses supported the idea and the seeds of diverse partnerships were planted. Goodwill Industries of West Michigan offered use of a vacant half-acre lot behind their corporate headquarters; the Community Foundation for Muskegon County provided a generous donation for start-up costs; and Community enCompass secured a full-time program coordinator with an Organic Farming Certificate from Michigan State University. With help from the Muskegon County Department of Employment and Training, the Community enCompass Youth Employment Program hired six neighborhood youth, and they broke ground in May 2009.

As a community-based social enterprise, McLaughlin Grows! seeks to:

Provide employment to McLaughlin residents by offering job training opportunities as well as the development of entrepreneurial and business skills.

- Transform the local food system by providing neighborhood residents with access to nutritious, affordable, organic produce
- Build a healthy neighborhood by creating green space, promoting social interaction and fostering a sense of community

In the spring of 2013, McLaughlin Grows started “Site 2” thanks in large part to a HEALTHY Muskegon Grant (WKKF Funds). This second urban farm was designated to assist and partner with the Growing Goods project of Muskegon Public Schools. The Growing Goods project is a summer school program for Muskegon Public Schools (Middle School) students who did not pass at least one of the core classes. In addition to re-learning the information, these students also learn gardening and farming skills, and then eat the product from the garden for lunch to see the process of farm to table. The students are assisted by the McLaughlin Grows (McGrows) employees as well as high school counselors. In the summer of 2013, 99 of the 102 students that were part of the Growing Goods program passed their summer school courses to continue on to the next grade.

In the fall of 2014, Goodwill Industries delivered the message to Community enCompass that Goodwill would indeed need the land that they had originally loaned to McLaughlin Grows. A wide search was started to find a new location for McGrows. Fortunately, Mercy Health Partners stepped up and invited McLaughlin Grows to move their urban farm to the land adjacent to one of their hospitals. This move was completed in 2014 thanks in large part to a host of volunteers.

Total acreage at new site is 0.75 acres of developed land (with potential of up to 2.5 acres) to go with the existing 0.75 acres of developed land at Site 2.

Business Structure

Community enCompass is a registered 501(c)3 non-profit. McLaughlin Grows is a program underneath the parent organization, Community enCompass. Many of the roles involved with Community enCompass and McLaughlin Grows combine duties and have some overlap. As it relates specifically to the urban farm, McLaughlin Grows has three “full-time” workers. There is the Farm Manager, Cody Yothers, who is just finishing his first full growing season with the urban farm. There are two additional AmeriCorps VISTA employees who work on the farm. One colleague is more focused on Education and collaborating with the overall non-profit mission and goals, and the other colleague is more focused on the implementation of youth programs. These two roles do not have a set end date, and the AmeriCorps VISTA employees can work for McLaughlin Grows as long as they desire.

In addition to the on-site team members, McLaughlin Grows has a Steering Committee to assist with targeting and achieving specific farming goals as well as program goals. The Steering Committee meets once a month and includes Sarah Rinsema-Sybenga (Executive Director of Community enCompass), a colleague from Mercy Health Partners, a few community and neighborhood residents, as well as two individuals from Pioneer Resources.

Markets Served

The main product and source of revenue for McLaughlin Grows is the CSA program. It is designed to reach two markets: 1) middle-aged/upper-middle class residents who want to buy local, fresh food, and 2) lower income community residents who may not have direct access to healthy food. There is a summer CSA program that runs for 20 weeks and is roughly \$20/share (\$400 commitment). There is also a fall CSA program than runs for 10 weeks. In addition, some CSA shares are purchased/subsidized by individuals in the community to be used for neighborhood residents in need.

Due to the City of Muskegon's ongoing discussion about urban farming and what is allowed to be sold, there is currently no sales activity at the Muskegon Farmer's Market for "Urban Farms". Once zoning laws allow urban farms to sell at the market, McLaughlin Grows does plan to bring produce to the market throughout the summer. However, recent events have raised neighborhood challenges to the farm operation. Residents elsewhere in Muskegon have caused problems by expressing their "Right to Farm", which has caused negative feedback to the idea of urban farming. Furthermore, the City of Muskegon is in the process of completely re-examining the zoning law as it relates to urban farming and selling product for profit. As it stands right now, urban farms are not allowed to sell at the farmer's market, but that could change after the next zoning update in early 2015.

McLaughlin Grows sells around \$200 - \$500 per week to Chartwells, a commercial food service provider. This relationship was developed because of the Growing Goods project, which brings Muskegon Middle School students who are taking summer courses to the garden as one of their classes. Food harvested in the McGrows garden is sold to Chartwells, and included in the school lunches bringing the full circle of farm to table since Chartwells has the food service contract for the Middle School.

Advisors

The main advisors include a Steering Committee, which ultimately determines the farming and program goals for McLaughlin Grows. In addition, the Committee determines what works well and what should be improved for future growing seasons. Other advisors include technical resource providers in the region who have helped with farming knowledge and assistance with the build out of the hoop house.

Food Value Chain

The Farm Manager creates a garden plan in the winter, which includes the variety and number of seeds to purchase, farm development, farm improvements, and any other related costs to get the farm growing. Seeds are planted by McLaughlin Grows colleagues as well as assisted by educational classes from area schools. Crops are harvested throughout the summer and fall, and the hoop house provides season extension during the winter months. Most seeds and other crops are purchased through trusted vendors online, if not donated.

Programs

Since McLaughlin Grows is part of a larger non-profit organization, there is no shortage to the number of programs. The current initiatives include:

- Growing Goods (Muskegon Public Schools)
- Boom Youth (YEP)
- Food For Thought (Pioneer Resources)
- Trustees from Muskegon County Jail
- Faith Based Service Events from Area Churches
- Michigan WORKS!
- AmeriCorp VISTA
- Sierra Leone

Finance

The overall payroll is handled by the larger organization, Community enCompass. However, the goal is to become sustainable in the sense of not relying on grant funding or donations. The operation is currently 33% self-funded due to a recent increase in expenses. Nonetheless, these decisions have opened up the urban farm to the potential of an exponential growth in capacity. While there will always be external sources of funding since Community enCompass is a non-profit, McLaughlin Grows is aiming to get to 60% sustainability in the next few years. The ultimate goal is to build the farm to a position where the related farm jobs are significant enough to support a family.

Key Learnings

The key learnings have been the continued development of the farm to institution model, understanding the role of all players involved, and how that affects McLaughlin Grows. In addition, the ongoing relationship with Chartwells food service can continue to improve exposure of McLaughlin Grows to a strategic market in which they can expand sales. The goal is to achieve a higher level of professionalism. Clear evidence that this is a substantial operation will increase access to funding, grants, capacity building, and economic development. McLaughlin Grows aims to be a true model of an urban farm, as opposed to the idea that the organization is simply gardening in the city because a vacant lot has become available. McLaughlin Grows aims to not only be a successful operation, but strives to be a source of economic development in the community.

Links

www.communityencompass.org/our-initiatives/mclaughlin-grows/

<https://www.facebook.com/pages/McLaughlin-Grows-Urban-Farm/106456159379286>

PROJECT TITLE – MICHIGAN CHRISTMAS TREE ASSOCIATION – Michigan Christmas Tree Inventory - FINAL

PROJECT SUMMARY

Michigan ranks 3rd in the nation for the number of Christmas trees harvested each year. An inventory of Christmas tree acreage and species in the State of Michigan has been conducted periodically to provide important information on the size and growth trends of this industry. The last inventory was completed in 2004. Much has changed in the Michigan Christmas tree industry, including the mix of tree varieties and the availability of labor. It is critical that the industry and other agricultural interest groups have more current information to enable them to effectively plan economic development, promotion and public policy activities. This information

is also critically important to establish the future needs of the industry as it faces the challenge of remaining competitive in the marketplace.

PROJECT APPROACH

The Michigan Christmas Tree Association worked with the National Agricultural Statistics service to develop a questionnaire for the survey. The basis for this questionnaire was the previous questionnaire used in the 2004 survey. The content of that questionnaire was evaluated and updated to reflect changes in the industry. Content focusing on the employment of paid workers was also added to address current concerns of labor availability in the industry. Content carried forward from the last effort included questions relating to production area by species, wholesale and retail sales by species, sales of wreaths, boughs and garlands, sales by buyer location, participation in agri-tourism, succession planning, insect control and sources of tree management information.

The NASS list frame produced the sample used for the survey. The NASS list frame incorporates control data compiled from list building activities and previous surveys that identified a target population of Christmas tree growers as well as their relative size expressed in terms of total acres in production. The final sample listing totaled approximately 1,200 operations with a potential to represent over 40,000 acres of Christmas tree production. NASS planned a data collection period beginning on the first of April, 2014 that would conclude the following June. The data collection strategy included mailed questionnaires, and telephone and personal interviews as needed based on the relative weight on the operation in terms of size. The MCTA assisted in data collection efforts through general by spreading awareness of the project through their own networks as well as outreach to their members and constituents to promote participation.

NASS statisticians processed and analyzed the data using typical methods, including data processing programs and tools developed during the execution of the 2004 survey. These tools were further developed based in the summary specifications made by the MCTA.

GOALS AND OUTCOMES ACHIEVED

NASS administered the survey in April 2014, collecting the bulk of the data in that month and delivered a four page summary in the form of tables in July of 2014. The survey was an overall success, both in terms of participation and the usability of the data collected. Approximately half of the target population participated and was in business, and an additional 20 percent of the target population was no longer or never engaged in production of Christmas trees. Survey participants still in business represented 70 percent of the total control data acreage in the target population. Over half of those participating responded by mail, and only approximately five percent had to be reached by personal interview with the remaining participants being reached over the phone. The results of the 2014 survey were published along with results from previous years to identify the biggest areas of change in the Michigan Christmas tree industry.

BENEFICIARIES

Michigan's Christmas growers form an important foundation of Michigan's rural communities and the diverse agriculture found in this State. Good data regarding the size and trends in the industry is very important in supporting Christmas tree production as a viable industry in Michigan's future economy. The beneficiaries of this project include:

- Michigan Christmas tree growers. The report will also contain information on several topics or barriers to growth that are currently impacting the industry. One specific example is documenting the number of permanent and seasonal workers required to keep this industry viable.

- Michigan Agribusiness and Lenders have access to information that will guide them in forming partnerships with an important part of Michigan's agricultural sector.
- Allied organizations, such as Michigan State University Extension, will use these data to develop their programs.
- Political leaders and policy makers will use these data to form a sense of size and needs of the Michigan Christmas tree sector and to inform their policy decisions.

Agricultural data users in Michigan, the U.S. and worldwide have a more complete body of information at their disposal.

LESSONS LEARNED

Because this is a project that we have executed in the past for Michigan's Christmas tree producers and similar to surveys that we undertake for other agricultural commodity groups, the project went smoothly and as planned.

CONTACT PERSON

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 517-545-9971
 marsha@mcta.org

ADDITIONAL INFORMATION



Michigan Christmas Tree Inventory 2013-2014



Please make corrections to name, address, and Zip Code if necessary.

To avoid duplication, indicate below any firm name or partner(s) associated with this operation not included in the above address.

If you receive more than one of these forms, please complete one, mark any other "duplicate" and mail in all forms.

If not growing Christmas trees, check reason below and give new operator's name:

- Operation sold.
- Operation rented.
- Never had Christmas trees.

Firm Name: _____ New Operator's Name: _____

Partner's Name(s): _____ Address: _____

Address: _____ City: _____ State: _____ Zip: _____

City: _____ State: _____ Zip: _____ Telephone: _____

1. A. Total Christmas tree acres on January 1, 2014: _____

(Include acres owned and rented, exclude acres rented to others.)

601 / 600

2. A. Tree sales in 2013

Species	Wholesale		Retail-cut		Choose and cut	
	Trees sold	Average price per tree	Trees sold	Average price per tree	Trees Sold	Average price per tree
	Number	Dollars	Number	Dollars	Number	Dollars
Scotch Pine	002	014	026	038	050	062
White Pine	003	015	027	039	051	063
Black Hills Spruce	004	016	028	040	052	064
Colorado Blue Spruce	005	017	029	041	053	065
White Spruce	006	018	030	042	054	066
Norway Spruce	007	019	031	043	055	067
Douglas Fir	008	020	032	044	056	068
Fraser Fir	009	021	033	045	057	069
Concolor Fir	010	022	034	046	058	070
Balsam Fir	011	023	035	047	059	071
Canaan Fir	012	024	036	048	060	072
Other _____ (specify)	013	025	037	049	061	073

Dollars
088

2. B. Sales of wreaths, cut boughs, and roping (garlands) in 2013

2. C. Sales in 2013

Buyer Location	Percent of total
Michigan	085
Out of state	086
Out of U.S.	087
Total =	100%

3. Did you have any agri-tainment (agri-tourism) enterprises in addition to your Christmas tree operation in 2013?	Yes	116
	No	117

4. How many paid workers in each category were employed by this operation in 2013?	Permanent (150 days or more per year)	Seasonal (149 days or fewer per year)
	348	349
	Full-time (32 hours or more per week)	
Part-time (31 hours or less per week)	350	351

5. Within the next 10 years I plan to: (Check the **one** response that best describes your intentions.)

- Continue my current Christmas tree operation. (Skip to item 6.)
- OR**
- Turn over this Christmas tree operation to a relative.
- Discontinue Christmas tree sales, but keep ownership of the acreage.
- Sell the Christmas tree acreage to another Christmas tree operator.
- Sell the Christmas tree acreage for non-agricultural use.
- Other _____ (specify)

Office use only
091

6. Which of the following insect control issues do you consider to be significant to your Christmas tree business? (Check as many as apply.)

- Insect control issues do not affect my business.
- OR**
- Gypsy moth certification.
- Availability of effective insecticides in the market.
- Cost of MDARD field inspections.
- Federal quarantines in other states.
- Other _____ (specify)

Office use only
092

7. Rank your two most important sources for Christmas tree management information from the following: (Enter a "1" for your first choice and a "2" for your second.)

370	Michigan State University	371	Extension Service (AOE)	372	Private Consultant
373	Other Universities	374	Other Christmas Tree Professionals	375	Michigan Christmas Tree Association (MCTA)
376	Community College	377	Commercial Technical Reps	378	Other Professional Association
				379	Other _____ (specify)

Reported by: _____ Phone: _____ Date: _____

Response	Respondent	Mode	Enum.	Eval.	Office Use for POID
1-Comp	9901	1-Op/Mgr	9902	100	789
2-R		2-Sp			
3-Inac		3-Acct/Bkpr			
4-Office Hold		4-Partner			
5-R - Est		9-Oth			
6-Inac - Est					
7-Off Hold - Est					
8-Known Zero					
		1-Mail	9903		
		2-Tel			
		3-Face-to-Face			
		4-CATI			
		5-Web			
		6-e-mail			
		7-Fax			
		8-CAPI			
		9-Other			
				R. Unit	Optional Use
				921	407 408



United States Department of Agriculture
National Agricultural Statistics Service
Great Lakes Region



2013-2014 Michigan Christmas Trees

There were 27,200 acres in Christmas tree on 560 farms in Michigan on January 1, 2014. Ten operations had 500 acres or more. Seven counties had 1,000 acres or more; they accounted for 59 percent of all acres. The top three species, in order, were Fraser fir, Douglas fir, and Scotch pine, accounting for 60 percent of all acres. There were 1.69 million trees sold in

2013 with a farm level value of nearly \$30.6 million. There were an additional \$4.1 million of sales of wreaths, cut boughs, garlands, and other cut greens. Five percent of operations had agri-tourism activities. Two hundred farms hired workers, providing nearly 2,300 jobs.

Christmas trees: Acres by species, January 1, 1997-2014

Species	1997		2000		2005		2014	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Fir								
Balsam	2,100	3.0	2,250	4.2	2,300	5.5	1,300	4.8
Canaan	100	0.1	250	0.5	500	1.2	650	2.4
Concolor	750	1.1	900	1.7	1,100	2.6	1,000	3.7
Douglas	13,600	19.7	10,350	19.2	7,600	18.1	4,450	16.4
Fraser	4,000	5.8	4,700	8.7	7,600	18.1	7,500	27.6
Pine								
Scotch	29,500	42.8	19,000	35.2	9,000	21.4	4,350	16.0
White	1,300	1.9	1,500	2.8	1,450	3.5	1,000	3.7
Spruce								
Black Hills	700	1.0	700	1.3	1,950	4.6	1,950	7.2
Colorado Blue	12,300	17.8	9,750	18.1	6,900	16.4	2,900	10.7
Norway	400	0.6	450	0.8	700	1.7	800	2.9
White	3,200	4.6	3,200	5.9	1,700	4.0	700	2.6
Other	1,050	1.5	950	1.8	1,200	2.9	600	2.2
Michigan	69,000	100.0	54,000	100.0	42,000	100.0	27,200	100.0

Christmas trees: Number of operations and acres, by size group

Operation size group	Operations			Acres		
	2000	2005	2014	2000	2005	2014
1 to 4.9 acres ¹			70			220
5 to 9.9 acres	135	145	130	900	950	830
10 to 24.9 acres	325	315	195	5,000	4,750	2,800
25 to 49.9 acres	165	160	80	5,600	5,400	2,600
50 to 99.9 acres	98	90	41	6,800	6,000	2,850
100 to 499.9 acres	91	59	34	16,200	11,400	6,400
500 acres or more	16	11	10	19,500	13,500	11,500
Michigan	830	780	560	54,000	42,000	27,200

¹ Not included in 2000 or 2005.

Christmas trees: Sales by species, 2013

Species	Trees	Price per tree	Value of sales
	<i>Number</i>	<i>Dollars</i>	<i>Dollars</i>
Balsam Fir			
Wholesale	83,000	15	1,245,000
Retail	7,000	38	266,000
Total	90,000	16.8	1,511,000
Canaan Fir			
Wholesale	24,000	17	408,000
Retail	7,000	44	308,000
Total	31,000	23.1	716,000
Concolor Fir			
Wholesale	31,000	19	589,000
Retail	6,000	44	264,000
Total	37,000	23.1	853,000
Douglas Fir			
Wholesale	194,000	16	3,104,000
Retail	11,000	41	451,000
Total	205,000	17.3	3,555,000
Fraser Fir			
Wholesale	710,000	19	13,490,000
Retail	45,000	44	2,115,000
Total	755,000	20.7	15,605,000
Scotch Pine			
Wholesale	362,000	12	4,344,000
Retail	13,000	26	338,000
Total	375,000	12.5	4,682,000
White Pine			
Wholesale	46,000	12	552,000
Retail	5,000	29	145,000
Total	51,000	13.7	697,000
Black Hills Spruce			
Wholesale	40,000	15	600,000
Retail	4,000	36	144,000
Total	44,000	16.9	744,000
Colorado Blue Spruce			
Wholesale	44,000	15	660,000
Retail	20,000	36	720,000
Total	64,000	21.6	1,380,000
Other			
Wholesale	26,000	16.5	430,000
Retail	12,000	34.3	412,000
Total	38,000	22.2	842,000
Michigan			
Wholesale	1,580,000	16.3	25,422,000
Retail ¹	130,000	39.7	5,163,000
Total	1,690,000	18.1	30,585,000

¹ Includes 45,000 trees sold retail-cut and 85,000 trees sold choose and cut.

Christmas trees: Sales by destination, 2013

Destination	Trees sold
Michigan	470,000
Other states	1,150,000
Out of United States	70,000
Total	1,690,000

Christmas trees: Number of operations and acres, by county and MDARD region

County	Operations			Acres		
	2000	2005	2014	2000	2005	2014
Alcona	5	7	9	280	350	170
Alpena	8	8	10	200	150	160
Antrim	17	16	8	1,200	1,050	530
Arenac	12	6	5	160	110	95
Bay	(¹)	(¹)	5	(¹)	(¹)	55
Cheboygan	18	15	8	1,000	750	460
Chippewa	4	8	3	170	150	65
Clare	3	4	7	120	80	200
Delta	15	14	13	820	670	380
Dickinson	9	6	3	240	120	15
Emmet	6	5	8	130	120	95
Genesee	12	11	10	200	170	130
Gladwin	4	5	3	130	140	65
Grand Traverse	16	13	8	1,100	550	160
Huron	(¹)	(¹)	3	(¹)	(¹)	20
Iron	(¹)	(¹)	3	(¹)	(¹)	30
Isabella	14	12	3	400	430	25
Kalkaska	27	15	13	3,300	1,650	690
Lake	6	6	3	530	250	110
Lapeer	11	10	9	200	250	230
Leelanau	13	13	9	370	380	120
Manistee	27	25	14	2,600	1,900	1,000
Marquette	4	4	3	100	60	20
Mecosta	6	10	4	650	350	140
Menominee	9	13	16	1,800	1,400	470
Midland	5	9	3	150	190	15
Missaukee	40	48	35	6,500	7,200	6,900
Montcalm	25	22	15	3,400	2,600	1,500
Muskegon	12	11	5	350	220	120
Newaygo	14	14	9	1,400	1,200	530
Oceana	55	40	22	4,500	4,000	1,950
Osceola	(¹)	(¹)	11	(¹)	(¹)	960
Presque Isle	7	4	3	210	170	50
Saginaw	14	12	8	350	340	100
Sanilac	6	6	9	340	350	340
Tuscola	9	6	8	260	190	200
Wexford	41	36	15	7,300	3,800	2,500
Others ¹	102	94	32	5,320	3,060	1,100
Region 1	576	528	355	45,800	34,400	21,700
Allegan	29	21	16	2,500	1,900	1,100
Barry	(¹)	(¹)	4	(¹)	(¹)	85
Berrien	14	14	6	170	180	100
Branch	(¹)	(¹)	5	(¹)	(¹)	55
Calhoun	13	12	10	220	200	120
Kalamazoo	9	7	9	210	130	85
Kent	8	9	7	570	370	190
Ottawa	16	12	12	450	310	210
St. Joseph	(¹)	(¹)	4	(¹)	(¹)	45
Van Buren	17	12	8	750	800	1,050
Others ¹	18	25	6	380	660	210
Region 2	124	112	87	5,250	4,550	3,250
Clinton	8	13	8	160	240	130
Eaton	15	14	12	270	260	150
Hillsdale	6	5	5	250	190	80
Ingham	13	14	13	310	340	220
Jackson	19	16	9	370	360	300
Lenawee	(¹)	(¹)	5	(¹)	(¹)	45
Livingston	13	11	4	290	210	50
Monroe	5	11	12	130	210	290
Oakland	15	16	14	270	320	190
St. Clair	9	14	8	410	390	210
Shiawassee	3	4	5	50	100	65
Washtenaw	10	11	13	250	250	410
Others ¹	14	11	10	190	180	110
Region 3	130	140	118	2,950	3,050	2,250
Michigan	830	780	560	54,000	42,000	27,200

¹ Not published separately to avoid disclosure of individual operators.

Christmas trees: Operations by type of sales, 2013

Type of Sales	Operations	Percent
Wholesale only	105	18.8
Wholesale and retail-cut	20	3.6
Wholesale and choose & cut	20	3.6
Wholesale, retail-cut, and choose & cut	15	2.7
Retail-cut only	50	8.9
Retail-cut and choose & cut	25	4.5
Choose & cut only	175	31.3
No sales	150	26.8
Total	560	100

Christmas trees: Plans for operation in the next 10 years

Plan	Percent
Continue current operation	60
Turn over operation to a relative	9
Discontinue sales but keep ownership of acreage	24
Sell the acreage to another grower	3
Sell the acreage for non-agricultural use	3
Other	1

Christmas trees: Growers reporting that insect control issues affect their business significantly, by type of operation

Insect control issues	Type of operation ¹			
	Wholesale <i>Percent</i>	Retail-cut <i>Percent</i>	Choose & cut <i>Percent</i>	All ² <i>Percent</i>
Do not affect business	47	64	68	67
Do affect business	53	36	32	33

Significant insect control issues for growers responding "Do affect business" (total may exceed 100 percent)

Gypsy moth certification	63	43	16	41
Availability of effective insecticides on market	51	48	59	55
Uniformity of MDA field inspections	34	43	13	27
Federal quarantines in other states	33	13	7	17
Other	4	4	21	11

¹ Defined by channel through which majority of trees were sold.

² Includes operations not categorized because they had no sales.

Christmas trees: Sources of management information

Sources	First choice	Second choice
	<i>Percent</i>	<i>Percent</i>
Michigan State University	26	18
Other Universities	0	1
Community College	0	0
Extension Service (AOE)	16	17
Other Christmas Tree Professionals	17	14
Commercial Technical Reps	1	2
Private Consultant	4	3
Michigan Christmas Tree Association	16	12
Other Professional Association	2	2
Other	4	3
None chosen	13	28

Christmas tree farms with hired workers, by size group, 2013

Size group	Farms	No. with	Percent	Workers
1-9.9 acres	200	40	20.0	115
10 to 24.9 acres	195	65	33.3	365
25 to 99.9 acres	121	55	45.5	590
100 acres or more	44	40	90.9	1,210
Total	560	200	35.7	2,280

Hired workers on Christmas tree farms by category, 2013

Category	Workers
Permanent, full time	425
Permanent, part time	80
Seasonal, full time	680
Seasonal, part time	1,095
Total	2,280

TITLE: MDARD, Food and Dairy Division - Increasing Awareness and Sales of Healthy Michigan Specialty Crops and Their Nutrition Value through Education

PROJECT SUMMARY

In Michigan, intake of fruit and vegetables is lower than recommended for both adults and adolescents. Michigan produces a wide variety of specialty crops and leads the nation in production of many fruit and vegetable specialty crops. These specialty crops provide nutrient dense, low calorie foods important for health. Eating a diet high in fruits and vegetables is associated with a decreased risk of some chronic diseases and is associated with weight management. Michigan may see both economic and health benefits from increasing consumption of Michigan specialty produce crops through promotional and educational tools. Michigan is working to decrease its obesity rates and in recovering from the recession, seventeen individual Michigan produce specialty crops educational cards were created. Each produce card contains helpful hints on the individual crop, such as availability, nutrition information, recipes food safety tips, and a USDA core nutrition message. Five hundred two-sided cards of seventeen Michigan specialty produce crops were created and printed for handouts. A Michigan produce availability chart was also made available to promote seasonal availability of Michigan produce. The educational and promotional materials were provided at events such as Michigan Farmers Markets, and Detroit River Days. The cards increased awareness of Michigan specialty crops and provided information to work toward healthier eating behaviors by increasing purchases and consumption of Michigan specialty produce crops. Samples cards are provided as reference the end of the report.

PROJECT APPROACH

Pictures of Michigan specialty crops were used in a wheel game to assist in teaching people about the many Michigan produce specialty crops grown in MI. The wheel game attracted people to our booth. Visitors at the booth had available the three question survey with questions on large poster boards. The first two questions related to current consumption of fruits and vegetables grown in Michigan. Serving sizes used were one-half cup per serving. Stickers were placed on posters for easy answering of the survey. Education was then provided on recommended intakes of fruit and vegetables for age and sex using the USDA "My Plate" charts. The recommended daily fruit servings and daily/weekly amounts of each vegetable subgroup and variety of color were reviewed.

The wheel game and produce cards allowed for education and promotion of seventeen Michigan specialty produce crops. The survey recipients were then asked a third survey question, "Knowing more about Michigan specialty crops are you more likely to change your intake?" Answer choices were: No, Stay the same, or Yes.

GOALS AND OUTCOMES ACHIEVED

Surveys were completed at the planned events. Not all seventeen educational cards were made available at all events due to nutrient analysis needing more research and printing of the cards. When the educational cards were not available, charts of Michigan grown produce and Michigan specialty crop booklets from a previous grant were utilized for education.

The four event days allowed for 137 people to answer part or all of the survey. The question on usual daily vegetable intake question had 137 responses, fruit intake had 114 responses and the third question on whether they would increase, stay the , or not change intake of the Michigan specialty crops received 114 responses. Receiving a larger number of vegetable

responses may be due to some participants thinking they had completed the survey after having answered the first question or needing to move on due to time constraint.

USDA recommended intake of vegetables per day ranges from 2-6 one half cup servings per day for age and sex. The survey of the results from all of the event days indicates the average servings of vegetable intake per day were 3.17. Twenty-one percent of those surveyed reported eating less than two servings of vegetables per day. Seventy-four percent reported eating in the recommended range of 2-6 servings per day and 5% stated they ate >7 servings per day. USDA recommended intake of fruit servings per day ranges from 2-4 one half cup servings per day. The total survey population average was 3.04 servings per day. Fourteen percent of those surveyed were below two servings of fruit per day, 69% were in the recommended range and 17% were above the range.

The survey results appear to indicate that Michiganders are taking in more fruit and vegetable servings than what is reported in the State Indicator Report on Fruit and Vegetables 2013, the median intake being 1.1 fruit servings per day and 1.6 vegetable servings per day. One reason for higher reported intake may be that participants want to respond in a way that makes them look as good as possible. (1) Thus, they tend to under-report behaviors deemed inappropriate by researchers or other observers, to over-report behaviors viewed as appropriate. (2) Choosing to come to a booth on nutrition may also show a bias of people already interested in nutrition and healthy habits.

Table 1 illustrates a comparison of the two different event locations where the surveys were conducted. The Detroit River Days event showed a greater percentage of respondents reporting their daily consumption of both fruit and vegetables below the recommended intake. The Detroit River Days event also had a lower number of respondents who felt they consumed the recommended daily serving range of, but more people at that event felt they consumed the recommended serving range of fruit than respondents at the Michigan Farmers' Market. Farmers' market responders were higher in the vegetable recommended range. When comparing the two events, consumers attending the market event were more inclined to purchase fruit and vegetables for consumption due to direct access to the produce.

Table 1. Comparison of survey responses from Farmers Markets at the Capitol (FMC) and Detroit River Days (DRD)

Servings	Vegetables		Fruit	
	FMC	DRD	FMC	DRD
Below recommendations	16%	25%	10%	11.5%
In the range of recommendations	81%	68%	67%	75%
Greater than recommended range	3%	6%	22%	13%

Common comments from those surveyed were that they were low on intake of some of the recommended sub-groups of vegetables and high in others and that variety in color of vegetables was lacking. Fruit juice was mentioned often as a way of getting fruit servings daily. Once educated on Michigan specialty crops 91 of the 114 respondents (80%) reported they would increase consumption of Michigan specialty crops, 22(19%) would stay the same, and one responder wouldn't change. This indicated, by educating people on the specialty crops of Michigan and the recommended intakes, more people are willing to consume Michigan specialty fruit and vegetable crops.

Michigan specialty produce cards promoting in-season produce were popular, along with the recipe cards. Our goal of reaching an average of 25 families per event was accomplished within the four days of events.

BENEFICIARIES

Partnering in events with the Michigan Department of Natural Resources or Michigan Farmers Market Association allowed for a variety of people to be surveyed and educated on Michigan specialty produce.

Educating the public and promoting Michigan fruit and vegetable specialty crops at events with the created education produce cards will allow for increased sales of produce at grocery stores and farmers markets where the cards will be available during Pure Michigan FIT events. The Michigan Department of Education verbalized they may be interested in the recipe for schools to help meet the fruit vegetable servings needed and to support Farm to School efforts of local foods.

LESSONS LEARNED

Consider questions of types of vegetables usually consumed to better evaluate and educate on those needing to increase in the diet.

Consider survey questions on why intake may not meet recommendations, such as access or cost. Increase the places of events for better comparison of reported intake.

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ADDITIONAL INFORMATION

1. <http://www.cdc.gov/nutrition/downloads/state-indicator-report-fruits-vegetables-2013.pdf>
- 2.. <http://www.cgu.edu/include/Understanding%20self-report%20bias.pdf>

Sample charts can be found at the following sites.

<http://www.choosemyplate.gov/printpages/MyPlateFoodGroups/Vegetables/food-groups.vegetables-amount.pdf>

<http://www.choosemyplate.gov/printpages/MyPlateFoodGroups/Fruits/food-groups.fruits-amount.pdf>

Here is a sample of handouts for the educational and promotional cards.



Pure MI Fit.zip