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Specialty Crop Block Grant Program-Farm Bill  
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## Michigan Department of Agriculture & Rural Development FY 2014 – FINAL REPORT

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**Submitted: December 5, 2017**

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## **SUB-GRANTEE REPORTS**

### **PROJECT TITLE: MICHIGAN VEGETABLE COUNCIL - Development of Irrigation and Chemigation Practices in Michigan Asparagus - FINAL**

#### **PROJECT SUMMARY**

An increasing number of asparagus growers in MI view irrigation as potentially beneficial for i) increasing yields through improved fern growth and root carbohydrate production during dry periods in July and August, and ii) improving spear quality through cooling during the harvest season. However, the impact of irrigation on pests of asparagus, and the potential to improve pest management through irrigation delivery and activation systems has not been extensively explored in MI. To address this knowledge gap, our project investigated the impact of irrigation on the incidence of key insect and weed pests and yields of two varieties of asparagus in a long term irrigation trial. Irrigation of asparagus during July and August resulted in increases in yield for the Guelph Millennium variety of approximately 10%, but had little or no benefit for the Jersey

Supreme variety. Irrigation had small and inconsistent direct effects on insect pests and beneficials, and no detectable effect on key weed species during the 2015 season.

Chemigation with systemic insecticides can reduce insect damage, but this is currently not a commercially available option for asparagus growers. Chemigation is a method to deliver systemic insecticides into the root-zone of a plant, which is then taken up by the plant and expressed throughout the entire tissue. This technology is able to control many pest species and is commonly used in vegetable crops, asparagus being one exception. The most common way to manage insects in asparagus post-harvest is to use broadcast foliar spray applications of contact insecticides, but this is not effective in the case of the asparagus miner, because larvae are hidden inside the stems. If a systemic insecticide is incorporated into the tissue of the plant post-harvest, growers would have to spray less, and the insecticide would be able to reach insects within the plant tissue. This would especially be important in the early stages of the planting, when it is the most susceptible to asparagus miner colonization. Reducing damage to young plants may therefore have a long-term positive effect on production. *Our goal is to test the efficacy of systemic insecticides on asparagus miners, asparagus beetles, and Japanese beetles, and measure the longevity of the effect as the asparagus field ages. This knowledge will give asparagus growers practical information for insect management.*

### **PROJECT APPROACH**

The effects of irrigation system (none, overhead or sub-surface drip) and asparagus variety (Millenium or Jersey Supreme) on key insect and weed species, as well as crop yield, were examined in a long-term irrigation trial established from crowns in 2010. Plots were arranged in a split-plot design with irrigation as the main plot factor, and variety the sub-plot factor. Main plots are 120' x 20' with four rows of asparagus on five foot spacing. Overhead irrigation was accomplished with a solid-set system mimicking center-pivot systems commonly used for other vegetables in the region. Sub-surface drip irrigation was accomplished with pressure-compensated drip tubing placed below the crown at planting. Irrigation was triggered when soil volumetric water content reached 50% of available water at a depth of two feet and was applied until soil water content reached field capacity based on readings from Diviner 2000 soil moisture monitoring system. Asparagus yields were evaluated from 120 row-ft in each plot on 21 harvest dates in May and June. To better understand the impacts of irrigation on key pests, we monitored the population dynamics of two herbicide resistant weeds—marestail and Powell amaranth-- in each plot at the end of the harvest period (early-June), and prior to a killing frost in late-October. The effects of irrigation and variety on insects were evaluated in all treatments by counting the number of asparagus miner mines at the base of the stem, and the number of asparagus beetles, Japanese beetles as well as beneficial insects on the fern from 10 row-meters per plot, on 5 August and 25 August, 2015.

Chemigation trials were developed based on previous tests of seven insecticides, of which Platinum ® (Thiamethoxam, Syngenta ®) performed the best. We field-tested Platinum efficacy in reducing damage by three important asparagus pests: the asparagus miner (*Ophiomyia simplex*, Diptera: Agromyzidae), a specialist stem miner; the common asparagus beetle (*Crioceris asparagi*, Coleoptera: Chrysomelidae), a specialist chewing defoliator; and the Japanese beetle *Popillia japonica*, Coleoptera: Scarabaeidae), a generalist chewing defoliator. We planted asparagus crowns in eight experimental plots established in 2015. New asparagus growth was broadcast-sprayed twice with Platinum then irrigated in four plots, the remaining four plots received irrigation only. Insecticide was applied twice (6/23/2015 and 7/30/2015). Ten asparagus stems were collected per plot following each insecticide application to determine insecticide uptake by asparagus stems. To assess the efficacy of the insecticide, the number of asparagus stems, asparagus miner-damaged stems, adult Japanese beetles, and adult asparagus beetles were counted weekly for nine weeks following the initial insecticide application (7/14/2015-9/9/2015).

## GOALS AND OUTCOMES ACHIEVED

### GOAL 1) Evaluate irrigation effects on insect and weed population dynamics

#### OUTCOMES:

In 2015, crop yields were increased by irrigation in Millennium, but not Jersey (Figure 1). Irrigation was not needed in July due to consistent rainfall. In August, soil moisture declined, and irrigation was applied three times in both overhead and drip irrigation treatments for a total of 2.5 inches for drip and 4.5 inches for overhead. Soil moisture during August and much of September was higher in irrigated compared to unirrigated treatments due to sparse rainfall (Figure 2).

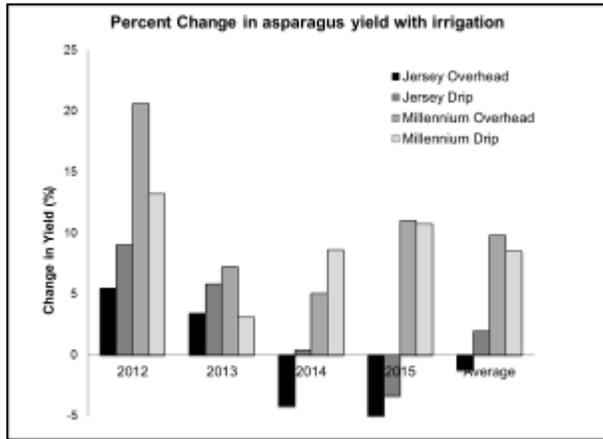


Figure 1. Effects of irrigation on asparagus yield by variety.

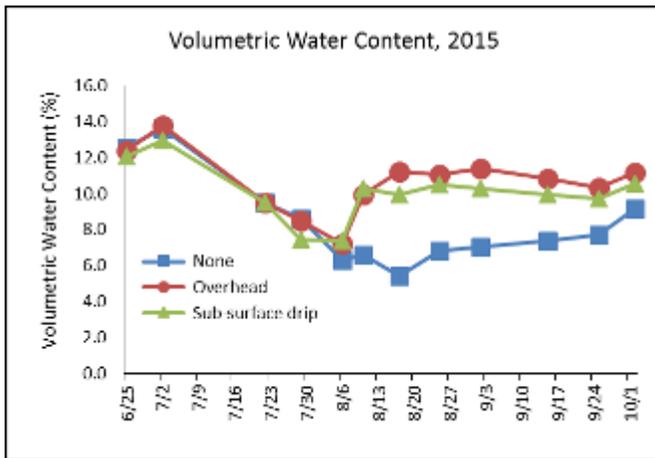


Figure 2. Soil moisture by date and treatment in 2015.

On the August 5 sampling date, Japanese beetle abundance was higher in the Millennium-overhead treatments compared to all other treatments except Millennium drip, although this effect was only marginally significant ( $P=0.097$ ) (Table 2). On the August 25 sampling date, asparagus miner damage was greater in overhead irrigation treatments than in drip or unirrigated

treatments. No differences in beneficial insects were detected at either sampling date (data not shown). Irrigation had no detectable effect on either Powell amaranth density (data not shown) nor marestail density or percent groundcover (Table 1). Contrary to expectations, total weed percent groundcover in October was higher in Jersey Supreme compared to Millennium ( $P=0.078$ ).

Table 1. Effects of irrigation and asparagus variety on insect and weed pests in asparagus, 2015.

	Insects				Weeds		
	Japanese beetle (adults)		Asparagus miner (mines)		Marestail		Total
	5-Aug	25-Aug	5-Aug	25-Aug	Number	Cover	Cover
	-----#/m-row-----				#/m <sup>2</sup>	-----%-----	
<b>Variety main effect</b>							
Jersey supreme	9.57	0.90	0.90	2.97	220.4	8.6	14.1 a
Millenium	15.93	1.02	0.92	2.53	149.9	6.1	9.3 b
<b>Irrigation main effect</b>							
None	11.60	1.70	1.08	3.85 a	123.0	5.9	8.0
Drip	11.05	0.53	0.38	3.33 a	251.9	8.3	14.4
Overhead	15.60	0.65	1.28	1.08 b	180.6	7.7	12.7
<b>Variety x irrigation interaction</b>							
Jersey supreme							
anone	12.45 b	1.65	1.05	3.90	170.3	8.6	10.4
drip	8.80 b	0.50	0.45	3.65	270.0	9.1	16.1
over	7.45 b	0.55	1.20	1.35	221.0	8.0	15.8
Millenium							
anone	10.75 b	1.75	1.10	3.80	75.8	3.2	5.6
drip	13.30 ab	0.55	0.30	3.00	233.8	7.6	12.7
over	23.75 a	0.75	1.35	0.80	140.3	7.4	9.5
Significance of fixed effects (P-value)							
Variety	0.064	NS	NS	NS	0.109	NS	0.078
Irrigation	NS	NS	NS	0.049	NS	NS	NS
Variety*irrigation	0.097	NS	NS	NS	NS	NS	NS

Different letters within a column indicate statistically significant difference at P<0.10.

## GOAL 2) Improve asparagus production through chemigation

### OUTCOMES:

Asparagus plants in sprayed plots had approximately 9x fewer asparagus miner mines than untreated plants, and approximately 50% fewer asparagus beetle adults (Figure 3A, B). Conversely, untreated plants had nearly 2x as many Japanese beetles compared to insecticide sprayed plants (Figure 3C). While differences in Japanese and asparagus beetle abundances between treatments were clear, abundances were also quite low, and so actual beetle numbers differed on the order of one additional beetle per 200 asparagus stems. The observed reduction in miner damage from 9% to 1% likely represents an economically important effect for asparagus growers. Insecticide spray did not affect number of asparagus stems. Analysis of stem tissue for insecticide uptake showed that asparagus plants did uptake the insecticide into plant tissue, however after the second application plants in control plots also showed signs of insecticide uptake.

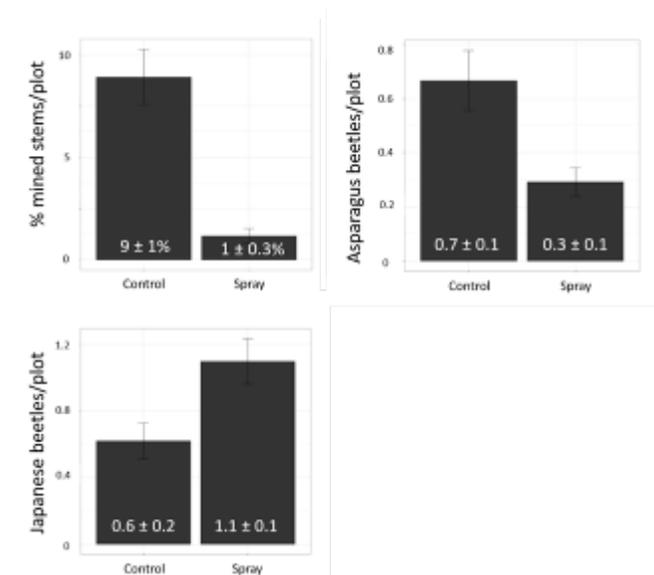


Figure 3. Mean ± SEM of asparagus miner stems, asparagus beetles, and Japanese beetles in sprayed and unsprayed asparagus plots.

**OUTREACH:** Results generated from this project were shared widely with asparagus growers across Michigan at the Great Lakes Expo and at the Annual Oceana Asparagus Growers' Meeting, where growers and other stakeholders have the opportunity to interact with researchers and ask questions. We also publish results in the Great Lakes Expo Proceedings.

## BENEFICIARIES

Oceana Asparagus Day was held in March in 2013-2015 with approximately 150 attendees from 18 Michigan counties and from out of state. Attendees were surveyed, and 92% of them were from farms growing 1-300 acres of asparagus, totaling ~4,400 acres in 2013 and ~4,600 acres in 2014. Acreage of respondents represented 40-45% of the total Michigan asparagus acreage according to USDA-NASS.

Approximately half of respondents indicated they use or are thinking about using irrigation due in part to MSU research and extension. Reported irrigated acreage from survey respondents increased by approximately 30% from 337 acres in 2013 to 437 acres in 2014. Both overhead and drip irrigation are being used, with more using overhead. Assuming survey respondents are representative of Michigan asparagus as a whole, irrigated acreage is approximately 1000 acres, representing about 10% of total acreage, with a gross value of approximately \$1.4 million. Given estimated yield improvements from irrigation during fern growth of 10% (Figure 1), irrigation likely contributes at least \$140,000 in gross revenues per year to MI asparagus farmers. Additional economic benefits that are not yet quantifiable include improvements in spear quality and yield due to harvest-season irrigation, and improvements in pest management efficacy or reductions in pest management costs associated with delivery and activation of pesticides with irrigation.

In 2013 and 2014, about 45% of respondents rated the importance of crop advisors in their pest management decisions as 'extremely important'. In 2013, 10% of growers applied insecticides targeted at the asparagus miner, 32% applied insecticides on a calendar basis and the majority (62%) did not specifically target this pest with insecticide applications. In 2014, 21% said that they timed their insecticide sprays for the asparagus miner, 43% said they used calendar insecticide sprays, and only 37% said they did not manage this pest specifically. Thus, from 2013 to 2014 the proportion of growers who targeted insecticide applications to asparagus miner increased by 22%, and awareness to manage this pest overall also increased by 25%. In both years 62% of growers said they were satisfied with their asparagus miner management program. About 22% of the growers were interested in applying systemic insecticides to target the larval stages of the asparagus miner.

## LESSONS LEARNED

We have learned that irrigation during the fern growth period can increase yields of the variety Guelph Millennium by approximately 10%, but that yield benefits for Jersey Supreme are minimal. Irrigation had no detectable impact on weed emergence and growth. Overhead irrigation increase Japanese beetle density in one asparagus variety on one sampling date, and reduced mines due to the asparagus miner on another sampling date, but these insect impacts were not consistent and were unlikely to have a major impact on asparagus production.

Through chemigation trials, we have learned that the asparagus miner and common asparagus beetle damage and abundance on asparagus plants can be reduced by use of systemic broadcast-sprayed insecticide, but that Japanese beetles may respond to other characteristics of the asparagus plant following insecticide application. Growers interested in systemic insecticides may be interested in this product to control specialist asparagus pests when Japanese beetles are in low abundance.

**CONTACT PERSON**

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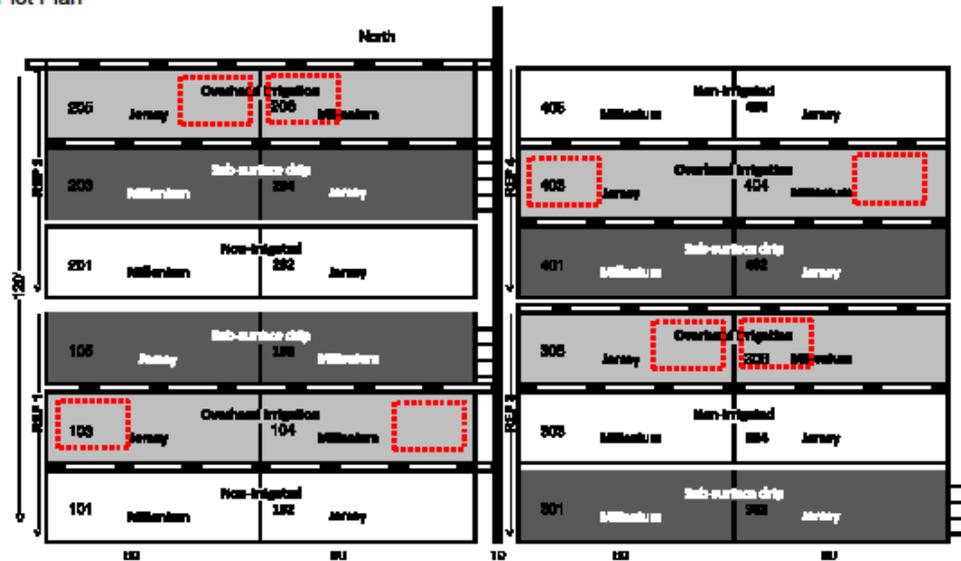
**ADDITIONAL INFORMATION**

Below are handouts provided to growers at the GLEXPO in December and Oceana/Mason County field tours last summer. A very similar presentation handout was provided at Oceana Asparagus Day in March. The EXPO and Asparagus Day audiences were ~150 growers. Field tour had approximately 30.

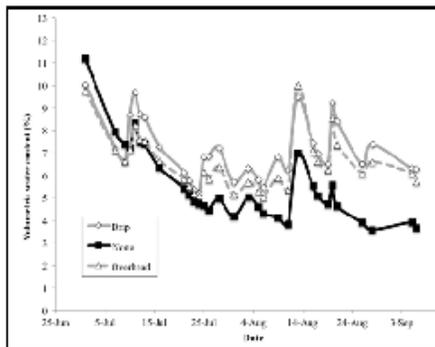
**Jackson Rd Irrigation Trial Update**

Dan Brainard, Ben Byl, Zack Hayden; Corey Noyes; MSU, Department of Horticulture  
 John Bakker; MARB; Ben Werling; MSUE  
 Funding: MARB; Project GREEN; MDARD, Specialty Crop Block Grant  
 5/27/15

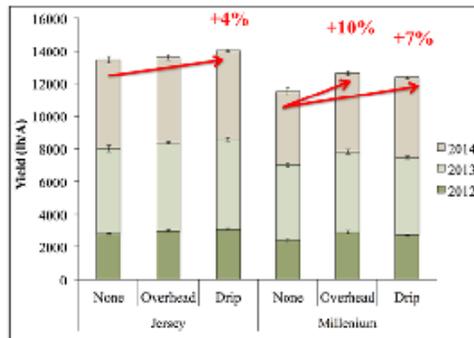
**Plot Plan**

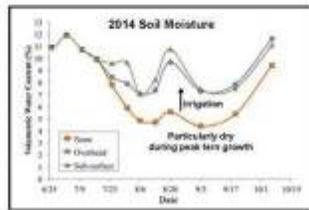
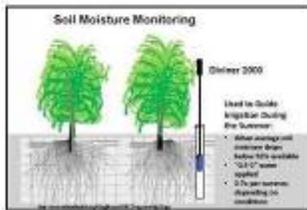
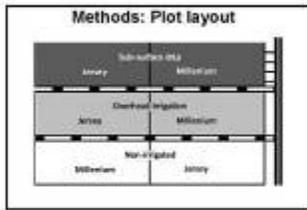
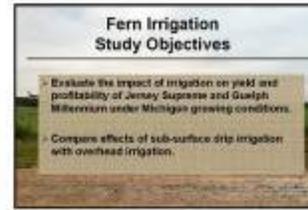
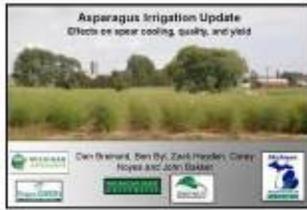


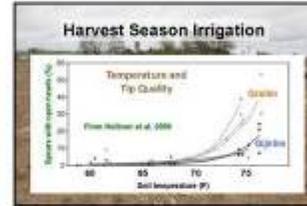
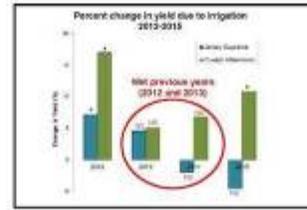
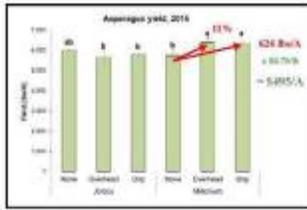
**Soil Moisture Content Example**



**Yield Response**







**Harvest Season Irrigation**

Overhead irrigation during **hot, dry** periods may:

1. Cool air and soil temperatures via
  - Cold irrigation water
  - Evaporative cooling
2. Slow spear elongation and improve tip quality
3. While hopefully not increasing fungal disease

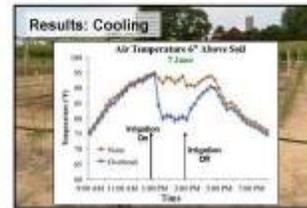
**Methods: Irrigation during harvest**

**Conditions:**

- 5 Day temps exceeded 80 °F and 50°C
- 75% available
- 3 years in 2014, only once in 2015
- 2.5" - 4.25" per event

**Data Collected:**

- Air and Soil Temperatures
- Yield
- Spear Quality
- Purple Spot





YouTube. All of these postings brought consumers back to the Michigan Christmas Tree Association's social media pages and website where we provided information on selecting a real Christmas tree and directed them to Christmas tree farms and retail locations. Members of the Michigan Christmas Tree Association were provided three opportunities for social media training; assisting them in promoting their own businesses as well as the entire fresh Christmas tree industry.

## PROJECT PURPOSE

The objective of this project was to increase consumer interest in farm-grown Christmas trees, encourage purchases and to provide consumer guidance on how to select a tree and where to purchase. The constant pressure from the artificial Christmas tree producers and marketers negatively impacts the sale of real Christmas trees. We took advantage of the current popularity of social media; where real Christmas tree fans could share their story and positive feelings about having a real Christmas tree to sway their friends and encourage them to also adopt a real Christmas tree tradition. According to Jonathan Bernstein of Social Media Today, 46% of web users turn to social media for making purchase decisions and 60% of consumers say that the integration of social media makes them more likely to share about products and services. With more than 1.15 billion users on Facebook, more than 500 million users on Twitter and more than 70 million users on Pinterest, we felt confident that sharing our message on social media would create interest in Michigan-grown Christmas trees. Further, by providing training sessions to our growers and retailers on how to incorporate social media in their marketing plans, they could realize the benefits of increased customers and sales in their businesses from this campaign.

The social media campaign was designed to specifically promote the real Christmas tree experience, thus we can ensure that all grant funding was used appropriately.

This proposal was not submitted to any other Federal or state grant program or Project GREEN. This project did not build on a previously funded Specialty Crop Block Grant project.

## PROJECT ACTIVITIES

The purpose of this project was to increase consumer awareness and demand for Michigan-grown, cut Christmas trees using social media as the vehicle to carry our message. The first step in executing this campaign was a strategy meeting including MCTA Executive Director, Marsha Gray, Adrienne Wallace, Director of 834 Design and Michelle LeFevre, Executive Director of Courtland Consulting. Courtland Consulting designed and currently hosts the MCTA website and 834 Design is a marketing firm selected to execute the social media campaign.

In these initial strategy sessions, we determined that the best way to track the success and reach of the campaign would be to direct consumers to the MCTA website. The first item of work included updates to the MCTA website ([www.mcta.org](http://www.mcta.org)) that enabled the site to work efficiently with the campaign.

The second area of work addressed was the campaign itself. With input from Marsha Gray, Adrienne Wallace and her creative team at 834 Design, a series of blogs, stories and posts was developed to be featured on the MCTA Facebook page that began in August and ran through December 25. The team also developed content for Twitter and Pinterest accounts to capture new followers. The preparation and execution of these posts and blogs was the most time consuming part of the project. This content was enhanced and supported by directing \$3,000 of the budget to paid on-line engagement using Google AdWords and Facebook Ads. The team at 834 Design selected key words used by Christmas tree shoppers and budgeted modest daily amounts of \$40 on Thursdays, Fridays, and Saturdays (when most Christmas tree shoppers do their on-line research) and spent a total of \$1,000 on Google AdWords. \$2,000 was budgeted for Facebook

ads in an effort to increase the number of impressions and “Likes.” Facebook ads ran through December 19.

The other component of the project that was completed in September was the social media training sessions for interested MCTA members. Adrienne Wallace of 834 Design presented social media training sessions on August 6 in Cadillac, on September 10 in Grand Rapids and September 17 in Howell. The sessions were promoted to the members of the association via direct mail and a number of email invitations. The attendance was lower than targeted, however the feedback from attendees was excellent. The purpose of the program was to help producers learn more about promoting their farm or retail location and the real Christmas tree message using social media; Facebook in particular. This can directly impact the success of the campaign, as more producers help to spread the message and campaign themes provided by the association.

The following links to our Facebook, Twitter and Pinterest pages demonstrate the type of work that was developed for the campaign:

<https://www.facebook.com/michiganchristmastreeassociation>

[https://twitter.com/real\\_MI\\_trees](https://twitter.com/real_MI_trees)

[https://www.pinterest.com/Real\\_MI\\_Trees](https://www.pinterest.com/Real_MI_Trees)

A complete recap of the social media campaign was prepared by 834 Design and presented at the MCTA Winter Meeting. A copy of that presentation is attached to this report.

No commodity groups other than Christmas trees benefited from this project.

#### GOALS AND OUTCOMES ACHIEVED

We were very satisfied with the outcome of the project as described above. Our goal to increase the visibility of Michigan-grown Christmas trees with consumers was definitely met. In greater specificity, the social media campaign met or exceeded the goals that we set:

- Increased metrics on all social media platforms: Facebook and Twitter over 150% and Pinterest over 100%
- Increased website traffic by 21% over previous year during November and December
- Increased website page views by 34% over previous year during November and December
- Increased the number of pages viewed per session by almost 11%
- Increased referrals to website from social platforms by 32% from previous year
- Created more than 70 unique Facebook posts and five unique blogs for the MCTA website
- Created and distributed a monthly electronic newsletter for MCTA members during the season with an open rate of 50% (industry average is 35%)
- Hosted three training sessions for MCTA members to improve usage and understanding of social media. Total attendance of approximately 40 people was lower than expected 90 participants. However participants responded that the sessions were extremely helpful.

#### BENEFICIARIES

All Christmas tree producers in Michigan were the potential beneficiaries of this project, in that the overarching message expressed in the campaign was to celebrate Christmas with a Michigan-grown Christmas tree. This message should help support sales. More directly, members of the Michigan Christmas Tree Association benefited from this consumer interest as all content directed consumers to the MCTA website and, more specifically, our locators that help consumers find a location to purchase a Christmas tree. The Christmas tree producers who actively engaged with this campaign with social media likely received the most direct benefit, as they engaged personally with consumers and were provided the opportunity to feature their farm or retail lot. Also,

Christmas tree producers who attended the social media training sessions received the direct benefit of developing skills to promote their own business.

#### LESSONS LEARNED

This project ran smoothly because of the good partners that we engaged to execute the campaign. We learned that with the right team in place, social media promotion is a very inexpensive and effective way to reach consumers. The greatest challenge we experienced was the much lower than anticipated participation at the social media training sessions. The possibility of success of this type of a social media campaign is greatly increased with more involvement on the part of more industry participants.

#### CONTACT PERSON

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#### ADDITIONAL INFORMATION

Attached to this report is a final report on the social media campaign from 834 Design, examples of the Facebook Ads.



# Favorite Things October

Post Details

**Michigan Christmas Tree Association**  
 Founded by a local grower in 1962, MCTA is...

Do you know where you're getting your Christmas tree? We have a few suggestions.



**Michigan Christmas Tree Association - Complete Membership Listing**  
 The Michigan Christmas Tree Association is committed to supporting family Christmas tree growers in the state, providing education and information.

1,985 people viewed

144 views

100 views 14 views 28 views  
 18 Comments 19 views 5 views  
 21 views 22 views 7 views

142 people liked

4 people liked 49 views 55 views

REACTIVE FEEDBACK

7 views 19 views  
 8 views 14 views

1,985 people viewed

View Post

View Details, Like, Share, and Follow

Search for more favorite things posts

**1,985** People Viewed

**144** Views

100 views 14 views 28 views  
 18 Comments 19 views 5 views  
 21 views 22 views 7 views

142 people liked

4 people liked 49 views 55 views

REACTIVE FEEDBACK

7 views 19 views  
 8 views 14 views

Post Details

**Michigan Christmas Tree Association**  
 Founded by a local grower in 1962, MCTA is...

It's the chemistry of a green Christmas. Real Christmas trees are renewable, recyclable, and they provide green space.



**How to Have a Green Christmas**  
 Many Christmas trees are made with single recycled aluminum tubes with a lead and tin coating that is not as durable as recycled aluminum. Compare the popular level and the growing method of trees to determine an ethical, safe tree.

2,538 people viewed

214 views

211 views 11 views 228 views  
 21 views 2 views 21 views  
 22 views 22 views 9 views

154 people liked

4 people liked 19 views 73 views

REACTIVE FEEDBACK

7 views 19 views  
 8 views 14 views

2,538 people viewed

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**2,538** People Viewed

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REACTIVE FEEDBACK

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# Google AdWords

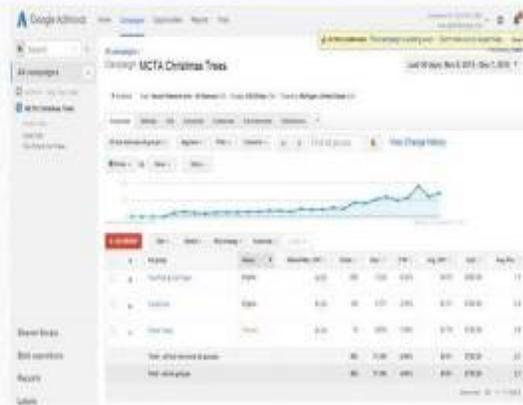
Started Mid-Nov

Regularly adjusted bids and audiences

Paused with website outages so as not to drive traffic to dead page.

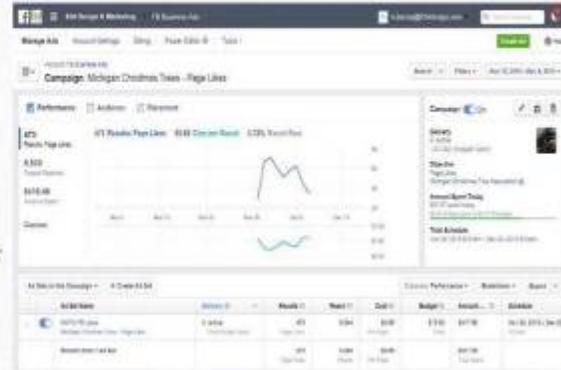
## AdWords

- Maxed out \$40 per day budget
- \$1000.00 budget total
- Heading into key weekends adjusted the ad schedule to only run on Thursday – Sunday from 6am to 11pm, at \$30 per day
- Page views increased per expectations to you pick & cut and lots.



# Facebook Ads

- Facebook ads ran to drive people to the website (**website clicks**) to find a farm or a lot, using approved creative. These ran since just before Thanksgiving.
- We also put some budget dollars into increasing Facebook Page **LIKES** as well. This resulted in 475 new likes to the page and nearly 10,000 impressions.
- \$2000.00 was allocated for Facebook ads.
- Facebook ads ran through 12/19, with \$700 balance of original budget allocated at \$50 per day for Ads for website clicks, and \$15 per day for Facebook likes 12/9 – 12/19.
- Wanted to drive people to website & map pages for choose & cut.





# Favorite Things November

The screenshot displays a Facebook post from the Michigan Christmas Tree Association, dated November 15, 2015. The post features a photograph of a decorated Christmas tree and a blue slide. The text of the post reads: "The team from Blue Statecraft Design got together to assemble the Detroit Lions Christmas tree at Ford Field. It's a 22 foot Christmas tree. Don't miss this event!" The post has 9,455 likes, 227 comments, and 712 shares. To the right of the post is a "Post Insights" dashboard. The "Audience Retention" graph shows a steady decline in viewer retention over time. The "Video Views" section shows 795 video views, with 335 seconds viewed. The "People Reached" section shows 1,661 people reached.

Metric	Value
Post Likes	9,455
Comments	227
Shares	712
Video Views	795
Seconds Viewed	335
People Reached	1,661



**PROJECT TITLE: FORGOTTEN HARVEST – Will Cover Crops and Conservation Tillage Increase Yield and Reduce Drip Irrigation when Growing Winter Squash? - FINAL**

**PARTNER ORGANIZATION**

Forgotten Harvest partnered on the grant with:

Michigan State University Extension (MSU-E)  
Ben Phillips, Educator

Also, during project, partners included additional MSU-E and Michigan State University experts, who provided guidance and oversight to project.  
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**PROJECT SUMMARY**

To enhance the Specialty Crop Industry, this project was designed to test use of cover crop sustainable growing methods to evaluate yield, various sustainable growing methods, and positive economic and environmental outcomes. In collaboration between Forgotten Harvest Farm staff and Michigan State University experts, the project used control and experimental variables (cover crop, till / no-till / strip-till, irrigation, and black plastic growing methods) on a 2 acre research plot at Forgotten Harvest Farm.

The primary output performance measures for the control and treatment sub-plots were: ease of seed planting; squash establishment, squash yield, quality, and cleanliness; weed pressure; and soil moisture and nitrogen content. Water run-off was qualitatively reviewed but not measured.

Outcomes included recommendations on: seed selection, planting density, and crop maintenance; irrigation application; and equipment selection, modification, calibration, and use -- all recommendations to help optimize cost-effective and sustainable growing methods to grow high yields of high quality squash while minimizing irrigation and plastic cover.

Outreach to Specialty Crop growers (urban and rural growers) and other Specialty Crop experts occurred at formal presentations, informal meetings, and a Field Day, and via MSU's networks. Formal reports and a comprehensive webinar are available online.

**PROJECT PURPOSE**

This project addressed concerns that many Specialty Crop growers face when deciding to expand production into a new area lacking irrigation ... or when their Integrated Pest Management rotation plan dictates that crops need to be placed in a field lacking irrigation. Specialty Crop growers also seek sustainable growing methods to protect and enhance soil, water, and other environmental qualities while growing high quality crops, using methods that minimize irrigation water sourced from wells and surface water sources and also optimize high quality crop yield. Also, as growers continue to focus on preventive methods to reduce the risk of food borne disease and to comply with food safety regulations, growers seek ways to reduce the need for irrigation methods that apply water to crop surfaces.

Per MI Ag Council: MI “ranks 2<sup>nd</sup> in the nation in the production of squash.” Per MDARD, squash is a major economic contributor to Michigan’s Specialty Crop segment; MI growers produced 122 million pounds of squash in 2013 for fresh consumption or for processing “totaling \$17.7 million.” Increasing the State’s sustainable growing practices and economic contribution, reinforcing the State’s agricultural leadership, and assuring environmental quality are among MDARD’s Vision, Mission, and Goals and increasing consumption of vegetables is on the State’s Dashboard.

This was a new project but benefited from research conducted previously by MSU experts and conducted and published by others outside of MI.

## PROJECT ACTIVITIES

Please see attached formal report for details and webinar for further details, illustrations, and videos.

- *Fall 2014:* Cereal rye (“winter” rye) was drilled in October 2014; however, the project determined in 2015 that the seed planting equipment may not have functioned as stated on the equipment’s seed dispersion measure. The project observed that the cover crop seed density appeared to be less than reported on the equipment and less than desired for most effective cover crop systems. Weed pressure, cover crop disintegration during summer, and squash cleanliness are factors that would be expected to have more consistent positive results with denser cover crop planting. (The importance of equipment calibration is a lesson learned in the use of various types of equipment during the project.)

The project selected cereal rye due to its relatively inexpensive cost, flexibility, and effectiveness for crop rotation and “nutrition scavenging.” Based on cover crop selection and experience, the project would recommend repeating a fall planting of cereal rye or a blend of cereal rye and vetch.

- *Winter 2014/2015 and Spring 2015:* Starting in May 2015 when the cereal rye was “waist high and blooming,” the cereal rye was sprayed with glyphosate and rolled with a roller-crimper at an angle perpendicular to the direction the rye was planted. The crimper – roller may be used with a 3-point hitch or with front “down pressure” applied with the loader (and may benefit from use of water added to roller for additional weight). (As with all equipment used in the project: the equipment is described in the attached formal report; additional details and use techniques are described and illustrated in the webinar.)

Sub-plots were delineated into six treatments – a change, which MDARD approved in Spring 2015:

- 1) Bare ground, no drip (negative control)
  - 2) No-till, no drip
  - 3) No-till, drip
  - 4) Strip-till, no drip
  - 5) Strip-till, drip
  - 6) Plastic mulch, drip (positive control)
- *Spring 2015 and Summer 2015:* In June, the project chisel-plowed and disced appropriate sub-plot sites. The project also laid drip irrigation in appropriate sub-plots and black plastic in an appropriate sub-plot (with drip irrigation under the plastic).
  - *Summer 2015:* Pre-emergent herbicide was applied. Later in the growing season, the project validated via satellite photos its on-the-ground observation that the boom

sprayer's outer reaches did not function as designated on the equipment scale – resulting in additional weed pressure.

“Probe” tubes for use in measuring soil moisture were installed at consistent, precisely-positioned locations across all sub-plots for use with a “Sentek Diviner 2000,” which is designed to measure soil moisture at 10 cm intervals and retain all data in a software-equipped “logger” for plotting and analysis. As illustrated in the webinar, the planned equipment posed various challenges due to soil resistance, auger size, and need to withdraw tubes at the project’s conclusion. “A big hammer” and other creative actions enabled the project to modify tubes and process to achieve the desired set-up – all illustrated in the webinar. Between July 8 and October 2, soil moisture was measured weekly.

In July, sub-plot treatments were marked with string to help guide squash seed hand-planting. To better accommodate the desires of Forgotten Harvest’s pantry clients, the project changed the project from growing Acorn Squash to growing Butternut Squash, which was hand-plated by trained FH volunteers using tube seeders. Since volunteers are an important factor in FH Farm’s community outreach, the project measured the ease of seed hand-planting in each sub-plot. Installation of irrigation tubes was completed in appropriate treatment sub-plots by August 8. Rainfall measure was obtained from “Runyan Lake Road Weather Station” (Station ID: KMIFENTO10), located 3.6 miles from the research site.

- *Fall 2015:* Starting on October 8, the research site was transected to enable measurement of weed pressure, product quality, and squash production. Product in each section was assessed, counted, and weighed.

The project conducted 3 soil nitrate measured during the project to assess each treatment’s ability to retain nitrogen.

At all times, the 2-acre site focused only on project. Activities in the sub-plots focused solely on the treatments to assess growing practices, yield, and quality on the six sub-plots. The reporting outreach was targeted to Specialty Crop growers but did not exclude growers of non-Specialty Crops. All equipment acquired by the project was used exclusively for this Specialty Crop project and was isolated at FH Farm to assure staff and volunteers did not unintentionally use it for other purposes. No funds were expended for non-Specialty Crop use.

## GOALS AND OUTCOMES ACHIEVED

*Please review the attached formal report for detailed charts and webinar for further descriptions and additional charts describing the project’s outcomes and recommendations.*

The project’s Overall Goal was: “To increase sustainable growing outputs for Specialty Crop growers by reducing use of irrigation water while maintaining or increasing Specialty Crop yield.” The Project Goals were: “To establish and measure (a) soil moisture levels and (b) yields in a research plot of winter squash to ascertain whether Michigan Specialty Crop growers can economically use a no-tilled cover crop when a growing site is located beyond well-pump range as an alternative to installing a new well and irrigation system, which are part of a plasticulture system.”

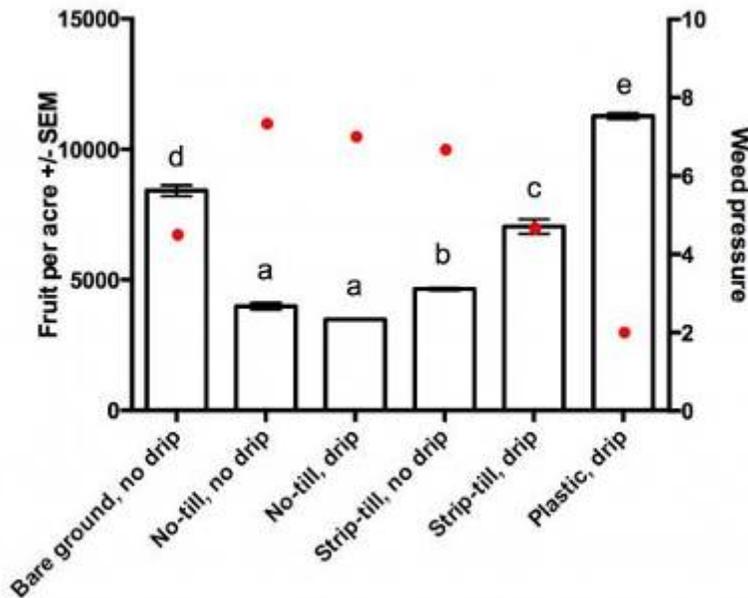
**Table 1.** Measured characteristics of six cover crop, tillage, and irrigation treatments used to grow butternut squash at the Forgotten Harvest Ore Creek Farm, Fenton, MI.

Treatment	Ease of seeding <sup>1</sup>	Weed pressure <sup>2</sup>	% Clean fruit	Fruit/plant	Plants/acre	Fruit/acre	Tons/acre
Bare ground, no drip ( <i>Negative control</i> )	3	4.50	22.41	2.21	3775.25	8421.72	8.37
No-till, no drip	4	7.33	30.91	1.14	3412.25	3993.06	4.62
No-till, drip	4	7.00	35.42	1.30	2758.84	3484.85	4.07
Strip-till, no drip	1	6.67	12.50	1.30	3702.65	4646.46	4.84
Strip-till, drip	1	4.67	27.84	1.96	3630.05	7042.30	8.47
Plastic, drip ( <i>Positive control</i> )	2	2.00	30.41	2.66	4239.90	11267.68	13.84

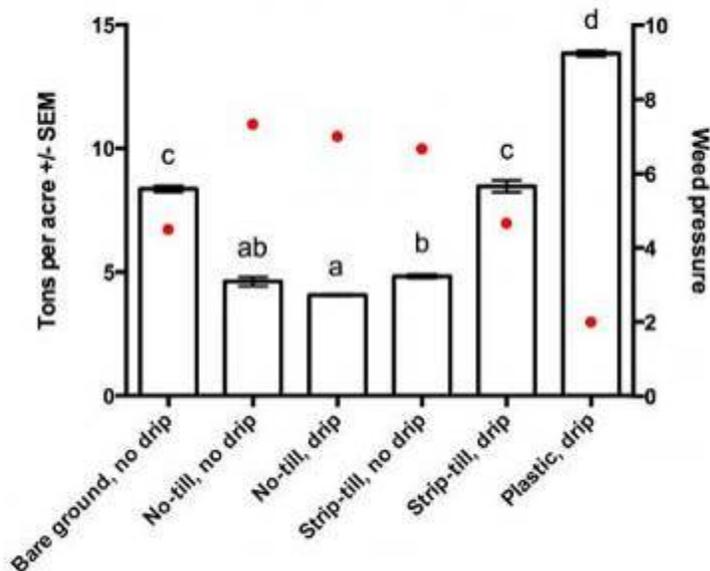
The project generated much helpful measured data, analysis, and recommendations for use among Specialty Crop growers in 2016 and for FH Farm's use in the 2016 crop season.

The following Table 1 and Figures 1 – 4 are excerpted from the MSU-E report (full report attached; also described in greater detail in webinar).

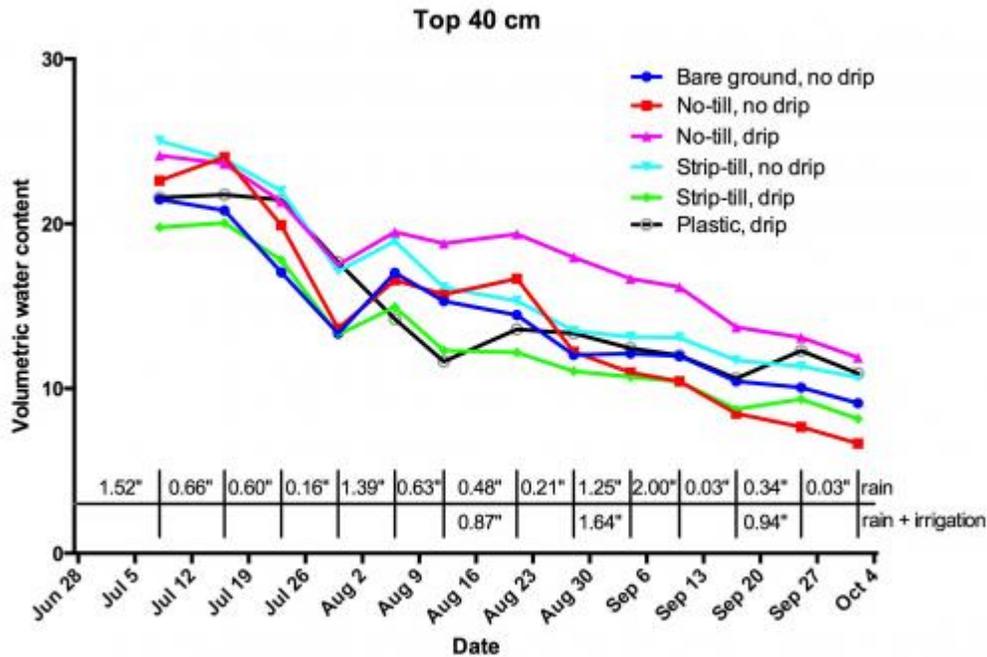
Plastic subplots contained four bedded rows 6.25 ft apart seeded in two staggered rows with an in row spacing of 39 inches (379 plants per plastic subplot). All other treatment subplots contained five flat rows five feet apart seeded with in row spacing of 24 inches (375 plants per subplot). All subplots were harvested at 100 days after planting.<sup>1</sup>Ease of planting was ranked; 1=easiest, and 4=hardest. <sup>2</sup>Weed pressure was assessed on a 1-9 scale in each subplot (1 = no weeds visible, and 9 = no crop plants visible).



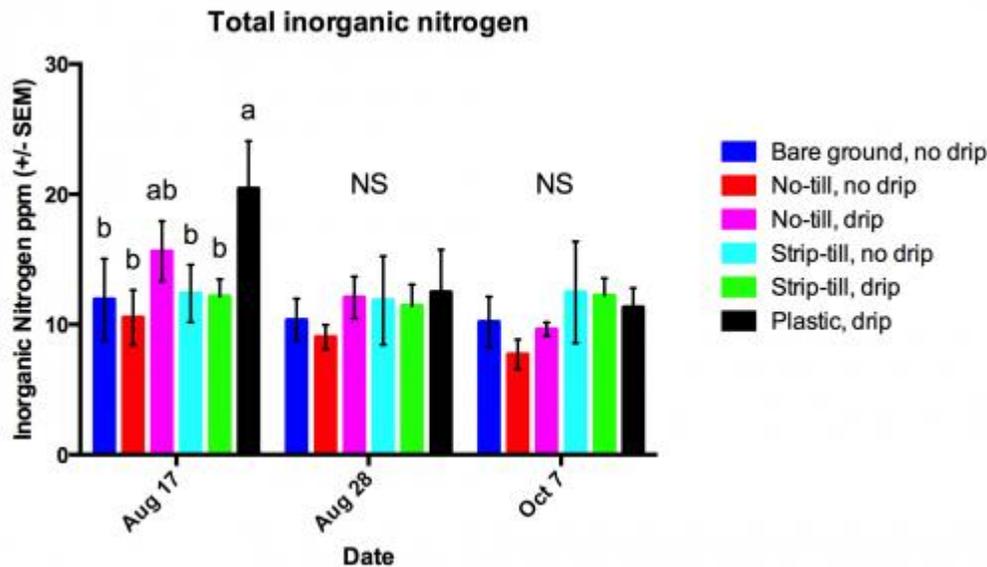
**Figure 1.** Fruit per acre (left axis; *bars*), and weed pressure (right axis; *red dots*) measured in six cover crop, tillage, and irrigation treatments used to grow butternut squash at the Forgotten Harvest Ore Creek Farm, Fenton, MI. Plastic subplots contained four bedded rows 6.25 ft apart seeded in two staggered rows with an in row spacing of 39 inches (379 plants per plastic subplot). All other treatment subplots contained five flat rows 5 ft apart seeded with in row spacing of 24 inches (375 plants per subplot). All subplots were harvested at 100 days after planting. Bars with the same letters do not differ significantly at  $P=.05$  based on Tukey's test.



**Figure 2.** Tons per acre (left axis; *bars*), and weed pressure (right axis; *red dots*) measured in six cover crop, tillage, and irrigation treatments used to grow butternut squash at the Forgotten Harvest Ore Creek Farm, Fenton, MI. Plastic subplots contained four bedded rows 6.25 ft apart seeded in two staggered rows with an in row spacing of 39 inches (379 plants per plastic subplot). All other treatment subplots contained five flat rows 5 ft apart seeded with in row spacing of 24 inches (375 plants per subplot). All subplots were harvested at 100 days after planting. Bars with the same letters do not differ significantly at  $P=.05$  based on Tukey's test.



**Figure 3.** Volumetric moisture content in the top 40 cm of soil over time measured in six cover crop, tillage, and irrigation treatments used to grow butternut squash at the Forgotten Harvest Ore Creek Farm, Fenton, MI. Rainfall and irrigation accumulation in inches is shown for each week between samples. Plastic subplots contained four bedded rows 6.25 ft apart seeded in two staggered rows with an in row spacing of 39 inches (379 plants per plastic subplot). All other treatment subplots contained five flat rows 5 ft apart seeded with in row spacing of 24 inches (375 plants per subplot). All subplots were harvested at 100 days after planting.



**Figure 4.** Parts per million of inorganic nitrogen measured in six cover crop, tillage, and irrigation treatments used to grow butternut squash at the Forgotten Harvest Ore Creek Farm, Fenton, MI. Rainfall and irrigation accumulation in inches is shown for each week between samples. Plastic subplots contained four bedded rows 6.25 ft apart seeded in two staggered rows with an in row spacing of 39 inches (379 plants per plastic subplot). All other treatment subplots contained five flat rows 5 ft apart seeded with in row spacing of 24 inches (375 plants per subplot). All subplots were harvested at 100 days after planting. Bars with the same letters, or NS, do not differ significantly.

Analyses of the collected outcome measures concluded: (Please review details in webinar and attached report.)

- Product yield was lower than expected. In ideal weather and planting conditions, Butternut Squash would be expected to yield 12 – 20 tons / acres. The plasticulture positive control treatment sub-plot yield/acre (11.3 tons / acre) was closest to the anticipated lower yield threshold; all other treatment sub-plots were further below the low end yield threshold.
- Plant population was lowest in the no-till sub-plots, where the squash faced much weed pressure, and the cover crop experienced much deterioration during the squash growing period.
- Less than desired cover crop density resulted in slower crop emergency, more weed pressure, less soil moisture retention, and “dirtier” squash.
- Timing of herbicide applications and the boom-sprayer’s lack of overlap spraying compromised the effectiveness of the herbicide and likely resulted in higher weed pressure.
- Limited rain events may have provided effective natural irrigation to plants in the no-drip treatments; however, once rain run-off occurred, weeds appeared to have taken-up remaining available water and suppressed plant growth.
- Lower nitrogen content in soil may have served as a negative growth factor, since supplemental nitrogen often is applied during drip irrigation but was not used on the site due to research treatment design eliminating drip from several treatment sub-plots.
- Product quality was affected positively by presence of plasticulture and untilled cover crop.

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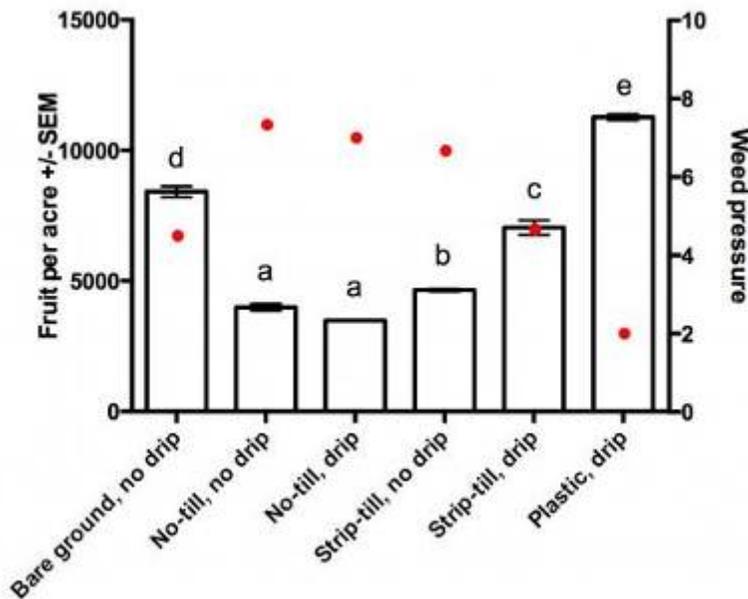
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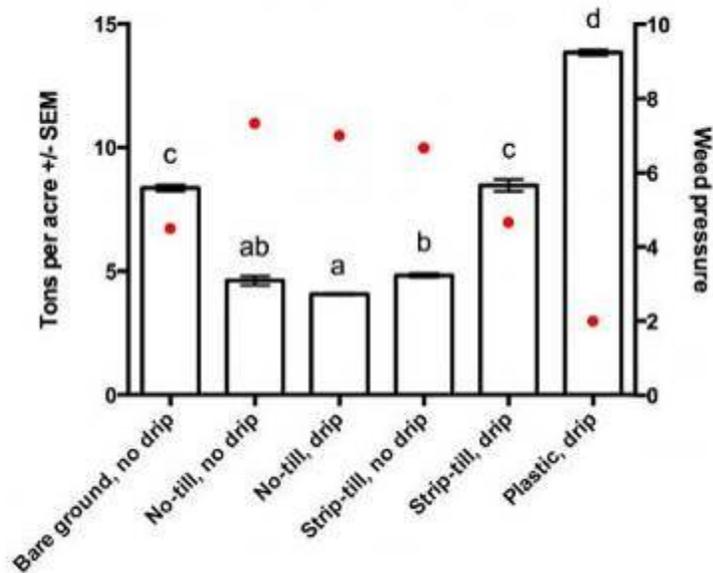
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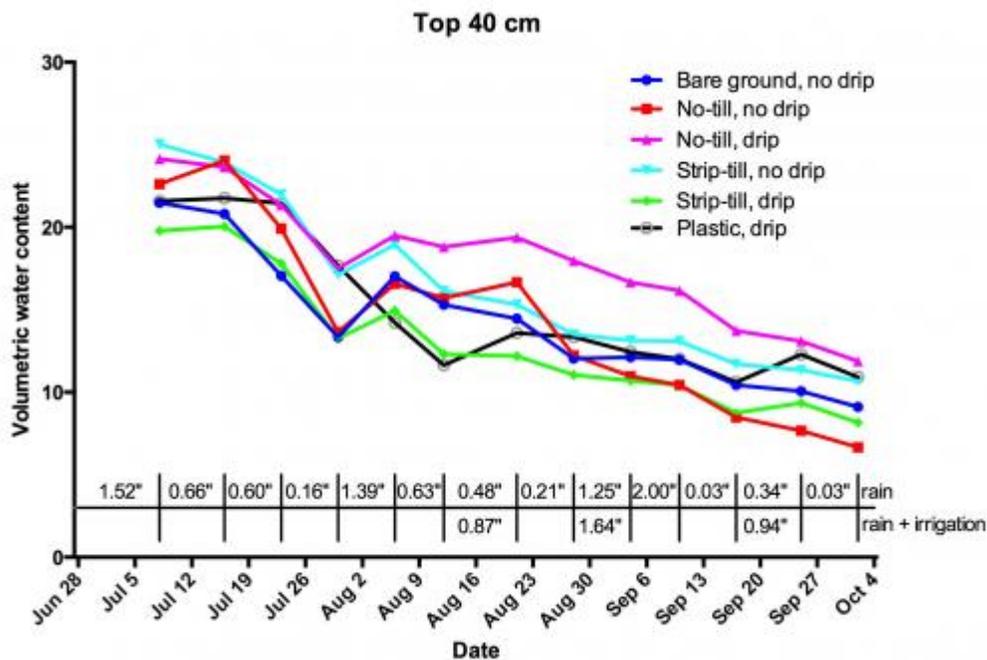
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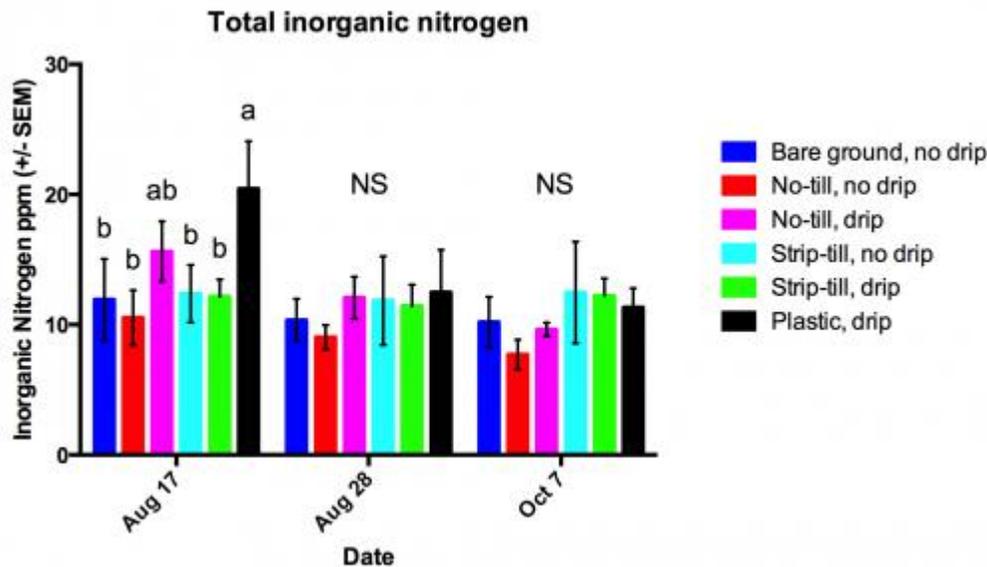
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## BENEFICIARIES

Through MSU-Extension's formal and informal outreach across Michigan and the nation, Specialty Crop growers were acquainted with the project via MSU-E's extensive list-serve, online webinars, traditional mail and email promotion of the Field Day, and the publication of the final report and posted webinar.

At the Great Lakes EXPO and its published proceedings, the project was communicated to fruit and vegetable growers across Michigan and to others in region.

Through formal and informal volunteer and group visits to FH Farm, unknown numbers of guests learned about and observed the project. In addition, as Ben Phillips and Mike Yancho talked among their professional and personal Specialty Crop colleagues, the project received much additional exposure.

Finally, at a very high level, Forgotten Harvest's short external communications about its programs, including FH Farm, included brief mentions of FH Farm's honor to host the MDARD – USDA funded Specialty Crop Block Grant-funded project, including its objectives and partnership with MSU-E.

### o How many benefited from the project?

- Field Day: 24 growers representing seven farms located in six counties.
- Quebec, Canada, cover crop bus tour: 18 people.
- Great Lakes EXPO: 108 people at conference; unknown website visits after conference.
- MSU-E "Cover Crop and Soil Health" webinar (January 28, 2016): 21 people during webinar; unknown additional viewers.
- MSU-E website to read final report: 214 page visits as of April 26; 12 Facebook "Likes / Shares."
- MSU-E final report also posted on: Purdue University "Purdue ePubs, Midwest Fruit and Vegetable Research Reports: Midwest Vegetable Trial Report for 2015": 50 downloads between February 10 to April 26, 2016.
- FH Farm volunteers: 250 individuals.
- FH Farm hosted workforce development students: four (under supervision and hands-on training with FH Farm and MSU).
- Informal guests to FH Farm and offsite discussions with Specialty Crop growers at MSU, at out-state farm and garden meetings, etc.: Unknown.

### o How did they benefit from the project?

MSU-E outreach generated questions from MSU-Extension Educators and from Conservation District experts, who sent questions such as:

- Why did you roll instead of flail mow?
- Why was the weed pressure so heavy?
- Would another cover crop work better?
- What nitrogen management technique might help improve yields with a rye mulch?
- Do you think pest pressure was better or worse with the rye mulch?

While the scale of the researched sustainable growing processes and equipment would vary depending upon a site, the processes and lessons learned in this project are applicable at any Specialty Crop growing sites from multi-acre commercial rural and urban growing operations to community gardens and home kitchen gardens.

## LESSONS LEARNED

The project was conducted on non-profit organization's Forgotten Harvest Farm, which grows fresh produce for distribution through FH's partner pantries – at no cost to the pantries. This research location provided a highly effective platform, because the project was not under the competitive market pressures of normal Specialty Crop growers yet enabled much qualitative and quantitative measurement and assessment for quality research.

Water run-off was qualitatively reviewed in a simulated tilt-table demonstration using soil samples from each sub-plot but was not quantitatively measured in the project.

### Recommendations:

- In 2016 application, FH Farm recalibrated the seed drill and used a more dense application of cereal rye.
- FH Farm now checks its boom sprayer performance thoroughly.
- Timing the herbicide aligned with the Specialty Crop planting time and using the “right product at the right time” are critical effectiveness factors.
- As noted above: Alternative methods to “inject” nitrogen are necessary when a Specialty Crop grower is not using irrigation as a vehicle for nitrogen injection into the growing site.
- “Plastic is pretty good.” Specialty Crop growers need to have the cover crop system “well dialed-in” to achieve desired outcomes.
- FH Farm is working on a fertilizer project” using Specialty Crops in the 2016 growing season to complement the tillage practices used in this Specialty Crop grant project completed during the 2015 growing season.

## CONTACT PERSON

*For questions about the project:*

Mike Yancho, Farm Manager, Forgotten Harvest  
[myancho@forgottenharvest.org](mailto:myancho@forgottenharvest.org)

Ben Phillips, Educator, MSU Extension  
[phill406@anr.msu.edu](mailto:phill406@anr.msu.edu)

*For questions about the grant and grant management:*

Anne Ginn, Senior Director of Public Policy, Forgotten Harvest  
[aginn@forgottenharvest.org](mailto:aginn@forgottenharvest.org)

## ADDITIONAL INFORMATION

The formal report and comprehensive webinar produced to provide useful, science-based, detailed information on the project's approach, equipment, processes, measurements, outcomes, and recommendations were listed on page 3 of this “Final Performance Report.”

Attached is a copy of the formal report published by Michigan State University Extension.



2015 Butternut squash cereal rye cover crop trial

Weeds, nitrogen and equipment calibration are factors to consider when cover cropping and using conservation tillage in a butternut squash system.

Posted on **February 15, 2016** by [Ben Phillips](#), Michigan State University Extension



Overview of the trial plots.

*This article was originally published in the Vine Crop Session Proceedings of the Great Lakes EXPO, Dec. 9, 2015. You can also [watch a webinar](#) of the following findings being presented starting at 28:50.*

A Specialty Crop Block Grant from the [Michigan Department of Agriculture and Rural Development](#) funded a one-year cover cropping trial in butternut squash. The trial was planted at the [Forgotten Harvest Ore Creek Farm \(9153 Major Rd, Fenton, MI 438430\)](#). The objective was to determine how water and yields were conserved by six cropping systems: bare ground

disked rye without irrigation, no-tilled rye without irrigation, no-tilled rye with irrigation, strip-tilled rye without irrigation, strip-tilled rye with irrigation and plastic beds with irrigation. The bare ground and plastic treatments served as negative and positive controls, respectively, as the grower-cooperator was most familiar with these growing methods. All irrigation was supplied through pressure compensating drip lines at a rate of 0.25 global precipitation measurement (gpm) per 100 feet.

On Oct. 15, 2014, cereal rye was drilled into the two-acre experimental area at a rate of about 73 pounds per acre. Three replicated plots (150 feet x 150 feet) of all six subplots (150 feet x 25 feet) were measured on Nov. 26. A 12-foot drive lane separated each replicated plot, and a 12-foot drive lane for a sprayer bisected all plots into two 69-foot sections. The soil type was a Miami loam with a 6-11 percent grade. Pre-plant fertilizer was broadcast at a rate of 80 pounds nitrogen (N), 20 pounds phosphorus (P) and 105 pounds potassium (K).

Between May 20 and June 25, 2015, each subplot treatment was created. The entire area was sprayed with glyphosate (1 quart per acre) before all of the rye was rolled perpendicular to the direction it was planted with a roller-crimper (I & J Manufacturing, 5302 Amish Rd, Gap, PA 17527). A custom-made, one-row strip-tiller was borrowed for the strip-tilled subplots, bare ground subplots were created with two passes of a chisel plow and 10 feet disc implement, and a one-row plastic and drip tape layer was used to create beds in the plastic subplots (watch a video of the custom-made, one-row strip tiller in action). Dual Magnum was used as a pre-emergent herbicide (1.33 pints per acre), and a commercial push-style deck mower was rented to cut back between-row weeds on Aug. 5. Drip tape was later added to one of the two no-till and strip-till subplots in replicate plots.

On July 1 and 2, all butternut squash (Butternut cultivar) were hand-planted with tube seeders (Stand 'N Plant, 95 Rose Rd, Saltsburg, PA 15681). Plastic subplots contained four bedded rows 6.25 feet apart seeded with two staggered rows with an in row spacing of 39 inches (379 plants per plastic subplot). All other treatment subplots contained five flat rows 5 feet apart seeded with in-row spacing of 24 inches (375 plants per subplot). Seeds were coated in the Farmore F1400 chemical treatment consisting of thiamethoxam, mefenoxam, fludioxonil and azoxystrobin. The only other pesticide applied was Kocide 3000 (copper hydroxide) on Aug. 18 at a rate of 1.25 pounds per acre.

On June 25, all moisture-monitoring tubes were installed to a depth of 15.75 inches, and weekly moisture monitoring with the Sentek Diviner 2000 (Sentek Sensor Technologies, 77 Magill Road, Stepney SA 5069, Australia) occurred between July 8 and Oct. 2. By Aug. 11, all irrigation tubing was installed in irrigated plots. Rainfall accumulation was logged by the Runyan Lake Road weather station 3.6 miles northeast of the plot.

On Oct. 8 (day 100), harvest transects were measured 20 feet on either side of the center drive lane. Weed pressure was assessed in each treatment subplot on a 1-9 scale (1 = no weeds visible and 9 = no crop plants visible), the number of plants were counted and fruit were tallied as "good and clean," "good and dirty" and "cull." All good fruit were combined and weighed.

Pollination was provided by four bumble bee quads from Koppert Biological Supply (1502 Old US-23, Howell, MI 48843), and three nearby honey bee hives.

## Moisture monitoring

The Sentek Diviner 2000 measures moisture within 10 centimeters surrounding the monitoring tube, and takes samples every 10 centimeters of depth. Though the Sentek moisture units are not in cubic inches, we were able to generate relative comparisons of "volumetric moisture content" at different depths between treatments. For analysis, moisture readings for all depths were integrated within each treatment subplot, creating one average volumetric moisture content reading for each date.

## What establishment, yield and quality performance did we expect?

- Our positive control, plastic with drip irrigation, would establish faster and produce the cleanest fruit.
- No-till yields would be the slowest to establish yet cleanest because of the mat of cereal rye blocking sunlight and heat from the seedbed.
- Similar yields between plastic subplots and conservation tillage subplots with equal plant populations.
- Similar yields between strip-till plots and bare ground plots because of the tilled soil more exposed to the thermal energy of the sun.
- Higher yields in irrigated subplots.

## What moisture dynamics did we expect?

- No-till and plastic subplots would maintain higher soil moisture levels within the top 40 centimeters of soil over time.
- Irrigated subplots would maintain higher soil moisture levels within the top 40 centimeters of soil over time.

## Results

### Establishment

Soil hardness, row markings and walkability were key factors in ranking the ease of hand seeding. Plastic beds required an additional step of running a dibbler to place holes in the plastic before seeding. Once holes were established, it was problematic to walk on the plastic beds to seed. No-till and bare ground subplots were hard to maintain straight rows and required an additional step of marking with string. No-till subplots had noticeably harder soil that challenged the seeding tools. Rankings of the ease to plant are in Table 1.

### Yield

Weed pressure (broadleaf complex of lambs quarters, velvetleaf, nightshade, pigweed, and jimson weed) was high across the research area, but it is difficult to determine whether weeds were the cause or effect of the number of squash plants per acre (Table 1). Weed pressure was highest in no-till treatments, which took at least five full days longer to emerge than plastic

and bare ground subplots. Irrigated strip-tilled subplots had lower weed pressure than unirrigated subplots, and had similar pressure to bare ground subplots. Weed pressure in plastic subplots was the lowest. Bare ground plots and plastic plots maintained the highest number of plants per acre, and were the first to emerge.

The hard surface of the no-till treatments made hand seeding more difficult and could have caused more skips and gaps in emergence and resulted in fewer plants per acre and weed proliferation. However, three factors may have allowed heavier broadleaf weed pressure overall:

1. The seed drill was not calibrated, and actually seeded two-thirds of the rate required for the recommended population of 110 pounds per acre of rye.
2. The sprayer booms appeared to deliver inconsistent active ingredients to the far ends of the booms.
3. We forewent the typical addition of Command 3ME to the pre-emergent herbicide tank-mix, which has good efficacy on some of the prevalent broadleaf weeds in the plots, and delayed out pre-emergent application of Dual by a week after a second post-emergent burndown with Roundup. Therefore, weed competition was a real effect on crop stand.

The number of fruit and tonnage produced in each treatment was also varied (Figure 1). No-till plots had the least amount of fruit, and there was no significant difference between irrigated and unirrigated no-till treatments. The irrigated strip-till treatment produced significantly more fruit per plant than the unirrigated treatment, and both strip-till treatments produced more fruit than no-till treatments. The bare ground treatment produced significantly more fruit per acre than any conservation tillage treatment, and the plastic treatment significantly out-produced all other treatments. The fruit from the irrigated strip-till treatments were heavier than all other treatments. As a result, the bare ground treatment did not produce a significantly higher tonnage of fruit than the irrigated strip-tilled treatment when weight was considered.

In general, yields were below the normal 12-22 tons per acre range to be expected in a winter squash crop in most subplots (Table 1). Plasticulture subplots attained 13 tons per acre on average, which was still a relatively low yield. We suspect that nitrogen availability played a role in low yields overall. After 45 days, all plots had less than 25 parts per million (ppm) of inorganic nitrogen available to the root zone, and could have benefitted from a split N application. However, plasticulture plots held on to the most nitrogen for longer. We suspect the plastic increased N mineralization by warming the soil, and reduced leaching from rain.

### Quality

Despite lower yields, a higher percentage of fruit harvested from no-till subplots were free of dirt (Table 1). Plastic rows also had cleaner fruit. Bare ground subplots had the second lowest percentage of clean fruit. Interestingly, the treatment with the lowest percentage of clean fruit was the unirrigated strip-till subplots. This could have been a result of poor rye stand and bare soil in strip-tilled plots.

### Moisture dynamics

Treatment	Ease of seeding <sup>1</sup>	Weed pressure <sup>2</sup>	% Clean fruit	Fruit/plant	Plants/acre	Fruit/acre	Tons/acre
Bare ground, no drip	3	4.50	22.41	2.21	3775.25	8421.72	8.37
No-till, no drip	4	7.33	30.91	1.14	3412.25	3993.06	4.62
No-till, drip	4	7.00	35.42	1.30	2758.84	3484.85	4.07
Strip-till, no drip	1	6.67	12.50	1.30	3702.65	4646.46	4.84
Strip-till, drip	1	4.67	27.84	1.96	3630.05	7042.30	8.47
Plastic, drip	2	2.00	30.41	2.66	4239.90	11267.68	13.84

Plastic subplots contained four bedded rows 6.25 ft apart seeded in two staggered rows with an in row spacing of 39 inches (379 plants per plastic subplot). All other treatment subplots contained five flat rows 5 feet apart seeded with in row spacing of 24 inches (375 plants per subplot). All subplots were harvested at 100 days after planting. <sup>1</sup>Ease of planting was ranked; 1=easiest, and 4=hardest. <sup>2</sup>Weed pressure was assessed on a 1-9 scale in each subplot (1 = no weeds visible, and 9 = no crop plants visible).

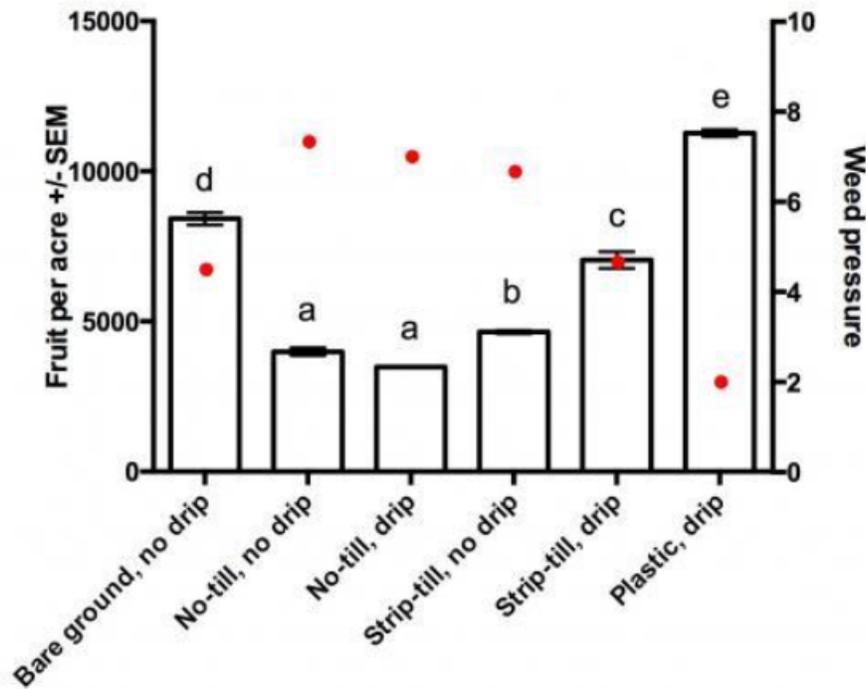


Figure 1. Fruit per acre (left axis; bars), and weed pressure (right axis; red dots) measured in six cover crop, tillage, and irrigation treatments used to grow butternut squash at the Forgotten Harvest Ore Creek Farm, Fenton, MI. Plastic subplots contained four bedded rows 6.25 ft apart seeded in two staggered rows with an in row spacing of 39 inches (379 plants per plastic subplot). All other treatment subplots contained five flat rows 5 ft apart seeded with in row spacing of 24 inches (375 plants per subplot). All subplots were harvested at 100 days after planting. Bars with the same letters do not differ significantly at  $P=0.05$  based on Tukey's test.

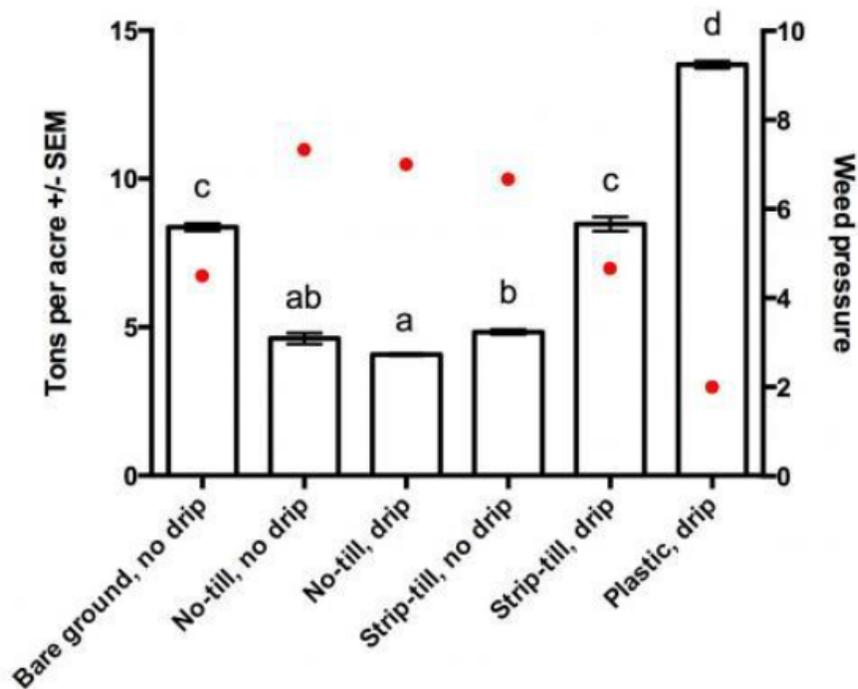


Figure 2. Tons per acre (left axis; bars), and weed pressure (right axis; red dots) measured in six cover crop, tillage, and irrigation treatments used to grow butternut squash at the Forgotten Harvest Ore Creek Farm, Fenton, MI. Plastic subplots contained four bedded rows 6.25 ft apart seeded in two staggered rows with an in row spacing of 39 inches (379 plants per plastic subplot). All other treatment subplots contained five flat rows 5 ft apart seeded with in row spacing of 24 inches (375 plants per subplot). All subplots were harvested at 100 days after planting. Bars with the same letters do not differ significantly at  $P=0.05$  based on Tukey's test.

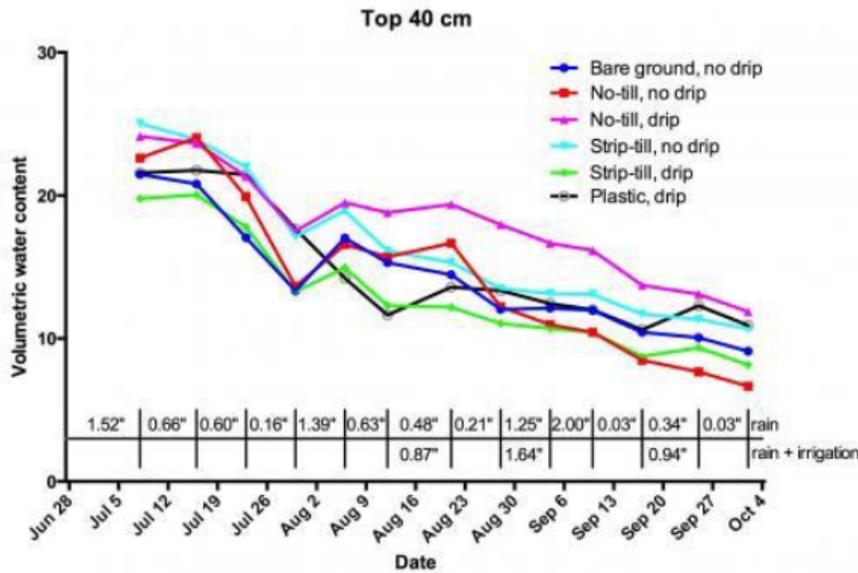


Figure 3. Volumetric moisture content in the top 40 cm of soil over time measured in six cover crop, tillage, and irrigation treatments used to grow butternut squash at the Forgotten Harvest Ore Creek Farm, Fenton, MI. Rainfall and irrigation accumulation in inches is shown for each week between samples. Plastic subplots contained four bedded rows 6.25 ft apart seeded in two staggered rows with an in row spacing of 39 inches (379 plants per plastic subplot). All other treatment subplots contained five flat rows 5 ft apart seeded with in row spacing of 24 inches (375 plants per subplot). All subplots were harvested at 100 days after planting.

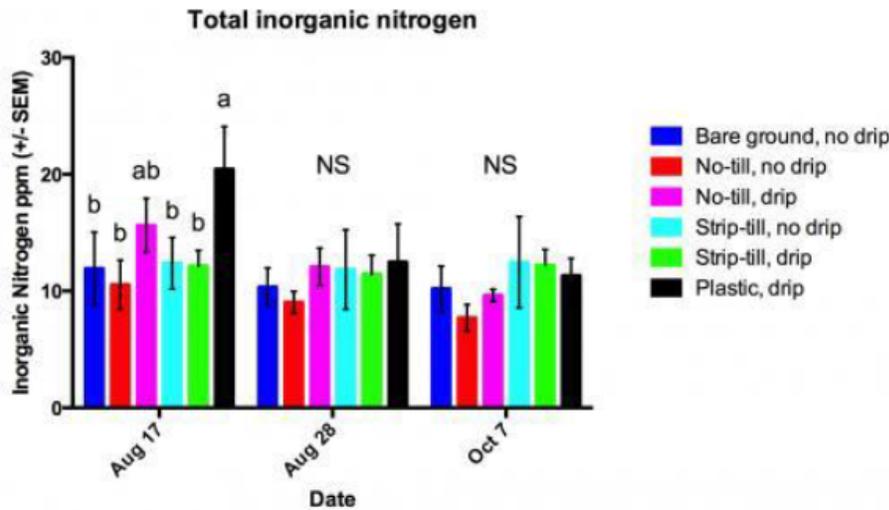


Figure 4. Parts per million of inorganic nitrogen measured in six cover crop, tillage, and irrigation treatments used to grow butternut squash at the Forgotten Harvest Ore Creek Farm, Fenton, MI. Rainfall and irrigation accumulation in inches is shown for each week between samples. Plastic subplots contained four bedded rows 6.25 ft apart seeded in two staggered rows with an in row

spacing of 39 inches (379 plants per plastic subplot). All other treatment subplots contained five flat rows 5 ft apart seeded with in row spacing of 24 inches (375 plants per subplot). All subplots were harvested at 100 days after planting. Bars with the same letters, or NS, do not differ significantly.

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## **PROJECT TITLE: MICHIGAN BEAN COMMISSION – Assessment and Optimization of Pre-Harvest Strategies Suitable for Direct-Cut Dry Beans with the State of Michigan - FINAL**

### **PARTNER ORGANIZATION**

Michigan Bean Commission

### **PROJECT SUMMARY**

This project was designed to address strategies used to prepare dry beans and weeds for harvest. Critical issues associated with the appropriate and optimized approaches to assure necessary plant and pod “dry-down” prior to harvest of Michigan dry beans were investigated. Chemical desiccation of both dry bean varieties and weeds species were researched. Genetic traits offering fast dry down in different dry bean classes were examined. White mold disease controls using fungicides and genetic resistance were evaluated. Trials to evaluate canning quality were conducted to assure new dry bean varieties would perform to industry standards. Dry bean navy varieties Alpena, Vigilant and some experimental lines were identified as having fast dry down traits when compared to other cultivars. Sharpen plus Gramoxone desiccants always provided the quickest speed of dry down activity at three days after treatment (DAT). Sharpen, when applied at the 2 fl oz/A to Zorro reduced yield. Gramoxone or combinations with Gramoxone provided the greatest desiccation of common lambsquarters weed. Endura, Omega and Propulse have reduced levels of white mold infection in dry beans. There were 469 dry bean growers who attended one of the nine dry bean field tours during the 2015 growing season and 632 growers attended winter meetings.

### **PROJECT PURPOSE**

Project objectives included: 1) Assessment of the impact and adaptability of dry bean cultivars and breeding lines for rapid and uniform “dry down” characteristics suitable for production regions within Michigan; 2) Assessment of late-season weed desiccation and pre-harvest bean plant desiccant application strategies; and 3) Implementation of grower educational activities to communicate the optimized approach that provides maximum bean yield and quality with minimal economic inputs. Work was conducted to assure complete pre-harvest recommendations and guidelines suitable for production of quality dry beans. Previous Specialty Crop Block Grants have been successful in identifying cultivars, row widths, planting populations, and weed management programs. Further, research for white mold tolerance in all dry bean classes and color retention in black bean varieties has been beneficial to Michigan growers and processors. Impact of the SCBG program has increased adoption of narrow row technology by growers from 40% of the planted Michigan acres to a current estimate of 85%. However, it is currently essential to focus on pre-harvest strategies to assure adequate late-season weed and bean plant tissue “dry down” (leaves, stems and pods) prior to harvest without sacrificing yield (premature plant senescence) or delayed response during late

season applications (particularly during cold, wet, overcast weather conditions). Dry bean plants must maintain vigorous growth until full maturity to enhance yield; however, to assure optimum harvest it is essential that plants rapidly and uniformly “dry down,” especially under severe weather conditions. Failure to achieve thorough “dry down” will result in decreased harvest opportunities, decreased yield and increased levels of damaged beans. Optimization of cultivars and direct spray applications are needed to ensure vitality in this important specialty crop.

## PROJECT ACTIVITIES

The Production Research Advisory Board (PRAB) compiled, statistically analyzed and reported on small plot and large strip plot trials previously harvested from September 17 to October 19. All the dry bean varieties in these trials were canned for quality appearance and reported to the dry bean industry. These yield trials were included in the Dry Bean Research Report and posted on websites [www.agbioresearch.msu.edu/saginawvalley/index.html](http://www.agbioresearch.msu.edu/saginawvalley/index.html) and [www.michiganbean.org](http://www.michiganbean.org) for growers to access. The Dry Bean Research Reports were given out to growers during the winter and spring grower meetings. Reports were also given out to dry bean elevators and extension offices. The white mold trial yields were also reported on websites and in the Dry Bean Research Report.

Dr. Jim Kelly reported yield and other agronomic data from two locations, the Saginaw Valley Research and Extension Center (SVREC), near Richville and the Montcalm Research Center in Central Montcalm County. The Montcalm County site also included a white mold screening trial to measure genetic tolerance to white mold. The major problem at Montcalm was the presence of severe root rots, mainly *Fusarium* that was accentuated by the cooler soil conditions and wetness early in the season. Dr. Kelly published all his dry bean trials on the SVREV website as the 2015 SVREC Report. Dr. Kelly used a desirability score for dry down (higher number means better dry down). Dr. Christy Sprague reported yields and desiccant data on three classes of beans, Zorro black from MSU, Merlin navy from Provita and Eldorado pinto from MSU at the SVREC Research Farm. Sharpen + Gramoxone always provided the quickest speed of activity 3 DAT. By 7 DAT, most treatments provided greater than 90% desiccation, with the exception of Roundup and Aim; and Gramoxone alone in 2 of 3 varieties. By 14 DAT, Aim was the only treatment for all three varieties that did not reach 90% desiccation. Yield was only lower in one instance, when Sharpen was applied at 2 fl oz/A to Zorro (12% reduction). Overall, many of the treatments provided good bean desiccation and when applied at 80% pods yellow did not reduce yield. Dr. Sprague also reported yields and desiccant data on Four pre-harvest herbicides registered for use in dry bean: 1) Gramoxone Inteon (paraquat), 2) glyphosate (several formulations), 3) Valor (flumioxazin), and 4) Sharpen (saflufenacil), each of these products and combinations of these products. Gramoxone or combinations with Gramoxone provided the greatest desiccation of common lambsquarters (77% or greater) 7 DAT. These treatments also provided good desiccation of navy beans 7 DAT. By 14 DAT, Gramoxone, Roundup (glyphosate) or combinations with these herbicides were needed for common lambsquarters desiccation. Navy bean yield was lowest when Sharpen was applied at 2 fl oz/A. Bean desiccation was similar for 1 and 2 fl oz/A of Sharpen, but in two trials this year the higher rate of Sharpen is where we have observed lower yields. While we have several years data comparing pre-harvest treatments, our recommendation if a grower decides to use Sharpen is to use 1 fl oz/A rate, this also reduces the rotation restriction for following crops, such as sugar beet. In many cases there were no detriments for applying tank-mixtures of the preharvest herbicides. However, Gramoxone or Roundup was in many cases needed to help with weed desiccation. Dr. Karen Cichy conducted canning tests on the small and large dry bean trials in this project. Canning research results were posted online and emailed to members of the Michigan and U.S. Dry Bean Industry. Dr. Cichy conducted a small survey at our Research Priority Meeting for growers to respond to all production practices in growing dry beans.

Winter meetings were held in December-March with 632 dry bean growers attending. The December meetings were the Dry Bean Outlook meeting and three regional meetings in the dry bean areas of Michigan and the January meeting was the Dry Bean and Sugar Beet Symposium.

## GOALS AND OUTCOMES ACHIEVED

1 Cultivars have been identified for their dry down capabilities. Commercial Zorro and Zenith black beans dry down fully at maturity. Zenith has been released and commercial seed will be available to Michigan growers in 2016. New Navy varieties, Alpena and Vigilant will dry down better than Medalist and Merlin navy. However, Medalist and Merlin have a higher yield potential with their green stems. Green stemmed cultivars should be sprayed with a desiccant. Other newer black lines B15408 and B15430 and navy lines N14218 and N15341 have shown excellent dry down. Viper small red bean will dry down better than the Merlot variety.

2 The standard desiccant sprays have shown very good dry down of bean plants when used according to the product label. Growers will have to follow labels to avoid applying desiccants too early before maturity. The use of Gramoxone is very helpful in drying down lambsquarter weeds in dry beans.

3 White mold disease control strategies of varietal tolerance, biological and chemical controls are critical to reduce white mold infection in dry beans. Michigan growers are aware of the three best fungicides and timing of sprays.

4 Educational meetings and private communication with dry bean growers were conducted throughout this project. Growers received information from the Michigan Bean Commission, dry bean elevators, chemical salespeople and Extension Educators.

Below in additional information are the survey results of 20 growers on which desiccant they are using. There were 17 growers out of 20 that used Sharpen herbicide or a combination of Sharpen and another product. Dry bean growers are aware of the superior performance of Sharpen herbicide as a desiccant.

We feel we have increased the effective use of pre-harvest preparation strategies among Michigan dry bean growers. We have engaged Michigan's primary growers (>33%) who account for the majority of dry bean acreage (>80%) to adopt "pre-harvest best practices" for enhanced direct-cut harvesting.

## BENEFICIARIES

This project has benefited the 1200 Michigan dry bean growers, the dry bean elevators in Michigan and the dry bean canners across the U.S. who are producing, canning and selling a superior canned and packaged beans to the U.S. consumers. We believe 800 of these 1200 growers have read a report, website or newsletter or listened to radio spots, or have attended a dry bean meeting where dry bean desiccation was discussed. Many growers have done all three of the above educational activities.

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	December 2014 January 2015	173
Dry Bean Outlook Meet.	December 17, 2014	184
West MI Bean Meeting	December 18, 2014	32

Canning Evaluation-MSU	January 12, 2015	47
State Dry Bean Day	January 20, 2015	174
Planning Meeting	March 11, 2015	24
MSU Ext Bean Webinar	March 16, 2015	43
Organic Dry Bean Meet.	April 30, 2015	61
Bean and Beet Field Day-SVREC	August 26, 2015	201
County Dry Bean Field Tours 8	August, 2015	268
Dry Bean Outlook Meet.	December 17, 2015	181
Region MI Bean Meeting	December 16-18, 2015	172
Canning Evaluation-MSU	January 12, 2016	47
State Dry Bean Day	January 19, 2016	198
UP Dry Bean Webinar	February 19, 2016	8
Planning Meeting	March 9, 2016	26

### LESSONS LEARNED

The excessive rain at the MRC two days after planting was very challenging in 2015. Reduced stands and root rot disease destroyed the ability to have uniform plant growth and white mold disease needed to conduct sound agronomic research. Some research could be moved like the white mold trials to eastern Huron County. Dr. Jim Kelly though, could not move nurseries that were already planted. He still harvested all the trials at MRC and noted the stand counts as a 1-5 rating with five being a 100% stand. We were able to evaluate dry bean cultivars for their root rot tolerance. During the early growing season at planting, we discovered a problem with the two ounce rate of Sharpen herbicide carrying over and stunting growth of succeeding 2014 sugar beet fields. When Dr. Christy Sprague was informed of this issue, she decided to add another objective to see if Sharpen carryover could become a recurring problem for sugar beet growers who followed dry beans in their rotation. Christy has sprayed some black beans on the SVREC and will do a plant back trial with sugar beets in 2016. She has used 1, 2, and 4 ounces of Sharpen and a standard Gramoxone treatment. Sugar beets will be evaluated in the spring of 2016 for possible plant injury due to Sharpen herbicide carryover. This trial will add to the overall knowledge of Sharpen use on dry beans. We do believe this injury on sugar beets was induced by the quick freeze up in the fall of 2014 allowing Sharpen to be viable to hurt the sugar beet seedlings.

### CONTACT PERSON

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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 26, 2015. Richville, MI.

Presentation on dry bean varieties, desiccants and diseases.

2) Alpena, Bay, Delta, Gratiot, Huron, Montcalm, Sanilac and Tuscola County Dry Bean Tours. August 10-31 and September 1-2, 2015. Showed 469 dry bean growers commercial and experimental dry bean cultivars planted in 20-inch rows.

3) SVREC Report, Michigan Dry Bean Variety Trials, Canning Trials and Research Report posted online at [www.agbioresearch.msu.edu/saginawvalley/index.html](http://www.agbioresearch.msu.edu/saginawvalley/index.html). The Research Report will also be posted on the Michigan Bean Commission website at [www.michiganbean.org](http://www.michiganbean.org).

4) PowerPoint Presentation on Small Plot Trials and White Mold Control at 2015/2016 Dry Bean Meetings.

5) State Dry Bean Day in January, 2016 Dissemination Dry Bean Research Reports. Dr. Jim Kelly and Dr. Christy Sprague presented research on dry bean variety dry down and desiccants for Michigan.

6) Michigan Dry Bean Commission Newsletter. Approximately 2400 circulation. 2015 and 2016 articles on dry bean production. Variety Trials, White Mold and Desiccation. Can be found at [www.michiganbean.org](http://www.michiganbean.org).

Grower Survey of Desiccant Used							
None	Roundup	Sharpen	Gramoxone	Aim	Adjuvant	Timing	Notes
		2oz				7 days	
			2 pt			7	
		1-2 OZ				5 to 7	
		1.25 OZ				8	
	22 OZ		2 PTS			10-14 days RU	
		1 OZ	1 PT			7-10 days	
		1 OZ	1 PT			7	
		1 OZ		2 OZ		7 to 10	
		1.5 OZ	2PT	2 OZ		7 to 10	
	22 OZ	1 OZ				7 to 14	
		2 OZ				7 to 14	
		2 OZ				7 to 10	
		1 OZ	22 OZ			5 to 7	
		1-2 OZ				6 to 10	
		1 OZ		1 OZ		7 to 10	
		1 OZ				7 to 10	
		1.5OZ				7 to 10	
		1 to 2oz				7 to 10	
		2oz				7 to 10	

**Harvest aid effects on three classes of dry beans**  
Christy Sprague and Gary Powell, Michigan State University

<b>Location:</b>	Richville (SVREC)	<b>Tillage:</b>	Conventional
<b>Planting Date:</b>	June 4, 2015	<b>Row width:</b>	30-inch
<b>Replicated:</b>	4 times	<b>Soil Type:</b>	Clay loam, 2.6% OM, pH 8.1
<b>Varieties:</b>	'Zorro' black beans	<b>Populations:</b>	106,000 seeds/A
	'Merlin' navy beans		106,000 seeds/A
	'El Dorado' pinto beans		100,000 seeds/A

Table 1. Effect of preharvest treatments on bean desiccation (%) 3 & 7 days after treatment (DAT) and yield.

Treatments	Zorro			Merlin			El Dorado		
	3 DAT	7 DAT	Yield <sup>a</sup>	3 DAT	7 DAT	Yield	3 DAT	7 DAT	Yield
Sharpen (1 fl oz) + MSO + AMS	90 bc <sup>b</sup>	97 ab	18.7 ab	76 b	93 a	23.8 a	78 b	98 a	17.6 a
Gramoxone (2 pt) + NIS	83 e	90 c	19.2 ab	82 a	86 b	24.9 a	80 b	80 b	19.8 a

Valor (1.5 oz) + MSO	85 de	93 bc	18.0 ab	70 c	91 ab	24.3 a	79 b	95 a	20.8 a
Roundup (22 fl oz) + AMS	66 g	84 d	20.6 a	62 d	76 c	24.8 a	60 d	74 c	20.7 a
Aim (2 fl oz) + MSO	72 f	79 e	18.9 ab	60 d	76 c	25.4 a	65 c	84 b	21.0 a
Sharpen (2 fl oz) + MSO + AMS	93 b	97 ab	17.2 b	71 bc	94 a	22.8 a	80 b	97 a	18.1 a
Sharpen (1 fl oz) + Roundup + MSO + AMS	87 cd	98 a	18.2 ab	69 c	94 a	24.3 a	82 b	98 a	20.2 a
Sharpen (1 fl oz) + Gramox.+ MSO + AMS	97 a	99 a	18.5 ab	86 a	91 ab	23.0 a	88 a	98 a	18.1 a
Untreated	52 h	65 f	19.6 ab	52 e	58 d	24.0 a	52 e	58 d	20.5 a

<sup>a</sup> Yield is in cwt/A obtained by direct harvest and adjusted to 18% moisture

<sup>b</sup> Means within a column with different letters are significantly different from each other

**Summary:** This study was conducted to evaluate the effects of different pre-harvest treatments on desiccation and yield of three different classes of dry beans that have different speeds of dry down, 'Zorro' black bean (uniform dry down), 'Merlin' navy bean (green stem), and 'El Dorado' pinto bean (green stem). All preharvest applications were made when 80% of the pods were yellow for each variety. There were some differences in the speed and effectiveness of the different treatments between varieties. However, there were some general trends that were similar among the three varieties. For example, Sharpen + Gramoxone always provided the quickest speed of activity 3 DAT. By 7 DAT, most treatments provided greater than 90% desiccation, with the exception of Roundup and Aim; and Gramoxone alone in two of three varieties. By 14 DAT, Aim was the only treatment for all three varieties that did not reach 90% desiccation. Yield was only lower in one instance, when Sharpen was applied at 2 fl oz/A to Zorro (12% reduction). Overall, many of the treatments provided good bean desiccation and when applied at 80% pods yellow did not reduce yield. This research was supported by the Michigan Dry Bean Commission through the Michigan Department of Agriculture Specialty Crops grant.

### Harvest aid effects on common lambsquarters and dry bean desiccation

Christy Sprague and Gary Powell, Michigan State University

<b>Location:</b> Richville (SVREC)	<b>Tillage:</b> Conventional
<b>Planting Date:</b> June 4, 2015	<b>Row width:</b> 30-inch
<b>Replicated:</b> 4 times	<b>Soil Type:</b> Clay loam, 2.6% OM, pH 8.1
<b>Varieties:</b> 'Merlin' navy beans	<b>Populations:</b> 106,000 seeds/A

Table 1. Effect of preharvest treatment on common lambsquarters and bean desiccation 7 and 14 days after treatment (DAT) and yield.

Treatments	C. lambsquarters		'Merlin' navy bean		
	7 DAT	14 DAT	7 DAT	14 DAT	Yield <sup>a</sup>
Sharpen (1 fl oz) + MSO + AMS	50 bc <sup>b</sup>	50 c	91 a	97 a	21.7 abc
Sharpen (2 fl oz) + MSO + AMS	60 b	76 b	91 a	98 a	15.9 e
Gramoxone (2 pt) + NIS	77 ab	90 a	84 a	84 bc	20.3 bcd
Valor (1.5 oz) + MSO	33 cd	70 b	85 a	94 ab	19.4 cde

Roundup (22 fl oz) + AMS	11 de	91 a	75 c	98 a	22.5 abc
Aim (2 fl oz) + MSO	20 d	24 d	76 bc	82 c	21.5 a-d
Sharpen (1 oz) +Roundup+ MSO +AMS	18 d	81 ab	84 a	99 a	17.9 de
Sharpen (1 oz) +Gramox.+ MSO + AMS	89 a	94 a	91 a	97 a	23.2 ab
Valor (1.5 oz) +Roundup+ MSO +AMS	43 c	92 a	91 a	98 a	20.1 bcd
Valor (1.5 oz) +Gramox.+ MSO + AMS	90 a	94 a	88 a	92 ab	19.6 cd
Aim (2 fl oz) +Roundup+ MSO +AMS	21 c	88 a	83 b	99 a	21.5 abc
Aim (2 fl oz) +Gramox.+ MSO + AMS	90 a	91 a	90 a	91 ab	21.2 a-d
Untreated	0 e	0 e	0 d	0 d	23.5 a

<sup>a</sup> Yield is in cwt/A obtained by direct harvest and adjusted to 18% moisture

<sup>b</sup> Means within a column with different letters are significantly different from each other

**Summary:** This study was conducted to evaluate the effects of pre-harvest herbicide treatments on common lambsquarters and bean desiccation and yield. All preharvest applications were made when 80% of the pods were yellow. Gramoxone or combinations with Gramoxone provided the greatest desiccation of common lambsquarters (77% or greater) 7 DAT. This treatment also provided good desiccation of navy beans 7 DAT. By 14 DAT, Gramoxone, Roundup (glyphosate) or combinations with these herbicides were needed for common lambsquarters desiccation. Navy bean yield was lowest when Sharpen was applied at 2 fl oz/A. Bean desiccation was similar for 1 and 2 fl oz/A of Sharpen, but in two trials this year the higher rate of Sharpen is where we have observed lower yields. While we have several years data comparing preharvest treatments, our recommendation if a grower decides to use Sharpen is to use 1 fl oz/A rate, this also reduces the rotation restriction for following crops, such as sugarbeet. In many cases there were no detriments for applying tank-mixtures of the pre-harvest herbicides. However, Gramoxone or Roundup were in many cases needed to help with weed desiccation. Please refer to the 2016 MSU Weed Control Guide (E-434) for recommendations for the different pre-harvest herbicide treatments available in dry bean. This research was supported by the Michigan Dry Bean Commission through the Michigan Department of Agriculture Specialty Crops grant.

**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, East Lansing MI 48824 [kellyj@msu.edu](mailto:kellyj@msu.edu)

**Cooperators:** Greg Varner, Production Research Advisory Board, [varnerbean@hotmail.com](mailto:varnerbean@hotmail.com) Karen Cichy, USDA Geneticist in PSM, [Karen.Cichy@ARS.USDA.GOV](mailto:Karen.Cichy@ARS.USDA.GOV); Jim Palmer, Manager Foundation Seed Stocks, MCIA, [palmerj@michcrop.com](mailto:palmerj@michcrop.com)

**Objectives:** Improve yield, architecture, disease resistance, stress tolerance and canning quality traits of the major commercial dry bean market classes important in Michigan.

**Activities, Accomplishments, Impacts:** The MSU dry bean breeding and genetics program conducted 12 yield trials in 2015 in ten market classes and participated in the growing and evaluation of the Cooperative Dry Bean, Midwest Regional Performance, National Drought and the National Sclerotinia Nurseries in Michigan and winter nursery in Puerto Rico. All yield trials at Frankenmuth were direct harvested. Large-seeded kidney and cranberry trials, at Montcalm were rod-pulled. The white mold trial was direct harvested. Temperatures were moderate for the 2015 season and only

exceeding 90F for a few days in July. Overall rainfall for the three-summer months at the Saginaw Valley Research and Extension Center (SVREC) was equivalent to the 30-year average of 8.5". A moderate dry period occurred from June 16-July 13 with only 0.7" of rainfall which reduced the overall plant size and resulted in lower overall yields. A high incidence of common bacterial blight resulted in the nurseries and allowed for selection of resistant lines in a range of seed types. Rainfall patterns at the Montcalm Research Farm (MRF) were more extreme with a total rainfall of over 5" within two days of planting. This resulted in major flooding in some areas, soil crusting and compaction in other areas which resulted in low germination. In addition soil temperatures remained low in this critical period and a high incidence of root rots diseases occurred which also reduced germination and stands. The Andean kidney and cranberry beans were the most affected by the stresses whereas the Mesoamerican small and medium seeded black, navy, pinto, GN, and red beans managed to tolerate the conditions and had near normal stands. Overall vigor of the kidney and cranberry beans was poor resulting in small plants that had low overall yields. Plots at MRF had supplemental irrigation that did contribute to the development of white mold. Incidence in the National Sclerotinia Initiative nursery was very low in the susceptible checks despite the overall lower temperatures and excess irrigation. The major problem at MRF was the presence of severe root rots mainly Fusarium that was accentuated by the cooler soil conditions early in the season. The unfavorable condition allowed for the selection of lines with tolerance to root rot and with resistance to common bacterial blight in the kidney bean nurseries. No statewide data received by Nov 25, 2015

**Progress in black bean breeding:** The new black bean variety Zenith performed well in 2015. Data from five nurseries: Zenith yielded 28.6 cwt compared to 22.4 cwt for Zorro – the 50 location average (2010-2015) was 28.4 for Zenith vs. 26.3 for Zorro. Zorro had maturity problems at SVREC hence the lower yields in 2015. Off-type white (navy) beans have appeared in MI seed production of Zenith in 2015. This matter is addressed in a separate letter to MCIA.

**Progress in navy bean breeding:** The new navy variety Alpena was the top navy variety at SVREC in 2015. Off-type later maturing plants were observed in foundation seed fields in Idaho but not observed in MI. The variation could be environmental but to avoid future problems, 120 single plant selections were made in breeder block in ID and these will be planted as plant rows for re-selection in 2016 to eliminate any late maturing variants that might exist in the variety.

**Progress in pinto bean breeding:** Eldorado pinto continues to dominate yield trials in Michigan and it significantly outyielded La Paz, in plots in 2015. It performed well under white mold pressure. Efforts to introduce the slow darkening gene in Eldorado through backcrossing are underway.

**Progress in Otebo bean breeding:** In the Otebo class the new upright line G12901 was released as the variety Samurai. Samurai continues to show high yield potential yielding 24.4 cwt compared to 24.7 cwt for Eldorado (test 5105). Approximately 19K pounds of breeder seed were produced in ID in 2015.

**Progress in small red/pink bean breeding:** Stem breakage problems were observed in Rosetta pink bean in production areas of North Dakota which sustained high winds early in the season. As a result growers suffered yield losses which will affect seed sales in the area in 2016. Rosetta is the only upright pink bean variety in the marketplace. In the small red class, new line R13752 is showing potential in yield, agronomic and seed traits. The line yielded 33.6 cwt compared to 27.5 cwt for Merlot over seven locations in MI and WA (2013-15). Seed size is similar to Merlot and larger than Viper. Seneca Foods in ID received seed of the new Gypsy Rose Flor de Mayo and Desert Song Flor de Junio Mexican varieties for canning quality evaluations in their commercial process.

**Progress in kidney bean breeding:** Stand problems were severe in kidney trials in Montcalm due to cool wet Fusarium infected soils and 5" rain following planting. As a result yields were low and very variable. A new LRK variety Rosie from NDSU showed best potential (30 cwt) with high levels of root rot resistance at Montcalm. In DRK class, the new Talon variety was similar to Red Hawk in yield (20 cwt). Dark red kidney line K11306 that showed potential in past years suffered severe stand problems and resulting low yields in 2015. In white kidney more attention is being given to other new high-yielding early-season white kidneys possessing bullet-shaped seed. The new yellow bean

Y11405 yielded above average and exhibited root rot resistance but lacks virus resistance. All future cranberry breeding will be conducted by USDA-ARS group at East Lansing.

**Matching Funds:** Royalty funds from current MSU varieties; MSU continues to provide field, greenhouse and lab facilities and equipment; Continue to collaborate with PRAB to conduct statewide testing of elite MSU breeding lines with funding from MDARD Block Grant and the MDARC Strategic Growth Initiative –SGI on bean powder; Funds from the National Sclerotinia Initiative for research on white mold; Legume Innovation Lab project for work on drought and USAID NIFA grant to work on root rot in large-seeded beans (focus of last two projects is in East Africa).

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2015 DRY BEAN CANNING EVALUATION-Canning Score is 1-5, 5=best

No.	VARIETY	CANNING SCORE
1	HMS MEDALIST Huron	4.2
2	MERLIN Huron	2.8
3	HYLAND T9905	2.7
4	INDI	3.4
5	ALPENA	3.5
6	GTS OB-1723-03	3.7
7	GTS OB-3970-03	2.6
8	VISTA	2.0
9	REXETER	1.7
10	NAUTICA	2.3
11	MIST	3.9

12	FATHOM	2.5
13	VIGILANT	3.9
14	PROVITA 06063	2.6
15	PROVITA 08070	3.5
16	PROVITA 08072	3.3
17	PROVITA 12039	3.0
19	PROVITA 12047	2.3
20	PROVITA 12051	3.4
21	PROVITA 12063	3.4
22	PROVITA 12064	2.7
23	PROVITA 13066	3.3
24	MSU N13131	2.4
25	MSU N13140	2.9
26	MSU N14202	1.8
27	MSU N14230	2.5
28	SEM NAVC6V1200	3.2
29	GTS OB-1587-09	3.8
30	GTS OB-1593-09	1.9
1	HMS MEDALIST Sanilac	3.9
2	MERLIN Sanilac	3.0
3	HYLAND T9905	2.4
4	INDI	2.3
5	ALPENA	2.9
6	GTS OB-1723-03	3.2
No.	VARIETY	Canning
7	GTS 0B-3970-03	2.6
8	VISTA	2.3
9	REXETER	1.8
10	NAUTICA	2.0
11	MIST	3.7
12	FATHOM	2.6
13	VIGILANT	3.6
14	PROVITA 06063	2.8
15	PROVITA 08070	3.5
16	PROVITA 08072	2.5
17	PROVITA 12039	2.8
19	PROVITA 12047	3.3
20	PROVITA 12051	3.9
21	PROVITA 12063	3.9

22	PROVITA 12064	2.7	
23	PROVITA 13066	2.8	
24	MSU N13131	1.8	
25	MSU N13140	3.3	
26	MSU N14202	1.8	
27	MSU N14230	2.5	
28	SEM NAVC6V1200	2.9	3.9
29	GTS OB-1587-09	4.0	Color
30	GTS OB-1593-09	2.5	Score
31	ZORRO Huron	4.0	3.9
32	SHANIA Huron	3.2	3.1
33	LORETO	3.2	3.3
34	ZENITH	4.5	4.9
35	ECLIPSE	2.9	2.8
36	BLACK VELVET	3.0	3.2
37	BLACK CAT	2.7	2.3
38	BL 11355	3.3	3.2
39	BL 12576	2.7	1.9
40	BL 13490	3.4	3.0
42	BL 13500	3.0	3.0
43	BL 14498	2.5	2.2
44	BL 14504	4.0	3.9
45	BL 14506	3.9	4.7
No.	VARIETY	Canning	Color
46	BL 14510	3.3	3.4
47	BL 14518	2.4	2.3
48	BL 14520	2.0	2.0
49	GTS-1103	3.6	4.2
50	ADM B8006282	2.7	2.5
51	ADM B0042613	2.2	2.5
52	ADM B0043647	2.7	2.4
53	SEM BKBC6V1312	3.1	1.8
54	MSU B12712	3.6	3.5
55	MSU B12724	3.6	4.3
56	MSU B14302	1.9	2.6
57	MSU B14311	2.5	1.9
31	ZORRO Sanilac	3.1	3.6
32	SHANIA Sanilac	1.9	3.1
33	LORETO	2.9	3.2

34	ZENITH	3.7	4.8
35	ECLIPSE	3.0	2.9
37	BLACK CAT	2.4	3.0
38	BL 11355	3.7	3.5
39	BL 12576	2.5	2.3
40	BL 13490	3.4	3.6
42	BL 13500	2.8	3.0
43	BL 14498	2.8	2.4
44	BL 14504	4.0	4.2
45	BL 14506	3.8	4.5
46	BL 14510	3.5	3.5
47	BL 14518	2.4	3.1
48	BL 14520	2.6	2.1
49	GTS-1103	3.4	4.1
50	ADM B8006282	2.7	2.7
51	ADM B0042613	2.7	2.8
52	ADM B0043647	2.3	2.1
53	SEM BKBC6V1312	2.8	1.9
54	MSU B12712	3.4	3.6
55	MSU B12724	3.2	4.6
56	MSU B14302	2.2	2.6
57	MSU B14311	2.5	2.1
No.	VARIETY	Canning	Color
58	T-39	2.5	2.4
	ND 206	1.8	2.3
31	ZORRO Voelker	3.0	3.6
32	SHANIA	2.2	3.5
33	LORETO	2.5	3.2
34	ZENITH	4.0	4.8
35	ECLIPSE	3.4	3.2
37	BLACK CAT	2.8	2.5
31	ZORRO Klink	3.2	3.0
32	SHANIA	2.6	3.6
33	LORETO	2.3	3.4
34	ZENITH	4.1	4.7
35	ECLIPSE	3.5	3.3
37	BLACK CAT	3.0	2.7
59	ELDORADO Gratiot	2.5	
60	LA PAZ	2.9	

61	LARIAT	2.1
62	MSU P14811	1.6
63	MSU P14815	2.5
64	SEM PINDJ091012	1.4
65	SEM PINC6V1314	2.9
66	POWDERHORN Huron	3.4
67	MSU G13444	3.6
68	MSU G13479	3.6
69	MSU G14506	2.6
73	MERLOT Huron	4.0
74	VIPER SR 09303	3.0
75	RUBY SR 09304	3.9
76	SR 11511	2.2
77	MSU R12844	4.3
78	MSU R12845	4.3
79	MSU R13752	2.3
80	ROSETTA	2.7
86	CALIF ELRK Montcalm	2.0
87	PINK PANTHER	3.1
88	CLOUSEAU	3.0
89	INFERNO	1.8
No.	VARIETY	Canning
90	MSU K11709	3.1
91	ROSIE ND061106	2.0
92	BIG RED (09351)	2.8
93	LRK 09360	1.3
94	LRK 09363	2.4
95	LRK 09378	1.5
18	LRK 06269	2.3
41	LRK 09394	2.6
86	CALIF ELRK Gratiot	3.8
87	PINK PANTHER	3.2
88	CLOUSEAU	3.2
89	INFERNO	1.9
90	MSU K11709	2.8
91	ROSIE ND061106	2.1
92	BIG RED (09351)	2.8
93	LRK 09360	2.0
94	LRK 09363	3.7

95	LRK 09378	2.4
18	LRK 06269	2.7
41	LRK 09394	3.1
96	RED HAWK Montcalm	3.5
97	MONTCALM	3.6
98	RED ROVER	2.3
99	DYNASTY	1.6
100	MSU K11306	2.4
101	MSU K14104	3.1
102	GTS 104	1.9
103	TALON ND061210	2.7
104	CHAPARRAL 07323	1.6
105	DRK 09424	2.1
106	DRK 09429	2.6
107	DRK 09430	2.7
108	DRK 09431	2.1
96	RED HAWK Gratiot	3.7
97	MONTCALM	3.3
98	RED ROVER	3.9
99	DYNASTY	1.5
No.	VARIETY	Canning
100	MSU K11306	2.9
101	MSU K14104	3.6
102	GTS 104	1.9
103	TALON ND061210	2.6
104	CHAPARRAL 07323	1.8
105	DRK 09424	2.4
106	DRK 09429	3.2
107	DRK 09430	3.1
108	DRK 09431	1.9
109	BELUGA Montcalm	2.4
110	SNOWDON	3.3
111	YETI	2.3
112	MSU K12803	4.0
113	MSU K13908	3.5
114	MSU K14807	2.8
115	MSU K14814	2.2
109	BELUGA Gratiot	2.3

110	SNOWDON	2.6
111	YETI	2.3
112	MSU K12803	2.8
113	MSU K13908	2.9
114	MSU K14807	3.2
115	MSU K14814	3.1

**PROJECT TITLE: MICHIGAN GRAPE AND WINE INDUSTRY COUNCIL - Michigan Sustainable Wine Grape Program – Feasibility Study MSWP - FINAL**

**PARTNER ORGANIZATION**

The Michigan Grape and Wine Industry Council

**PROJECT SUMMARY**

The Michigan Grape and Wine Industry Council coordinated a research project to explore the feasibility of developing and implementing a sustainable winery and vineyard program for Michigan’s wine industry. The Michigan Sustainable Wine Program (MSWP) will support an industry-led vision to increase the competitiveness of Michigan wine grapes in a global marketplace by differentiating wine produced from Michigan grapes wines from other Midwest states. It will meet the demand for sustainably produced local products from consumers and retailers, increase production efficiency, and provide the industry with the tools and resources to continue to grow. It will build social equity of the industry as a whole, and reduce the impact on Michigan’s natural resources. A report on this project is posted at <http://5lakesenergy.com/mi-sustainable-wines/> . The report outlines why and how Michigan’s wine industry can design and implement the Michigan Sustainable Wine Program (MWSP). The recommendations include a guide for developing/implementing different stages of the program, and the costs and resources to move from design through implementation. Information on how Michigan’s wine grape industry can finance, design, manage, structure and implement the MSWP are important components of the report. An infographic presenting key findings and outcomes of the project was developed.

**PROJECT PURPOSE**

This project meets the stated objectives of the Specialty Crop Block Grant Program by addressing issues related to Marketing, Plant Health and Industry Development, to improve the competitiveness of a specialty crop in Michigan. The project has not been submitted for funding to any other state or federal grant program, nor to Project GREEN.

The purpose of this project is to provide Michigan’s wine grape industry with a detailed guide for the design, development, and implementation of a sustainability program for Michigan wineries and vineyards. The report will address an opportunity facing the Michigan wine industry to increase its competitiveness as a recognized sustainable wine producing region.

The feasibility study completed under this grant project includes a set of recommendations on how: to fund and manage the MSWP, to create a project development timeline, to educate Michigan’s industry on sustainable practices, to engage the industry, technical advisors, and associated organizations in the creation of self- assessment workbooks or checklists, to establish priority issue areas and best

practices, to create a process/path for certification, and finally, to implement the entirety of the program over the next few years.

The MGWIC Research Committee has indicated a priority ranking for sustainability, and production and process efficiency development in Michigan.

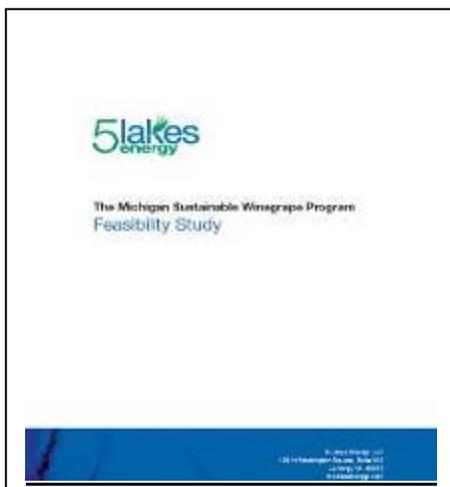
## PROJECT ACTIVITIES



- **Industry Survey:** 5 Lakes Energy (5LE) and the steering committee wrote an online survey hosted through Survey Monkey to assess the wine industry's interest in developing a sustainability program, the availability of industry resources, and the current level of awareness regarding the existing wine industry sustainability program. The survey was posted online at 5Lakesenergy.com and Michiganwines.com from December 2014 until March 2015. The online survey was distributed through the MGWIC newsletter, direct email from 5LE, regional wine industry association, and social media. Paper copies of the survey were handed out at the Northwest Orchard and Vineyard Show, the Southwest Horticulture Days, the Michigan Grape and Wine Conference, and at industry roundtable sessions.

Survey results are summarized in the Feasibility Study Report posted at <http://5lakesenergy.com/mi-sustainable-wines/> and linked from the Council's website <http://www.michiganwines.com/research>. Detailed information on the survey results is available upon request from the Council office.

- **Comparative Analysis:** The comparative analysis was conducted in two parts. First, members of the steering committee traveled to California in February 2015 and to Oregon and Washington in April 2015 to meet with wine industry members involved in sustainability programs. First, the Michigan representatives met with staff members from regional industry associations, and certification bodies, as well as, winery owners who participate in sustainability programs and certifications. Second, 5LE analyzed how wine industry programs have been developed in California, Washington, Oregon, New York, Virginia, South Africa, Chile and Australia. Based on feedback from the online survey and industry meetings, the research focused on how organizational development (funding, staff, budget, partnerships, etc.) because Michigan's industry expressed significant need to improve how it organizes itself state-wide.



The comparative research is summarized in the Feasibility Study Report <http://5lakesenergy.com/mi-sustainable-wines/>, and detailed information about each program and summary spreadsheet are available upon request.

- **Energy Audits:** 5LE subcontracted Keen Technical Solutions to conduct ASHRAE Level1 energy audits at 12 wineries across the state. 5LE and Keen held two webinars to educate interested wineries on the energy audit process, and to assist wineries with setting up an ENERGY STAY Portfolio Manager Account to prepare for an energy audit. The webinar was posted online at [www.5Lakesenergy.com](http://www.5Lakesenergy.com) . Wineries applied through the online survey. Ten wineries were selected out of 15 wineries based on complete application forms and their immediate need (no energy audit in the last five years).

Keen conducted energy audit site visits from April-July 2015. Steering Committee members were invited to attend site visits. The industry expressed interest in water efficiency, wastewater treatment systems, and solar energy. Keen included quotes in the individual reports for wineries that were interested. Additionally, each individual winery report included significant information about establishing energy management protocols to complement any energy efficiency upgrades.

Detailed individual reports were sent to each of the participating wineries, and a summary of results are summarized in the Feasibility Study Report. <http://5lakesenergy.com/mi-sustainable-wines/>

- **Education and Outreach:** A steering committee of four industry members, five Michigan Department of Agriculture & Rural Development (MDARD) / Grape and Wine Council (MGWIC) staff and two 5Lakes Energy (5LE) staff was formed in November 2014 to lead and direct communication with the industry and key partners. The steering committee was later expanded to include an additional two industry members. The steering committee members helped write the online survey, identify priority issue areas, and shape the recommendations and development scenarios in the final report.

5Lakes Energy gave educational presentations on sustainability in the wine industry, initial survey results, and potential development scenarios to the wine industry at the Northwest Orchard and Vineyard Show, Southwest Horticulture Days, the Michigan Grape and Wine Conference (recorded and posted online at <http://5lakesenergy.com/mi-sustainable-wines/>), and the Northwest Grape Kick-Off. Additionally, 5LE staff met with and regularly communicated with regional wine trail groups, and industry associations like Parallel 45 (P45) and the Michigan Wine Collaborative. During the one on one meetings, 5LE answered questions, and collected additional feedback on survey results.

5LE held two educational roundtable meetings with the industry in January at the MSU Northwest Horticulture Station and in March at the MSU Southwest Research Station. Twenty-one Industry members attended the two roundtable sessions, and responded to 15 survey questions during the presentation.

Copies of all the industry presentations are available upon request.

## GOALS AND OUTCOMES ACHIEVED

The Michigan Grape and Wine Industry solicited proposals from qualified firms in the sustainability consulting market. Three proposals were received and the steering committee reviewed them and selected 5Lakes Energy of Lansing, MI to conduct much of the work of the project.

5Lakes Energy's final report on this project is posted at <http://5lakesenergy.com/mi-sustainable-wines/> .

### Activity 1: Industry Survey

*Goal:* Establish current level sustainable practices in MI, reception to sustainability and willingness to commit resources to long-term implementation.

**Target:** 50% survey response rate from all Michigan vineyards (200+) and wineries (101). Hold three regional focus meetings with 10 industry participants each.

**Achieved Measureable Outcome:**

- a. 62 surveys were submitted by eight wineries, 15 vineyards, 31 wineries with vineyards, seven wine industry stakeholders in research and education and one vineyard management company.
- b. In total, the businesses represented by the respondent support 270 full time jobs, produce 281,795 cases of wine (roughly 48% of total MI production), and manage 1,167.2 acres of wine grapes (44% of MI winegrape acreage).
- c. 5LE held three regional focus groups attended by a total of 71 industry members
  - a. Michigan State University Northwest Research Station near Traverse City January 29, 2015
  - b. Michigan State University Southwest Research and Education Center near Benton Harbor March 13, 2015
  - c. Michigan Grape and Wine Conference on March 4, 2015

The online survey and roundtable discussions suggest that Michigan’s winegrape industry is interested in developing a sustainability program. Positive comments were received regarding the Michigan Agriculture Environmental Assurance Program, a voluntary program to assess environmental responsibility practices. Survey results indicate that Michigan’s wine grape industry should first focus effort on developing a secure funding mechanism and clear plan for a Michigan wine grape association to manage a program. Additionally, program development should focus on developing self-assessment tools, performance metrics, and expand educational workshops.



**Activity 2: Comparative Analysis**

**Goal:** Compilation of best practices/resources regarding winery sustainability that fit the needs of Michigan’s industry.

**Target:** Evaluate five domestic sustainability programs (CA, WA, OR, NY, VA) and three international sustainability programs (South Africa, Chile and Australia). Identify one issue area to create a draft self-assessment tool to test in case studies.

**Achieved Measureable Outcomes:** Research trips were conducted to California, and Oregon and Washington. Ten wine industry programs were evaluated based on their organizational structure and are summarized in a chart published on the project website. <http://5lakesenergy.com/mi-sustainable-wines/>



From left: Gordon Wenk, MDARD; Anna Huttel, Salmon-Safe; Matt Moersch, Round Barn Winery; Abby Cullinan, LIVE; Linda Jones, MGWIC; Cam Brown, 5 Lakes Energy; Michelle Crook, MDARD; Charlie Edson, Bel Lago Winery

The project team found that Michigan can build a roadmap to develop a sustainability program by learning from existing programs, and work to craft a plan that fits the available resources and needs of the Michigan industry. Michigan's agricultural community has an existing well-established Michigan Agriculture Environment Assurance Program that can form an important piece of a Michigan Winery Sustainability Program. Given variation in the size, funding, staff, and resources of existing wine industry sustainability programs, Michigan's development of a sustainability program can happen in many ways. Virginia and the Long Island Sustainable Wine (LISW) programs have been able to incubate and manage a sustainability program with only volunteers. California supports a number of regional programs and a state-wide sustainability program through industry funding, extensive grant work, and partnerships. All of the programs have produced tools and resources that Michigan can access to speed development time, and reduce costs. Program staff in other regions of the world demonstrated a willingness to share insights on the strengths and weaknesses of their program development, and management. They expressed their interest and desire to help answer any questions Michigan might have.

### Activity 3: Energy Audits/Case Studies

**Goal:** Develop suggested benchmarks for the Michigan industry, identify financing options, and create cases studies to present in the final report.

**Target:** Evaluate 12 wineries (four from each of Michigan's three AVA's) for six months; draft five case studies to be shared in preliminary, council meetings, and industry newsletters.

**Achieved Measureable Outcome:** In total the ten participating wineries annual pay an estimated \$248,588 for energy. On average the times by \$0.133/kWh, \$1.81 for liquid propane, and \$.91/CCF for natural gas. Overall the wineries consume 11.2 billion Btu's per year for energy. The ten wineries pay \$2.83 per year for in energy costs for every case of wine that they produce. Though the effectiveness and return on investment varies by the size and the age of the facilities, if all ten participating wineries improved energy efficiency in their facilities by 15% they would save annually an estimated \$3,798 per winery in energy costs. If the participating wineries are an accurate representation of Michigan wineries, all 117 Michigan wineries could collectively save over \$436,271 in energy costs by increasing energy efficiency by 15%, which would reduce the industry's estimated annual CO2 emissions by 985,160 lbs.

#### Activity 4: Education and Outreach

*Goal:* Educate industry on sustainable best practices, and collect feedback for long-term development

*Achieved Measureable Outcomes:* 5LE gave four presentations at major industry events, held two roundtable sessions, and spoke at three industry meetings December 2014- April 2015. An estimated 275 (including individuals who attended multiple meetings) industry members attended the presentations, sessions and meetings.

Based on the industry's interest in a sustainability program, the immediate need for a statewide industry association with a secure source of funding, and the process by which other wine industry programs have grown, the steering committee recommends that the Michigan Wine Industry pursue development in four short-term steps:

1. Expand or create an industry association capable of handling administration and management of marketing, research, and a sustainability program
2. Fund the industry association
3. Establish a budget that allocates funding for research, marketing, and the development and management of a sustainability program
4. Use the established budget to follow one of the three potential development scenarios identified in the report, to build a sustainability program.

#### **Additional Outcomes of the Project:**

##### **Media**

Two regional news outlets and publications wrote a story on the Feasibility Study and one national wine industry published an article on the project. All three stories were picked up by major industry news feeds.

- a. WMUK (Kalamazoo MI NPR), March 4<sup>th</sup>- "[As Michigan's Wine Industry Grows, State Council Looks Toward Sustainability](#)" by Robbie Feinberg.
- b. Traverse City Record Eagle, March 24<sup>th</sup>- "[Michigan Wine Industry Considers Launching Sustainability Certification Program](#)" by Carol Thompson.
- c. Wines & Vines, April 7<sup>th</sup>- "[New Sustainability Program for Michigan?](#)" by Linda Jones McKeefe.

##### **Winery Wastewater**

MGWIC and MDARD staff identified winery wastewater as a priority for the sustainability feasibility study. Winery water use, quality, and wastewater are typically a chapter included by wine sustainability programs in self-assessment tools. 5LE worked with MDARD, DEQ, and Lakeshore Environmental Inc., to demonstrate how a sustainability standard and self-assessment tool could help Michigan wineries better understand, track, and manage their water use, discharge, and quality. Based on ongoing conversation with wineries who are working with the MDEQ on the permitting process, 5LE identified that education on winery water use, quality, and wastewater should be a priority for the next phase of this sustainability initiative.

5LE helped coordinate a meeting on June 4, 2015, in Grand Rapids between DEQ, MDARD, members of the steering committee, and additional winery owners to review a guidance document that MDEQ put together regarding winery wastewater treatment systems. Additionally, 5LE put together a list of valuable resources on winery wastewater to help wineries educate themselves about wastewater treatment systems and best management practices. <http://5lakesenergy.com/mi-sustainable-wines/>

## Market Research Literature Review

Wineries were interested to learn about the demand from consumers, retail, and restaurants for sustainably certified wine. 5LE recruited Jenna Vegia, a graduate student at the University of North Texas and intern with the Leelanau Peninsula Vintners Association (LPVA), to conduct a literature review of existing research that covers. The literature review is intended to be a living document to educate Michigan wineries about market trends, and the demand from consumers, and large retail stores like Costco, Wal-Mart, or Whole Foods for a transparent sustainability message or certification.

The literature review is included in 5Lakes Energy's Feasibility Study Report, published online at <http://5lakesenergy.com/mi-sustainable-wines/>



## BENEFICIARIES

Michigan's wine grape growers will benefit from the results of this study. Michigan's wine industry has experienced significant growth in the last ten years, and the potential exists for continued growth. The information and recommendations will help the industry take action to develop deeper organizational capacity, and a secure source of annual funding. Both funding and organizational capacity will increase the industry's competitiveness because the industry will be able to match the marketing and promotion, and research commitments that other wine regions make annually. Furthermore, the this project has laid the foundation to build a sustainability program and certification, which will take several years, but will ultimately place Michigan at the forefront of sustainability in the wine industry, creating new marketing opportunities, attracting new consumers, strengthening community ties, and ensuring the environmental, social, and economic vitality of the industry for the next generation of Michigan vintners and growers.

## LESSONS LEARNED

While Michigan's wine industry has expressed interest in a sustainability program, the outlined objectives in the grant proposal to draft a self-assessment chapter and run case studies with wineries were too ambitious with the given time frame and the most immediate need of the industry. Thus the planned activity of creating workbooks for industry use was not accomplished and the funds budgeted for this activity were diverted to distributing copies of the Executive Summary of the final report to 117 wineries (copying and postage). The industry needs further education about the specific components of a sustainability program before it should commit the time and resources to developing a self-assessment tool. 5LE found that in other regions, wine industry self-assessment tools were built by volunteer groups made up of industry members and stakeholders. These involved an extensive review process by technical committees made up of issue area experts. At the moment, Michigan's industry lacks the infrastructure to manage such a process and needs to build technical committees.

The MGWIC has committed to crafting checklists, a preliminary version of a self-assessment chapter, for winery energy and water use to use in the next phase of the sustainability initiative. Funding for Phase II of this project was approved by USDA and MDARD in September 2015. The checklists will build on knowledge gained during this project, and be utilized to educate wineries about the self-assessment process, helping them take cost effective action to move further along the sustainability spectrum.

The grant proposal described 12 energy audits for wineries; but out of the 15 wineries that applied, only ten submitted complete information, demonstrated an immediate need, or had not had an energy audit in the last five years. It became evident that wineries required more information about energy conservation measures (ECM), which were detailed in their individual reports from Keen, and how to create an energy management plan before they would take the type of action that would make case studies valuable. Most of the wineries lack the type of monitoring systems or software to accurately track and record their energy and water use, and ultimately measure the impact of implemented ECMs. Keen Technical Solutions included quotes on monitoring systems for a number of interested wineries, which would be the first step to creating a case study at a Michigan winery. Additional work in educating wineries about energy conservation measures will be conducted during Phase II.

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#### ADDITIONAL INFORMATION

**PROJECT TITLE: MICHIGAN ASPARAGUS INDUSTRY DEVELOPMENT PROGRAM – Improving Harvest Efficiency, Worker Safety, and Food Security through the Creation of a Bilingual Training Video - FINAL**

#### PARTNER ORGANIZATION

Michigan Asparagus Advisory Board

#### PROJECT SUMMARY

Michigan asparagus traditionally has been harvested by migrant families coming from Texas and Florida. Until recent years, many returned each spring with a return worker rate of around 90%. The relatively few new workers that arrived were trained by the family or crew members they traveled with.

For the past five years Michigan asparagus farmers have been experiencing worker shortages and have seen a dramatic spike in new inexperienced workers available for harvest. This has created significant problems as whole crews, with no collective harvest experience, have struggled with learning how to properly harvest asparagus for Michigan's three markets – processed cuts, spears, and fresh. Improper harvest methods will result in reduced yields of 10 – 20 % of the annual production.

This grant facilitated the production and distribution of a video, with both an English and Spanish language version, that explains and demonstrates proper techniques for harvesting asparagus in

Michigan. Additionally, the video covers important aspects of worker safety and food security. The DVD and online version of the video were distributed in March 2016 with over 80% of Michigan asparagus farms receiving a copy. Feedback from growers that have used the video has been extremely positive with many reporting that even their experienced workers benefited from viewing it.

## PROJECT PURPOSE

Asparagus is a perennial crop that is harvested by making 25 – 40 trips over the same field in an eight week season. Trips are timed to harvest spears of the correct height. The correct spear height is determined by which of the three markets (fresh, processed cuts or processed spears) that you are delivering for that day. Asparagus spears can grow very rapidly, up to ½ inch per hour under ideal conditions, making harvest timing extremely critical. Spears that exceed the proper height have no market value and are removed by mowing. Unfortunately, mowing not only removes those spears that have exceeded marketable height but also destroys all of the shorter spears that have also emerged. One mowing early in the season will destroy about 10% of the field's annual production. Poor harvest techniques also result in losses of yield and quality. The lower portions of the stalks that remain in the field after harvest are referred to as stubble. Asparagus stalks must be snapped off close to the ground level to reduce the height of the stubble. If the stubble is left too tall each subsequent harvest results in lower yields and diminished tip quality. For that reason it is critically important that the first harvests of the season are done properly. Tall stubble left early in the season will result in annual yield losses of up to 25%.

Most asparagus farmers have a number of fields spread out over a fairly large geographic area. It is common that the first harvest of the season in most or all the fields occurs on the same day making the training and management of new harvest crews extremely challenging. The creation of this video has allowed our farmers to educate new asparagus pickers prior to the hectic first day of the season. It has also proven to be extremely valuable in reinforcing worker safety, food security and proper harvest to experienced workers.

The objective of creating this video was to teach new workers the proper way to snap harvest asparagus, as well as educate them in basic worker safety and food security. It has been reported that workers with prior harvest experience have also benefited from viewing the video.

We estimate that 5% (1 million lbs.) of our asparagus crop has been lost in each of the last three years due to a shortage of harvest labor. We are aware of at least eight large asparagus farms that have turned to the H2A program for the first time in 2016 to secure harvest labor. Most or all of these workers never harvested asparagus prior to arriving in Michigan. Every one of the farmers that has hired new workers this season has reported that having a training video to show prior to bringing them to the field has had a tremendous positive impact.

We are now estimating that 30% or more of our harvest workforce may be new to asparagus harvest by 2018.

## PROJECT ACTIVITIES

The committee members and Executive Director of the Michigan Asparagus Advisory Board (MAAB) developed the basic message and suggested the corresponding video images that would be needed for a worker training video. Once the raw footage was recorded, MAAB assisted in editing and wrote the final script for the voice-over. This was accomplished through a few face-to-face meetings and numerous electronic meetings.

Michigan Farm Bureau, Inc. (MFB) was contracted to perform most of the tasks in the work plan. MFB has expertise in filming on-farm videos, editing, bilingual translation, and worker safety and food security regulations.

In May 2015 MAAB staff arranged shoot locations, coordinating with farm owners and workers. In early June 2015 three staff members from MFB traveled to asparagus farms and shot all needed footage of harvest and related activities. MFB edited and cut footage for MAAB review. In December 2015 the MAAB board reviewed a very rough draft of the video, cut to about 10 minutes of total viewing. In January 2016 MAAB finalized the script for the voice-over and approved final video footage. MFB produced a draft version for final review in February 2016 and after final review produced both an English and Spanish version. Both versions were burned onto a DVD, and 120 copies were produced for distribution. In March 2016 MFB and MAAB presented the video to 150 persons in attendance at the annual "Oceana Asparagus Day" meeting. MAAB distributed copies to over 75 Michigan asparagus farms that were in attendance. MAAB followed up with a newsletter to all Michigan asparagus growers announcing that a copy of the video was available and followed up by mailing out additional copies to those that requested one. In May 2016 MAAB conducted a survey of 25 asparagus growers to get their impression of the impact if any. At the time of the survey most growers were just into their second week of harvest.

#### GOALS AND OUTCOMES ACHIEVED

The goal of this project was to have a better trained workforce for asparagus harvest. A better trained workforce understands how to perform the needed task and also understands why certain procedures and methods are beneficial. A field that is properly harvested result in yields 10-20% higher than those that are poorly harvested. The result is \$300 to \$600 dollars in additional profit per acre.

Most workers that harvest asparagus are paid on piece rate. Maximizing per acre yields also benefits these workers as they are harvesting more lbs. per trip over the field.

We believe that over 85 Michigan asparagus farms representing greater than 75% of the state's asparagus acreage now have a copy of the worker training DVD. 100% of the 25 growers surveyed in May of 2016 reported receiving a copy. 91% reported viewing it themselves and 76% reported showing it to their workers. 100% of those surveyed indicated that they had at least one new worker with no prior asparagus harvesting experience. One grower reported that all of his workers had no prior experience. 56% of the surveyed growers believed that showing the video to their workers would result in higher per acre yields.

#### BENEFICIARIES

Most Michigan asparagus farms will benefit from having a worker training video.

A number of other specialty crop producer groups, both in and out of the state have learned of this project and have viewed the video and have expressed interest in doing something similar for their crop.

To date we believe over ½ of the 120 commercial asparagus farms have benefited from this project. We also believe that 2/3rds of our industry will benefit in the future. Michigan asparagus farmers will benefit from having a safer, better trained workforce that understands the how and why of proper picking techniques. Better trained workers will result in higher yields and profits.

## LESSONS LEARNED

The number one lesson learned from this project is to have a well-developed script written prior to shooting the video. This will help you focus on and capture all of the shots needed. It is impossible to go out in January and capture a shot you missed in June. I also believe that the success of the project hinged on the expertise of the firm that we contracted with. Their knowledge of farms, farmworkers, Hispanic culture and government regulations was invaluable.

## CONTACT PERSON

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## ADDITIONAL INFORMATION

The videos can be viewed at: English [2016 Asparagus Worker Training - English on Vimeo](https://vimeo.com/153295308)  
<https://vimeo.com/153295308>  
Spanish [2016 Asparagus Worker Training - Spanish on Vimeo](https://vimeo.com/153368219) <https://vimeo.com/153368219>

## PROJECT TITLE: MICHIGAN CARROT COMMITTEE – Advancing Disease Control Strategies for Michigan’s Processing Carrot Industry to Reduce Reliance on Fungicides - FINAL

## PARTNER ORGANIZATION

Michigan Carrot Committee

## PROJECT SUMMARY

Michigan ranks 2nd in the US for carrot production, valued at \$7.2 million and grown on 1,500 acres in 2015. One-third of Michigan’s processing carrot acreage is for baby food and processor and consumers are concerned about pesticide residues. High relative humidity and frequent rainfall/irrigation create a favorable environment for foliar fungal pathogens, *Alternaria dauci* and *Cercospora carotae*, which threaten yields yearly by infecting and weakening leaves and petioles and interfering with harvest because tops break off during lifting. The fungi overwinter in carrot debris in soil and diseases recur yearly. Michigan growers use fungicides to manage disease. Using new fungicides, including “soft” pesticides, can minimize/eliminate fungicide residues on the harvested root. Weather-based disease-warning systems can reduce the number of fungicide applications per season by timing sprays when outbreaks or increases in disease severity are predicted. This project’s goal was to develop and implement a disease management system for processing carrot growers that minimizes fungicide use and eliminates residues on the harvested root by testing fungicide alternatives with emphasis on “soft” pesticides, testing the Tom-Cast forecasting system to time fungicide sprays using a wide range of fungicides, and testing processing carrot cultivars suitable for Michigan for resistance/tolerance to plant diseases.

## PROJECT PURPOSE

### Objectives:

- 1.) Test alternatives for currently and newly-registered fungicides with emphasis on reduced risk products or “soft” pesticides.
- 2.) Test the Tom-Cast forecasting system to time fungicide sprays using a wide range of active ingredients.
- 3.) Identify processing carrot cultivars for MI that are resistant to plant diseases.

**The specific issue, problem, or need that was addressed by the project:**

Michigan (MI) is ranked 2nd in the US for the production of carrots, grown on 1,500 acres in 2015 with a value of \$7.2 million (2). Currently, MI carrot growers rely on fungicides for disease management. High relative humidity and frequent rainfall/ irrigation common during the growing season create a favorable environment for foliar fungal pathogens. Fungal foliar blights caused by *Alternaria dauci* and *Cercospora carotae* threaten yields yearly by reducing photosynthetic area and weakening leaves and petioles, interfering with harvest because tops break off in lifting. When foliar diseases were not controlled, carrot yield in the Great Lakes growing region was 11.7 tons/acre compared with 15.7 tons/acre when a standard fungicide program was used (10). These blights occur yearly and fungi overwinter readily in carrot debris in soil. *Alternaria* primary infections occur in early to midsummer resulting in small, dark brown to black, irregularly shaped spots with a yellow border that form along leaf margins. Under heavy disease pressure, leaf petioles may become infected and dieback. The first disease symptoms of *Cercospora* blight include pinpoint spots of dead tissue surrounded by yellow borders which expand into spots with tan centers and dark borders and commonly occur on leaf petioles. Under favorable conditions of high relative humidity (>95%) and temperatures of 60-90°F, lesions caused by *Alternaria* or *Cercospora* may expand and increase. Carrots are usually planted in double rows spaced from 12 to 18 inches apart that close quickly once the carrot foliage is fully developed; the microclimate within the plant canopy becomes more humid and leaves remain wet longer because air circulation is reduced.

Currently, the fungicides chlorothalonil (Bravo) and the strobilurins (i.e. Cabrio or Quadris) are the fungicides typically used by growers for control of *Alternaria* and *Cercospora* blights other than copper-based formulations (applied for control of bacterial blight), and may be applied as frequently as every seven to ten days beginning in June and ending in mid-September. Chlorothalonil, a protectant fungicide, is classified as a B2 carcinogen and residues in the harvested root can be problematic; its status as a potential cancer-causing agent is a problem for processors of baby foods. Also, strobilurin residues in the finished product are of concern and must be eliminated from the final product. While detected residues on carrots are well within established tolerances, processors desire a residue-free product to satisfy their consumers.

Minimizing overall fungicide use and diversifying the fungicide active ingredient that is applied to the carrot crop is desirable so as to minimize/eliminate detectable residues on the harvested root. Disease management programs that reduce the total number of fungicide applications also reduce grower costs, potential residues on the produce, and risk of development of fungicide resistance in the pathogens. One way to reduce the number of necessary fungicide applications without compromising disease control is through the use of disease-warning systems that predict potential outbreaks or increases in disease severity based on the weather (5). Studies have been conducted at MSU to test the disease forecasting system, Tom-Cast (13), for use in managing foliar blights on carrot (3,4). Tom-Cast is derived from the disease forecasting system (FAST), originally developed to help time fungicide sprays for *Alternaria solani* on tomato (11). Tom-Cast has been used commercially in tomato production (7) and has been adapted for use in disease management of asparagus (12). The Tom-Cast program uses the duration of leaf wetness and the average air temperature during the wetness period for each 24-hour period (11 AM to 11 AM) to determine a disease severity value of 0 to 4 corresponding to an environment unfavorable to highly favorable for disease development, respectively (13).

MSU field trials indicated that Tom-Cast was an effective tool in managing foliar blight in carrots (3,4) and permitted a 60% reduction in the number of sprays compared to the standard

spray program without sacrificing disease control. Similarly, a research plot established with a grower-cooperator indicated that acceptable and even optimum disease control can be obtained using the Tom-Cast disease forecaster with chlorothalonil alone or alternating between chlorothalonil and azoxystrobin (3,4). While growers have used this forecasting program, their choice of fungicide products is resulting in unacceptable residues. However, in the last few years, new fungicides have been registered for use on carrots but have not been tested in conjunction with the Tom-Cast disease forecaster.

Observations and cultivar evaluations made in MI several years ago showed that several carrot cultivars and hybrids exhibit a level of resistance to fungal leaf blight (8,9). Similarly, leaf blight tests conducted in New York over a decade ago consistently show that a number of varieties such as 'Carson' require fewer fungicide sprays than other cultivars such as 'Eagle' (1). However, similar resistance screening of the newest processing carrot cultivars and combining this approach with recently developed fungicides/biocontrol agents applied via the Tom-Cast disease forecaster is of interest to MI's carrot growers and the processors that they supply.

In addition to the foliar fungal pathogens described above, soilborne molds are of increasing concern to growers due to root problems observed both in the field and in storage. White mold (*Sclerotinia sclerotiorum*) often develops when storing carrots. Cavity spot (*Pythium violae*), Phytophthora rot (*Phytophthora cactorum*) and crater rot (*Rhizoctonia* spp.) affect root quality (6) and are problems even with extended crop rotation. Forking and stubbing of carrot roots is a complex problem resulting from mechanical damage, disease, or nematodes. Loads of carrots containing >20% culls are rejected. Effective management strategies have not been developed for these problems and will likely require fungicide/biocontrol applications that will only add to the growers' issues of pesticide residue on the carrot roots.

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### **Importance and Timeliness of the Project:**

Gerber is a well-known producer of baby foods and is located in Fremont, MI. Their consumers are especially concerned with product safety and that includes the presence of pesticide residues. Processor contracts are a foundation to the business of many MI's family farms and Gerber's contracts are especially sought after. Growing processing carrots without pesticide residue is a challenge that can be met by combining new disease control products and recently developed carrot cultivars with an existing disease forecaster. Failure to develop and implement a management strategy that ensures a healthy crop without detectable residues will result in processors outsourcing carrots to growing areas outside of MI where the weather conditions are not favorable for disease development.

The current priorities of the MI carrot industry are posted at [www.green.msu.edu](http://www.green.msu.edu). Included in their priorities are: 1) Variety screening and development of carrot varieties for processing and fresh market with improved resistance to foliar diseases. 2) Disease control management to include screening new chemistries and chemical combinations for improved control. 3) Improved cultural practices with new rotations, cover crops and management practices to improve stands and reduce effects of soilborne diseases.

The current project replicated (over time) the field-based research that is required to achieve the overall goal of producing carrots without pesticide residues. Two years of field research is the minimum time needed to ensure that the research results are robust and will hold up under varying environmental conditions. Growers entrust their livelihood when they follow disease recommendations. Disease recommendations that are rushed or not replicated in time or otherwise improperly vetted result in crop failure and economic devastation for growers.

## **PROJECT ACTIVITIES**

Research was carried out by Dr. Mary Hausbeck, Department of Plant, Soil and Microbial Sciences, Michigan State University (MSU), and aided by Ben Werling, MSU Extension, Oceana Co.

**Activities 1a, 1b and 2:** Carrot seeds were sown spaced 1.5 inches apart within the row in a bed of three rows spaced 18 inches apart (196,000 seeds/A). Four replicates were established for each treatment arranged in a randomized complete block trial. Each treatment plot consisted of a 20-foot long three-row bed with a 2-foot buffer between treatment plots within each row. Treatments were applied using a CO<sub>2</sub> backpack sprayer and a broadcast boom equipped with three XR8003 flat-fan nozzles calibrated at 50 psi and delivering 50 gal/A. Plants in a 10-foot section of the middle row were evaluated for disease by counting the numbers of plants with one or more petiole lesions and evaluating the petiole area for lesions using the Horsfall-Barratt scale. Roots were harvested from the center 6 feet of each row and weighed.

### **Activity 1a. Test alternatives for currently and newly-registered fungicides with emphasis on reduced risk products or “soft” pesticides.**

This trial was planted with carrot 'Cupar' seeds in a grower-cooperator's field on 30 April in Oceana County, MI in a sandy soil. All plot maintenance was provided by the grower and was to commercial production standards. Treatments were applied on 2, 9, 17, 23 and 31 July; 10, 18, and 26 August; 1, 9, 16, 23 and 30 September. Plants with one or more petiole lesions were counted and plants were

evaluated for petiole disease using the Horsfall-Barratt rating scale on 13 October. Roots were harvested on 13 October and weighed on 14 October.

Petiole diseases caused by *Alternaria dauci* and *Cercospora carotae* developed in the field and were evaluated. Significant differences were only detected for plants treated with Kocide 3000 (Table 1). Kocide-treated plants had the lowest number of plants with infected petioles (21.5) and the lowest petiole disease severity rating of 3.0 (>3 to 6% foliar area diseased). The untreated controls and the biopesticides (Actinovate, Regalia, Mycostop Mix and Serenade Opti) all had considerably more disease with ≥49 plants with infected petioles and a petiole disease severity rating of 7.3 to 7.8 (>50 to 75% petiole area diseased). These results demonstrate that the biopesticides tested in this study when used alone and exclusively do not provide sufficient control of carrot petiole diseases caused by *Alternaria dauci* and *Cercospora carotae*. Yields did not differ significantly between treatments and/or the untreated control.

**Table 1.** Evaluation of fungicides and biopesticides for control of petiole diseases of carrot.

Treatment and rate/acre	Active ingredient	Plants with ≥1 infected petiole (no.)	HB petiole disease severity <sup>x</sup>	Petiole health <sup>y</sup>	HB diseased foliar area <sup>x</sup>	Yield (lb)
Untreated control	--	51.0a <sup>z</sup>	7.3a	5.0a	6a	17.3
Kocide 3000 1.75 lb	copper hydroxide	21.5 b	3.0 b	2.8 b	4.3 b	20.2
Actinovate 12 oz	<i>Streptomyces lydicus</i> WYEC 108	50.0a	7.8a	5.0a	6a	17.9
Regalia 4 qt.....	<i>Reynoutria sachalinensis</i> extract	49.0a	7.3a	5.0a	6a	17.0
Mycostop Mix 16 oz	<i>Streptomyces griseoviridis</i> Strain K61	52.0a	7.5a	5.0a	6a	18.9
Serenade Opti 20 oz	QST 713 strain <i>Bacillus subtilis</i>	49.0a	7.3a	5.0a	6a	17.8
Untreated control	--	49.3a	7.8a	5.0a	6a	17.7

<sup>x</sup>Rated on the Horsfall-Barratt scale, where 1=0% tissue area diseased, 2=>0 to 3%, 3=>3 to 6%, 4=>6 to 12%, 5=>12 to 25%, 6=>25 to 50%, 7=>50 to 75%, 8=>75 to 87%, 9=>87 to 94%, 10=>94 to 97%, 11=>97 to <100%, 12=100% tissue area diseased.

<sup>y</sup>Rated on a scale of 1 to 10, where 1=healthy, vigorous; 2=few petiole lesions, no petiole necrosis; 3=petiole lesions numerous, no petiole necrosis; 4=1 to 20% petiole necrosis; 5=21 to 40% petiole necrosis; 6=41 to 60% petiole necrosis; 7=61 to 80% petiole necrosis; 8=81 to 90% petiole necrosis; 9=>90% petiole necrosis; 10=100% petiole necrosis;

<sup>z</sup>Column means with a letter in common or with no letter are not significantly different (LSD t-test;  $\alpha=0.05$ ).

#### **Activity 1b. Evaluation of registered fungicides for control of foliar and petiole diseases.**

This trial was planted with carrot ‘Cupar’ seeds in a grower-cooperator’s field on 30 April in Oceana County, MI in a sandy soil. Treatments were applied on 2, 17, 31 July; 10, 24 August; 14, 23 September; and 7 October. Plants with one or more petiole lesions were counted and plants were evaluated for petiole and foliar disease using the Horsfall-Barratt rating scale on 13 October.

Petiole and foliar diseases caused by *A. dauci* and *C. carotae* developed in the field and were evaluated. All treatments were significantly better than the untreated control for all parameters measured (Table 2). Plants treated with Pristine had the lowest number of plants with ≥1 infected petiole and the lowest rating for diseased petiole area. Merivon-treated plants had the lowest rating for diseased foliar area.

Carrot samples were harvested and tested for residues through the MSU testing facilities. It was determined that Endura and Fontelis treatments result in detectable residues on the carrots. These

active ingredients appear to be especially long lasting in the environment and may be a problem when used by processing growers who must meet the stringent guidelines required by companies manufacturing baby food.

**Table 2.** Control of foliar and petiole diseases of carrot with registered fungicides.

Treatment and rate/A	Active ingredient	Plants with $\geq 1$ infected petiole (no.)	HB diseased petiole area <sup>x</sup>	HB diseased foliar area <sup>x</sup>
Untreated control ....	--	43.0 a <sup>y</sup>	5.8 a	5.8 a
Bravo WeatherStik 2 pt .....	chlorothalonil	4.8 c	1.8 c	3.8 bc
Quadris 15.5 fl oz ...	azoxystrobin	3.5 c	1.8 c	3.0 cd
Pristine 12 oz.....	pyraclostrobin/boscalid	0.5 c	1.5 c	2.8 de
Switch 12.5 oz .....	cyprodinil/fludioxonil	19.3 b	2.5 bc	3.3 cd
Rovral 42 pt .....	iprodione	9.5 bc	2.3 bc	2.8 de
Fontelis 1.5 pt.....	penthiopyrad	1.5 c	1.5 c	3.0 cd
Tilt 4 fl oz .....	propiconazole	19.0 b	3.3 b	4.3 b
Quadris Opti 1.6 pt .	azoxystrobin/chlorothalonil	2.0 c	1.8 c	3.0 cd
Quilt Xcel 8 fl oz.....	azoxystrobin/propiconazole	2.3 c	2.0 c	3.3 cd
Cabrio 12 oz .....	pyraclostrobin	4.3 c	2.0 c	3.3 cd
Merivon 5 fl oz .....	fluxapyroxad/pyraclostrobin	1.0 c	1.8 c	2.0 e
Endura 4.5 oz .....	boscalid	3.0 c	2.0 c	2.8 de

<sup>x</sup>Rated on the Horsfall-Barratt scale, where 1=0% tissue area diseased, 2=>0 to 3%, 3=>3 to 6%, 4=>6 to 12%, 5=>12 to 25%, 6=>25 to 50%, 7=>50 to 75%, 8=>75 to 87%, 9=>87 to 94%, 10=>94 to 97%, 11=>97 to <100%, 12=100% tissue area diseased.

<sup>y</sup>Column means with a letter in common are not significantly different (LSD t test;  $P=0.05$ ).

### Activity 2. Test the Tom-Cast forecasting system to time fungicide sprays.

This trial was planted with carrot 'Cupar' seeds in a grower-cooperator's field on 30 April in Oceana County, MI in a sandy soil. Three fungicide programs were applied to the Tom-Cast trial in accordance to three different spray schedules: (1) a 7-to-10-day spray schedule, (2) a Tom-Cast schedule based on the threshold of 15 disease severity values (DSVs), and (3) a Tom-Cast schedule based on a threshold of 25 DSVs. Fourteen sprays of the 7-to-10-day treatments were applied on 2, 9, 17, 23 and 31 July; 10, 18, and 26 August; 1, 9, 16, 23 and 30 September; 7 October. Eight 15 DSV treatments were applied on 2 and 20 July; 4, 14, and 20 August; 1, 9, and 30 September. Four 25 DSV treatments were applied on 2 and 28 July; 18 August; and 9 September. Treatments were rated on 20 October. Plants with one or more petiole lesions were counted and plants were evaluated for petiole disease using the Horsfall-Barratt rating scale. Overall petiole health was evaluated on a scale of one to ten and the diseased foliar area was assessed using the Horsfall-Barratt rating scale. Roots were harvested on 21 October and weighed on 22 October.

Petiole diseases caused by *A. dauci* and *C. carotae* developed in the field and were evaluated. All treatments resulted in significantly lower levels of disease regardless of disease rating or application schedule (Table 3). The untreated control plants had the most disease (42.5 plants with infected petioles) and a petiole disease severity rating of 7.0 (>50 to 75% petiole area diseased). All other treatments limited plants with infected petioles to  $\leq 9$  and petiole disease severity to 2.0 to 2.3 (>0 to 3% petiole area diseased). Applying the treatments according to the Tom-Cast disease forecaster reduced fungicide application by six sprays when scheduled at 15 DSVs and by 10 sprays at 25

DSVs. There were no significant differences among treatments for yield. Carrot samples were harvested and tested for residues through the MSU testing facilities. No detectable residues were observed for any treatment or spray schedule.

**Table 3.** Evaluation of fungicides applied according to the Tom-Cast disease forecaster for control of petiole diseases of carrot.

Application schedule	Application s (no.)	Plants with $\geq 1$ infected petiole (no.)	Petiole disease severity <sup>x</sup>	Petiole health <sup>y</sup>	HB diseased foliar area <sup>x</sup>	Yield (lb)
Untreated control..	--	42.5a <sup>z</sup>	7.0a	4.5a	5.5a	21.1a
<i>Treatment 1: Bravo WeatherStik SC 2 pt alternated with Quadris SC 15.5 fl oz</i>						
7- to 10-day intervals	14	4.0 c-e	2.0 b	2.0 c	2.8 bc	21.7a
.....						
Tom-Cast 15 DSV	8	6.8 bc	2.0 b	2.5 b	3.3 b	22.2a
Tom-Cast 25 DSV	4	9.0 b	2.3 b	2.5 b	3.3 b	21.7a
<i>Treatment 2: Quadris SC 15.5 fl oz alternated with Fontelis SC 24 fl oz</i>						
7- to 10-day intervals	14	2.8 e	2.0 b	2.0 c	2.3 cd	21.2a
.....						
Tom-Cast 15 DSV	8	3.0 e	2.0 b	2.0 c	2.0 d	22.8a
Tom-Cast 25 DSV	4	6.5 cd	2.0 b	2.0 c	3.0 b	22.1a
<i>Treatment 3: Fontelis SC 24 fl oz alternated with Switch WG 14 oz alternated with Merivon SC 5 fl oz</i>						
7- to 10-day intervals	14	2.8 e	2.0 b	2.0 c	2.0 d	23.3a
.....						
Tom-Cast 15 DSV	8	3.8 c-e	2.0 b	2.0 c	2.3 cd	22.0a
Tom-Cast 25 DSV	4	3.5 de	2.0 b	2.0 c	2.8 bc	22.2a

<sup>x</sup>Rated on the Horsfall-Barratt scale, where 1=0% tissue area diseased, 2=>0 to 3%, 3=>3 to 6%, 4=>6 to 12%, 5=>12 to 25%, 6=>25 to 50%, 7=>50 to 75%, 8=>75 to 87%, 9=>87 to 94%, 10=>94 to 97%, 11=>97 to <100%, 12=100% tissue area diseased.

<sup>y</sup>Rated on a scale of 1 to 10, where 1=healthy, vigorous; 2=few petiole lesions, no petiole necrosis; 3=petiole lesions numerous, no petiole necrosis; 4=1 to 20% petiole necrosis; 5=21 to 40% petiole necrosis; 6=41 to 60% petiole necrosis; 7=61 to 80% petiole necrosis; 8=81 to 90% petiole necrosis; 9=>90% petiole necrosis; 10=100% petiole necrosis;

<sup>z</sup>Column means with a letter in common are not significantly different (LSD t-test;  $\alpha=0.05$ ).

#### Activity 4. Identify processing carrot cultivars for Michigan that are resistant to plant diseases.

The trial was established in a Houghton muck soil at the Plant Pathology Farm in Lansing, MI. Seeds of 15 carrot cultivars were sown with 2.3 inch seed spacing with a Mater Mattic vacuum seeder on 22 May. Treatments were arranged in a completely randomized block design with four replicates established for each treatment. Each treatment replicate consisted of a 15-foot long three-row bed with a 5-foot buffer between replicates within a row. Ridomil Gold SL was applied in a banded treatment at 0.6 pt/A with a back pack sprayer on 25 May to control root rots. Plants in a 3-foot section of each treatment were evaluated for disease by rating the petiole area for lesions using the Horsfall-Barratt scale.

Petiole diseases caused by *A. dauci* and *C. carotae* developed in the field and were evaluated. Petiole disease severity ranged from a low of 5.7 (>12 to 25% petiole area diseased) for 'Carson' to a high of 8.0 (>75 to 87% petiole area diseased) for 'Cupar' (Table 4). Uneven germination due to excessive rainy weather resulted in uneven plant stands. As a result, carrot cultivar was not found to have a significant effect on petiole disease severity. However, trends can be noted as some cultivars consistently rated lower than the overall test average of 6.9 for petiole disease severity. 'Carson' and

'Presto' may have higher levels of resistance to petiole diseases than the other cultivars screened in this study although further study is required to confirm this trend.

**Table 4.** Evaluation of resistance of processing carrot cultivars to petiole diseases.

Cultivar	Seed company	Petiole disease severity <sup>x</sup>	Cultivar	Seed company	Petiole disease severity <sup>x</sup>
Apache	Siegers Seed Co.	7.5	CR2289	Siegers Seed Co.	ned <sup>z</sup>
Bermuda <sup>y</sup>	Bejo Seeds Inc.	7.0	Cupar	SeedWay, Bejo Seeds Inc.	8.0
Bergen	SeedWay	ned <sup>z</sup>	Danvers 126	SeedWay	ned <sup>z</sup>
Berlin	Bejo Seeds Inc.	7.0	Finley	SeedWay	ned <sup>z</sup>
Bermuda	Bejo Seeds Inc.	7.0	Florida	SeedWay	7.5
Canada	SeedWay, Bejo Seeds Inc.	7.3	Fontana	SeedWay	ned <sup>z</sup>
Canberra	Bejo Seeds Inc.	7.3	Presto	Siegers Seed Co.	6.3
Carson	SeedWay	5.7	Texto	Siegers Seed Co.	7.0

<sup>x</sup>Rated on the Horsfall-Barratt scale of 1 to 12, where 1=0% foliar area diseased, 2=>0 to 3%, 3=>3 to 6%, 4=>6 to 12%, 5=>12 to 25%, 6=>25 to 50%, 7=>50 to 75%, 8=>75 to 87%, 9=>87 to 94%, 10=>94 to 97%, 11=>97 to <100%, 12=100% foliar area diseased.

<sup>y</sup>'Bermuda' replaced 'Beijing.'

<sup>z</sup>Not enough data to calculate average due to poor plant stand.

#### **Activity 5. Disseminate new management recommendations to the carrot industry at the Great Lakes Fruit, Vegetable and Farm Market Expo.**

Results of the trials associated with Activities 1 through 3 were incorporated into a presentation and proceedings for the Great Lakes Fruit, Vegetable and Farm Market Expo, attended by 5,677 people in December 2015 in Grand Rapids, MI. This carrot presentation, "Carrot Pathology Update," was presented by Dr. Mary Hausbeck and attended by 144 people. Results were also presented to the carrot growers at their annual research meeting held in February 2016. In addition, management strategies were presented to growers in Pukekohe, New Zealand in 2015.

#### **Baseline data**

A survey was conducted at a carrot growers meeting regarding carrot production management practices. Seven growers representing the majority of carrot acreage in Michigan filled out and returned the survey. The years of experience at growing carrots ranged from 12 to 20, and averaged 17.4 years. The growers grew 26-50 acres (14.3%, one grower), 51-100 acres (14.3%, one grower) and >100 acres of carrots (71.4%).

Tom-Cast is currently used by 71.4% of the growers. Reasons that the growers use Tom-Cast include applications are more effective (42.9%), reduced pesticide residues (52.9%), reduced cost (28.6%), buyer/processor request (28.6%), reduced environmental impact (14.3%), saves time/fewer applications (14.3%). Fungicides used by the growers in 2014 for control of carrot diseases included Bravo (100% of growers), Quadris (85.7%), Quadris Opti (28.6%), Cabrio (28.6%), and Rovral (14.3%). Products that growers are hesitant to apply or have reduced the number of applications based on pesticide residue concerns include Bravo (57.1% of growers), Rovral (42.9%), Quadris (28.6%), and Pristine (14.3%).

Growers (71.4%) have grown certain carrot cultivars based on their perceived resistance to disease. Diseases that affect growers' choice of which carrot cultivar to plant include Alternaria blight (100% of

growers), cavity spot (57.1%), and crater rot (14.3%). Other disease issues that growers would like to see addressed: core rot (14.3%).

## GOALS AND OUTCOMES ACHIEVED

**1. Goal:** Increase the number of carrot growers using new disease management strategies to eliminate fungicide residues on the harvested root.

**a. Target:** Implement the new disease management strategies such that the percentage of processing carrot growers using new disease strategies increases by 50%.

**b. Benchmark:** Developed in the first year of the project.

**c. Performance Measure:** An increase in the understanding of the importance of the new management recommendations and the means by which to incorporate them as determined via post-presentation surveys from those who attend the presentations delivered on the results of the project.

**d. Outcome:** Surveys were conducted at carrot growers' meetings regarding carrot production management practices in 2015 and 2016. In 2015, seven growers representing the majority (>75%) of carrot acreage in Michigan filled out and returned the survey. The years of experience at growing carrots ranged from 12 to 20, and averaged 17.4 years. The growers grew 26-50 acres (14.3%, one grower), 51-100 acres (14.3%, one grower) and >100 acres of carrots (71.4%). 71.4% of the respondents use the Tom-Cast disease forecaster to time fungicide applications. When asked why they use Tom-Cast, 14.3% of the growers responded that they used it for reduced environmental impact and for savings in time and fewer applications, 28.6% replied they used it for reduced cost and to comply with buyer/processor request, and 42.9% replied they used it because it reduces pesticide residues and makes applications more effective.

Fungicides used during the 2014 carrot growing season included copper and Rovral (each applied by 14.3% of the growers), Cabrio and Quadris Opti (each applied by 28.6% of the growers), Quadris (85.7% of the growers), and Bravo (100% of the growers). Products that growers are hesitant to apply or have reduced applications of due to residue concerns include Pristine (14.3% of growers), Quadris (28.6%), Rovral (42.9%), and Bravo (57.1% of growers).

When asked about cultivars, 71.4% responded that they had grown certain varieties based on their perceived resistance to disease. Growers consider these diseases when choosing which carrot cultivars to plant: crater rot (14.3% of growers), cavity spot (57.1%), and Alternaria (100% of growers). Core rot is another disease issue that carrot growers would like to see addressed.

In 2016, three growers responded and represented >50% of the Michigan carrot acreage. The number of years they had been growing carrots ranged from 20 to 32 and averaged 24 years. In 2015, carrot acreage represented by these growers ranged from 51-100 (33.3%), and >100 acres (66.7% of the growers). Two-thirds of the respondents use the Tom-Cast disease forecaster to time fungicide applications. When asked why they use Tom-Cast, 33.3% of the growers responded that they used it for reduced environmental impact, reduced pesticide residues, and savings in time/fewer applications, 66.7% replied they used it for reduced cost and it makes applications more effective.

Fungicides used during the 2015 carrot growing season included Cabrio (33.3% of growers), Ridomil Gold (66.7%), and Quadris and Bravo (each used by 100% of the growers). Products that growers are hesitant to apply or have reduced applications of due to residue concerns include Bravo (33.3% of growers).

When asked about cultivars, all (100%) responded that they had grown certain varieties based on their perceived resistance to disease. Growers consider these diseases when choosing which carrot cultivars to plant: crater rot (33.3% of growers), cavity spot (66.7%), and Alternaria (100% of growers). Core rot was identified again as another disease issue that carrot growers would like to see addressed.

Due to the low number of respondents to the 2016 survey, it is challenging to determine whether the goal was achieved. Those growers who did respond do report incorporating new management strategies and recommendations into their production practices.

**2. Goal:** Test alternatives for currently and newly-registered fungicides with emphasis on reduced risk products or “soft” pesticides.

**a. Target:** Identify at least one new effective pesticide.

**b. Benchmark:** We will compare treatments to the current grower standards of chlorothalonil and azoxystrobin.

**c. Performance Measure:** Percentage reduction in disease incidence and severity will be calculated.

**d. Outcome: Activity 1a. Test alternatives for currently and newly-registered fungicides with emphasis on reduced risk products or “soft” pesticides.** The biocontrol/biopesticide products tested in this study do not provide sufficient control of carrot petiole diseases caused by *Alternaria dauci* and *Cercospora carotae* when used exclusively (Table 1). Kocide-treated plants had the lowest number of plants with infected petioles (21.5) and the lowest petiole disease severity rating of 3.0 (>3 to 6% foliar area diseased). While this result is disappointing, it is important to know the efficacies, or lack thereof, of these products so that growers are not encouraged to invest in ineffective disease management options. Perhaps the biocontrol/biopesticide products could be used in alternation with conventional products that are highly effective. This approach could allow a longer interval between the applications of the conventional products that can result in residues. The result could be a reduction in the total number of conventional sprays needed to produce a healthy, high-yielding carrot crop; the use of biocontrol/biopesticide products would not result in residues on the harvested product.

**Activity 1b. Evaluation of registered fungicides for control of foliar and petiole diseases.** All treatments were significantly better than the untreated control for all parameters measured (Table 2). Plants treated with Pristine had the lowest number of plants with  $\geq 1$  infected petiole and the lowest rating for diseased petiole area. Merivon-treated plants had the lowest rating for diseased foliar area. When compared to industry standard chlorothalonil, Pristine, Rovral, Merivon and Endura treatments resulted in significantly lower levels of diseased foliar area than chlorothalonil. Only the Merivon treatment also resulted in significantly lower levels of diseased foliar area than azoxystrobin.

**3. Goal:** The Tom-Cast forecasting system will become a tool that assists growers to time fungicide sprays and effectively uses a wide range of active ingredients such that pesticide residues are eliminated.

**a. Target:** Maintain crop health while decreasing the amount of fungicides applied. Eliminate pesticide residues on the harvested root.

**b. Benchmark:** The number of fungicides applied by traditional calendar scheduling will be compared to those applied by the Tom-Cast disease forecaster. Resulting residues will be measured.

**c. Performance Measure:** Disease severity, mean yield, fungicide residues present at harvest.

**d. Outcome:** Petiole diseases caused by *A. dauci* and *C. carotae* developed in the field and were evaluated. All treatments resulted in significantly lower levels of disease across disease ratings and application schedules (Table 3). No significant differences were detected among spray schedules for petiole disease severity despite the treatment used. Nor were significant differences detected for petiole health regardless of spray schedule for treatments of Quadris alternated with Fontelis (Treatment 2) or Fontelis alternated with Switch alternated with Merivon (Treatment 3). Only the Bravo alternated with Quadris treatment (Treatment 1) did not differ from the calendar schedule (7-10 day intervals) for HB diseased foliar area when using a threshold of 25 DSV. Applying the treatments according to the Tom-Cast disease forecaster reduced fungicide application by six sprays when using a threshold of 15 DSVs and by 10 sprays when using a threshold of 25 DSVs. There

were no significant differences in yield among treatments, although using a threshold of 15 DSV did result in higher yields than the calendar schedule or 25 DSV threshold schedule for Treatments 1 and 2. Carrot samples were harvested and tested for residues through the MSU testing facilities. No detectable residues were observed for any treatment or spray schedule. In summary, by using the Tom-Cast disease forecaster, growers can reduce the number of spray applications without risking disease control or yield.

**4. Goal:** Identify processing carrot cultivars for MI that are resistant to plant diseases.

**a. Target:** Identify at least one cultivar with disease tolerance.

**b. Benchmark:** Disease tolerance will be measured relative to 'Fontana,' a known susceptible standard cultivar.

**c. Performance Measure:** Percentage reduction in disease incidence and severity will be calculated.

**d. Outcome:** Uneven germination due to excessive rainy weather resulted in uneven plant stands. As a result, a clear relationship between carrot cultivar and petiole disease severity was difficult to discern. 'Fontana' was among the five cultivars where petiole disease severity was unable to be measured due to insufficient plant stands. Therefore, 'Fontana' could not be used as benchmark to evaluate other cultivars. If the overall test average of 6.9 for petiole disease severity is used as a benchmark instead, trends can be noted as some cultivars consistently rated lower and higher than the test average. Specifically, 'Carson' and 'Presto' appeared to have higher levels of resistance to petiole diseases and 'Cupar,' 'Apache' and 'Florida' appeared to be more susceptible than the other cultivars screened in this study. Further study is warranted to confirm this trend.

## BENEFICIARIES

This project targets MI's growers of processing carrots but also benefits fresh market carrot growers. Consumers desire pesticide-free food and growers need new tools in order to provide these products. In addition to growers, allied agricultural industries and rural/urban farming communities benefit from growers who have viable growing contracts and/or produce that meets the stringent requirements set forward by processors and consumer groups.

Overall, carrots are worth \$7.2 million to MI growers. By enabling processor contracts to remain in MI, this project supports family farms through strategies developed through this project. Additional benefits include an overall reduction in management costs through an improved disease management program that is more effective and cost efficient than currently used programs. Fifty-six people attended Dr. Hausbeck's presentation on this research at the Great Lakes Expo. Carrot disease recommendations and research were also presented at the commodity meeting and at a growers' meeting in New Zealand (her expenses were paid for by the New Zealand industry).

Other specialty crop growers who will benefit from the completion of the work supported through this grant include producers of other root and tuber crops including parsnip and radish that can develop *Cercospora* and *Alternaria* leaf blights, respectively. Very little disease management work has been conducted on parsnip and radish although the acreage of these crops has increased in recent years in Michigan. The results from our testing on fungicides and biocontrol/biopesticide products on carrots can provide needed recommendations for parsnip and radish to reduce their risk from disease.

## LESSONS LEARNED

Weather challenges negatively impacted the carrot cultivar trial due to the reduced plant stand. This resulted in some cultivars not having enough of a plant stand to evaluate. In future, site selection will involve considering implications to the trial if similar weather related events were to occur in order to avoid such devastating impacts.

## CONTACT PERSON

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## ADDITIONAL INFORMATION

**Tour** - Michigan State University Extension Midsummer's Eve Muck Vegetable Meeting and Tour: Onion and carrot diseases, disease questions for other vegetables, Grant, MI, 20 Jul 2015.

Carrot growers were surveyed in 2015 and 2016.

### 2015 Survey:

Seven growers responded. The number of years they had been growing carrots ranged from 12 to 30 and averaged 17.4 years. In 2014, carrot acreage represented by these growers ranged from 26-50 (14.3%), 51-100 (14.3%), and >100 acres (72.4% of the growers). 71.4% of the respondents use the TOM-CAST disease forecaster to time fungicide applications. When asked why they use TOM-CAST, 42.9% replied they used it because it reduces pesticide residues and makes applications more effective, 28.6% replied they used it for reduced cost and to comply with buyer/processor request, and 14.3% of the growers responded that they used it for reduced environmental impact and for savings in time and fewer applications.

Fungicides used during the 2014 carrot growing season included Bravo (applied by 100% of the growers), Quadris (85.7% of the growers), Cabrio and Quadris Opti (each applied by 28.6% of the growers), and copper and Rovral (each applied by 14.3% of the growers). Products that growers are hesitant to apply or have reduced applications of due to residue concerns include Bravo (57.1% of growers), Rovral (42.9%), Quadris (28.6%), and Pristine (14.3% of growers).

When asked about cultivars, 71.4% responded that they had grown certain varieties based on their perceived resistance to disease. Growers consider these diseases when choosing carrot cultivars to plant: Alternaria (100% of growers), cavity spot (57.1%), and crater rot (14.3% of growers). Core rot is another disease issue that carrot growers would like to see addressed.

### 2016 Survey:

Six growers responded. The number of years they had been growing carrots ranged from 20 to 50 and averaged 27 years. In 2015, carrot acreage represented by these growers ranged from 51-100 (16.7%), and >100 acres (83.3% of the growers). 66.7% of the respondents use the TOM-CAST disease forecaster to time fungicide applications. When asked why they use TOM-CAST, 66.7% replied they used it to make applications more effective, 50.0% of the growers use it for reduced cost and for reduced pesticide residues, 33.3% for reduced environmental impact and for savings in time/fewer applications, and 16.7% use it at the request of the buyer/processor.

Fungicides used during the 2015 carrot growing season included Bravo (used by 100% of growers), Quadris (66.7%), Cabrio (50.0%), and Ridomil Gold (used by 33.3% of the growers). Products that growers are hesitant to apply or have reduced applications of due to residue concerns include Bravo (33.3% of growers).

When asked about cultivars, all (100%) responded that they had grown certain varieties based on their perceived resistance to diseases. Growers consider these diseases when choosing carrot cultivars to plant: Alternaria (83.3% of the growers), cavity spot (66.7%), white mold (16.7%) and crater rot (16.7% of the growers). Core rot and black rot are other disease issues that carrot growers would like to see addressed.

## **Presentations**

- Hausbeck, M., and Donne, I. 2015. Carrot pathology update. Carrot Session, Great Lakes Fruit, Vegetable and Farm Market Expo, Grand Rapids, MI, Dec.
- Hausbeck, M. 2015. New strategies and pathogens for Michigan onions and carrots. Growers' Meeting, Pukekohe, New Zealand, Apr.
- Hausbeck, M. 2015. Update on disease control in carrots. Carrot Commodity Group Meeting, DeWitt, MI, Feb.

## **Publications**

- Hausbeck, M.K. 2015. Controlling blight and Pythium forking and stubbing. Carrot Country 23(2):4-6. Online.
- Hausbeck, M.K., Donne, I., and Cook, A. 2015. Carrot pathology update. Pages 2-5 in: Carrot Session Summaries, Great Lakes Fruit, Vegetable and Farm Market Expo, Grand Rapids, MI, Dec. Online.

## **PROJECT TITLE: COMMERCIAL MAPLE SYRUP PRODUCERS OF MICHIGAN – Enhancing the Competitiveness of Michigan’s Maple Syrup Industry through Education, Outreach, and Strategic Market Development - FINAL**

### **PARTNER ORGANIZATION**

Commercial Maple Syrup Producers of Michigan

### **PROJECT SUMMARY**

Maple syrup is an important agricultural commodity in Michigan’s rural communities and working landscapes. Sugar maple trees – the best maple tree species to tap for syrup – grow throughout Michigan. In fact, the [sugar maple is Michigan’s most common tree species](#) and the northern hardwood forest type in which sugar maple grows covers about 5 million acres. Because of the size of this resource, especially in areas where it is privately owned, there is a potential to increase maple syrup production. In 2012, researchers from Cornell University studied the growth potential of the maple industry and its potential impact nationally. This study indicated that Michigan had the largest number of potential sugar maple taps nationally, yet only 0.5 percent is tapped for maple syrup production, in comparison to three percent in Vermont.

Through this grant, the Commercial Maple Syrup Producers of Michigan (CMPSM) were able to create an interactive website and social media platform as well as conduct several educational and outreach activities throughout the state. The purpose of these activities was to create an awareness of the economic growth potential of producing maple syrup and the impact this industry could have on the state.

### **PROJECT PURPOSE**

The primary purpose of this project was to increase the competitiveness of Michigan’s maple syrup industry by reaching out to property owners as to the potential economic growth and industry available.

### **PROJECT ACTIVITIES**

The following were the activities performed during the grant period:

- Created a website and social media platform by utilizing optimization techniques for outreach and education specific to Michigan's maple syrup industry.
- Developed and implemented maple industry education and training workshops throughout the state for current and prospective maple producers.
- Developed and implemented a 'Business of Maple' conference with industry experts to build credibility and excitement about the maple syrup industry and its growth potential in Michigan.
- Developed, published and distributed quarterly maple industry newsletters that included valuable industry information, upcoming events and education about the state's growth potential.

*(Please see 'Additional Information' section for web locations of newsletters and websites.)*

## GOALS AND OUTCOMES ACHIEVED

The Commercial Maple Syrup Producers of Michigan (CMPSM) is committed to creating an awareness of the economic growth potential of maple syrup production in Michigan. Information was and will continue through our website, Facebook page, newsletters, presentations, trainings and workshops.

- Our first goal was to establish a useable, interactive website filled with educational information that promotes the growth of the maple syrup industry in Michigan. The expansion and development of the website was crucial to the promotion and awareness of the growth potential of maple syrup production in Michigan. The website has proven to be extremely valuable and productive too. As a result of having a more interactive website, website traffic has increased 95%.

A Facebook page was created as a means to educate its subscribers in a timely fashion about current industry news and upcoming industry events. Currently, our Facebook page has over 600 subscribers.

An electronic newsletter was also created for our members that include valuable industry information, upcoming events and articles from area maple syrup suppliers. Newsletters are distributed on a quarterly basis to a mailing list of over 4,000 producers in Michigan.

The website and Facebook page continues to be interactive by adding 'linkages to other educational sites and maple syrup industry articles' in order to expand the educational focus.

- The second goal was to develop and implement a series of training workshops across the state that would provide outreach and networking opportunities to both prospective and existing maple syrup producers about the potential economic growth and impact this industry could have on Michigan maple syrup production. A series of nine outreach events took place throughout Michigan. During these workshops, the scope and content of these trainings were to provide producers a firsthand opportunity to learn about the potential growth there is in Michigan, the economics of increasing their tap count and the grassroots efforts of the Commercial Maple Syrup Producers of Michigan. These workshops were well received by attendees, who participated actively in discussions. An important outcome was a verbal recognition by a number of attendees that the economic growth potential of producing maple syrup in Michigan could provide a significant source of income for their farms.
- The third goal was the 'Business of Maple' Conference. This was our first year in attempting to facilitate a two-day conference where novice and experienced producers could all gain valuable information about the maple industry. Attendees had the opportunity to attend over twelve educational workshops that took place throughout both days as well as visit with

industry professionals and view the latest equipment. Maple industry professionals came from as far away as Vermont and Quebec to represent various industries such as CDL, Leader, D&G, Inc., and LaPierre. Workshops matched the stated goals of this project closely by providing both prospective and current maple producers with information, demonstrations and discussions of the potential growth of production. As an example – our key note speaker operates a 90,000 tap operation in Quebec. In addition members of the local press were in attendance and several articles were written throughout local Michigan newspapers, as well as various industry newsletters, such as ‘The Maple News’ and ‘The Maple Digest’. This conference had 90 registered attendees as well as a number of industry professionals in attendance.

## BENEFICIARIES

Direct beneficiaries of this grant are the over 4,000 stakeholders (producers, suppliers, consultants, extension personnel, and industry representatives) in Michigan. However, Michigan’s economy as a whole also benefits from a vibrant, sustainable diversified agriculture of which maple syrup is an important component. It is expected that the awareness of the economic growth that the maple industry can have for producers will create a substantial growth in the production of maple syrup in Michigan in the years to follow.

## LESSONS LEARNED

- Website/Facebook/Newsletters – In order to remain relevant in today’s society, we must continue to adapt to the needs of our industry members. We are happy to report that we are able to communicate with producers in such a timely fashion.
- Workshops/Trainings – The planning and coordinating of these workshops proved to be extremely difficult when trying to accommodate everyone as Michigan is such a large state. In order to maximize producer attendance, meetings were scheduled late in the day during the week at various locations throughout the year. Many producers, however, were still unable to attend due to their work schedules and other obligations. While these workshops proved to be extremely beneficial, feedback indicated that greater regional diversity is desired. Many producers had to travel over three hours to attend the closest one to their farm. Presenters had to travel much farther, in some cases, over ten hours to various locations in the Upper Peninsula. It was decided to install the presentation on our website to encourage those who were not able to attend any of the workshops a place where they could view the presentation at their leisure.
- ‘Business of Maple’ Conference - While we had hoped for more attendees, the exiting surveys concluded that our conference was extremely beneficial to the industry and the need for such education is desired. Surveys were conducted prior to and after the conference to gain information about their knowledge of the maple industry in Michigan and its growth potential. It is difficult to determine how much expansion will take place in the following year but we are confident that producers will apply the information and insights gained from their participation to determine if growth is practical for their operation.
- Grading School: It was determined prior to the end of this grant period that there would be remaining funds that would not be utilized prior to the end of the grant. As such, a committee was formed to create an idea on how we could utilize those funds. As a result of those efforts, a grant extension was awarded to conduct a grading school where producers could gain valuable information about the need to produce good quality maple syrup and incorporate the new maple grading system into their production practices. This type of training was created by the University of Maine and has never been conducted in the State of Michigan. This class is

highly reputable and has a proven record of educating the producer on giving them the 'hands on' experience needed to evaluate maple syrup's density, flavor, clarity, etc.

Unfortunately, this proved to be an exhaustive effort due to a number of issues - time of year, location, producer and presenter schedules. The event was scheduled and rescheduled several different times due to the unexpected illness of one of the presenters. Once a final date was established, notices were again sent out to producers with a given RSVP date. The RSVP deadline passed and unfortunately, there were not enough participants to make it feasible for the presenters to travel from Maine to Michigan. The presenters cancelled the event without knowledge being given to CMSPM. Phone calls were made to those who had expressed interest and it was determined that producers want this valuable information but were just not willing to commit to an RSVP deadline. In the future, a written agreement should be developed with specific details as to both parties' requirements and responsibilities.

A final survey was recently conducted of prospective and current maple syrup producers about the effectiveness and gained knowledge of maple syrup production and its growth potential in Michigan as a result of this grant. The following are the questions and responses received:

Has the information obtained through the CMSPM website, Facebook page, various trainings and workshops, 'Business of Maple' conference, and/or newsletters allowed you to:

1. Increase your knowledge or understanding of the potential of increasing maple syrup production in Michigan – Yes 95%, No 5%, Unsure 0%
2. Determine if increasing tap count will benefit your operation - Yes 69%, No 21%, Unsure 10%
3. Network with other producers and industry professionals about pertinent industry issues – Yes 93%, No 0%, Unsure 7%

#### CONTACT PERSON

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#### ADDITIONAL INFORMATION

Website: [Commercial Maple Syrup Producers of Michigan http://www.cmspm.org/](http://www.cmspm.org/)

Contains maple syrup production statistics, promotional video, news articles, and quarterly newsletters.

Facebook: Commercial Maple Syrup Producers of Michigan

## **PROJECT TITLE: MBG MARKETING – Soil Supplements to Hasten Blueberry Plant Establishment and Productivity - FINAL**

### **PARTNER ORGANIZATION**

MBG Marketing/The Blueberry People  
Michigan State University Department of Horticulture

### **PROJECT SUMMARY**

Half of Michigan's 21,000 acres of blueberries are over 30 years old and comprised of older, low yielding cultivars that are best suited for processed uses rather than fresh fruit. Many farmers are discouraged from replacing old blocks with new superior varieties because new plants often require eight – ten years to reach full production. If establishment times could be shortened, growers could economically replace older cultivars with more productive and versatile types.

Establishment rates are usually slowest on sites that are replanted after many years of blueberry production. There is anecdotal evidence that additions of activated charcoal (biochar) or humic acid can improve soil properties and enhance growth on replanted sites. We established four field trials to assess whether biochar or humic acid at two rates can accelerate establishment. Treatments did not affect growth in the first year, but the plants will continue to be assessed for two more years. These trials will provide blueberry growers with science based information on the benefits of these soil amendments.

### **PROJECT PURPOSE**

The objective of this work was to determine the impact of biochar and humic acid on soil qualities and establishment rate of new Michigan blueberry fields. The purpose is to provide methods of speeding establishment of new fields. This is very timely since Michigan growers need to replace some older varieties with newer, more productive and high quality types, in order to remain competitive with producers in other regions. A key obstacle to replacing old fields in Michigan is the slow rate of establishment.

### **PROJECT ACTIVITIES**

Four field trials were established on Michigan blueberry farms to determine the efficacy of activated charcoal (biochar) and humic acid for accelerating the growth of new blueberries. The following five treatments were replicated three times at each location. The activated charcoal used in these trials was manufactured in Marquette, Mich. by the Biogenic Reagents LLC. The source of the humic acid was Soil Conditioner from Nature's Concept, which contained 15% humic acids derived from humic shale ore.

1. Non-treated control
2. Activated charcoal, 800 lb per acre
3. Activated charcoal, 1,600 lb per acre
4. Humic acid, 300 lb per acre
5. Humic acid 600 lb per acre

Trial 1 was in Nunica, MI. Plots consisted of 60 foot-long sections of single rows. Treatments were applied on 20 Oct., 2014 in a two foot wide band on top of raised beds. The grower constructed the beds with soil and pine bark and wood chips. The experimental materials were tilled into the top six inches of the beds, and plants were placed about a week later. Humate was re-applied in Sep, 2015.

Trial 2 was in Holland, MI. Plots were the same size and treated on the same date as Trial 1. The Trial 2 planting was on flat ground rather than raised beds. Materials were incorporated and plots planted with 'Liberty' within two weeks of treatment application. Humate was re-applied in Sep., 2015.

Trial 3 was conducted in a South Haven, MI field that was planted in the fall of 2014. Treatments were applied on 29 May, 2015 (post-planting) by spreading materials on the soil surface in a two foot wide band. Treatments were not incorporated. Plots were 40 feet long sections of single rows.

Trial 4 was established in Nunica MI. Treatments were applied on 2 June, 2015 with the expectation that plants would be established soon after. Planting was delayed however, until Fall, 2015, when raised beds were constructed, including addition of pine bark and wood chips, and the plants were planted.

Soil samples (composite of 20 cores per plot, 6 inch deep) of were collected from Trial 1 and 2 in May, 2015, and from Trial 3 in Oct, 2015. Leaf samples (25 leaves per plot) were collected from these plots in Aug., 2015. In Sep., 2015, after shoot growth had generally ceased, the size of each bush was determined by measuring the height and width in the narrowest and widest dimensions. Canopy size was calculated as the product of these dimensions. Plant size and soil and leaf nutrient levels will continue to be monitored for four seasons.

#### GOALS AND OUTCOMES ACHIEVED

Soil properties. Treatments had no significant effect on soil pH or major nutrient levels one year after applications (Table 1). The biochar used in this study had the following chemical properties: pH about 10, ash 1.6%; carbon 94%; calcium 0.6%; magnesium 0.08%; nitrogen 0.2%; surface area per gram >450 m<sup>2</sup>. One concern was that the biochar would increase soil pH above the desired level for blueberries (<5.5). No treatment affected soil pH. This likely illustrates the fact that, although the biochar had a very alkaline pH, it is nearly inert. The highly buffered nature of soils readily neutralized the alkalinity added in the biochar. The biochar also was very low in major nutrients, so it was not surprising to see that additions did not affect soil nutrient levels. The humate product was applied at modest rates and also did not affect soil measured soil properties.

**Table 1. Soil pH and nutrient levels (ppm) in Sep., 2015, one year after biochar and humate applications.**

Treatment and lb/acre	pH	P	K	Ca	Mg
<u>Trial 1 (Nunica)</u>					
Control	5.6	74	152	434	65
Biochar 800	5.6	62	142	376	48
Biochar 1,600	5.6	69	140	400	54
Humate 300	5.4	62	121	298	38
Humate 600	5.5	59	109	363	50
<u>Trial 2 (Holland)</u>					
Control	5.0	110	88	334	74
Biochar 800	4.9	99	89	248	58
Biochar 1,600	5.0	87	78	256	55
Humate 300	5.0	100	81	243	54
Humate 600	4.9	110	84	258	59

Leaf nutrient levels. Nutrients in leaf samples collect in August, 2015 were little affected by treatments (Table 2). The only exception was zinc levels, where the highest rates of biochar and humate increase leaf levels relative to the control in Trial 2 and in all three trials combined. All Zn levels were above the deficiency level of 8 ppm.

Leaf nutrient levels varied widely from trial to trial, independent of treatments. Plants in Trial 1 were deficient in N, P, Fe and Cu (deficiency levels: <1.70% N, < 0.09% P, <60 ppm Fe, <3 ppm Cu). Plants in Trial 2 were in good nutritional health except that Cu levels were low. Those in Trial 3 were also deficient in N, P and Cu, though levels were not as low as those in Trial 1.

Table 2. Effect of biochar and humate applied in Sep., 2014 (Trial 1 and 2) or May 2015 (Trial 3) on blueberry leaf nutrient concentrations in Aug., 2015. Means shaded gray are below sufficiency levels.

Treatment, lb/acre	%						PPM					
	N	P	K	Ca	Mg	S	Zn	Mn	Fe	Cu	B	
Trial 1 (Nunica)												
Control	1.05	0.070	0.76	0.41	0.17	0.15	10.3	112	34	1.7	64	
Biochar 800	1.00	0.067	0.75	0.40	0.16	0.15	9.7	103	34	1.7	56	
Biochar 1,600	0.93	0.067	0.70	0.42	0.17	0.14	10.0	111	34	2.0	53	
Humate 300	0.89	0.067	0.74	0.38	0.16	0.15	9.7	114	35	1.3	51	
Humate 600	0.89	0.070	0.74	0.37	0.15	0.13	12.3	107	58	1.3	48	
Trial 2 (Holland)												
Control	2.37	0.137	0.80	0.38	0.14	0.19	23.3	a	113	493	3.7	45
Biochar 800	2.46	0.133	0.79	0.49	0.18	0.31	32.3	ab	151	618	2.7	47
Biochar 1,600	2.44	0.130	0.74	0.43	0.16	0.23	47.0	b	117	501	2.3	44
Humate 300	2.41	0.130	0.79	0.41	0.14	0.21	36.3	ab	121	495	2.3	47
Humate 600	2.33	0.133	0.82	0.45	0.18	0.25	44.3	b	118	557	2.7	48
Trial 3 (South Haven)												
Control	1.59	0.073	0.65	0.58	0.22	0.14	9.3	125	61	2.7	95	
Biochar 800	1.55	0.070	0.72	0.53	0.18	0.13	8.3	104	59	2.3	107	
Biochar 1,600	1.61	0.070	0.65	0.59	0.21	0.13	8.3	114	55	2.0	83	
Humate 300	1.47	0.073	0.72	0.49	0.18	0.14	9.0	125	52	1.7	89	
Humate 600	1.60	0.073	0.73	0.53	0.19	0.14	10.3	153	56	2.7	100	
All trials combined												
Control	1.67	0.093	0.74	0.46	0.17	0.16	14.3	a	119	196	2.7	68
Biochar 800	1.67	0.090	0.75	0.47	0.17	0.19	16.8	ab	119	237	2.2	70
Biochar 1,600	1.66	0.089	0.70	0.48	0.18	0.17	21.8	b	114	196	2.1	60
Humate 300	1.59	0.090	0.75	0.43	0.16	0.17	18.3	ab	120	194	1.8	62
Humate 600	1.61	0.092	0.76	0.45	0.17	0.17	22.3	b	126	223	2.2	66

**Plant size.** The only effect of treatments on bush size was in Trial 2, where the low rate of biochar resulted in larger bushes than the untreated control (Table 3). This may have been an oddity since the high rate of biochar did not increase size and biochar had no effect on bush size in other trials. We will look to see if the effect in 2015 is seen in subsequent years. Overall bush size was greatest in Trial 2, intermediate in Trial 3, and smallest in Trial 1. Differences between trials appeared to reflect mostly the size of plants when planted. Plants used in Trial 1 were particularly small.

**Table 3. Effect of biochar and humate applied in Sep., 2014 (Trial 1 and 2) or May 2015 (Trial 3) on blueberry canopy volume (inches<sup>3</sup>) measured in Sep., 2015.**

Treatment and lb/acre	Trial 1	Trial 2	Trial 3
Control	730	4310 bc	1600
Biochar 800 lb	680	6430 a	1460
Biochar 1,600 lb	520	5820 abc	1700
Humate 300 lb	670	6270 ab	1920

Humate 600 lb	680	3670 bc	1700
Means followed by a common letter are not significantly different at 5% level.			
Means in columns without letters are not significantly different.			

**BENEFICIARIES**

This work will benefit the more than 500 blueberry growers in Michigan.

**LESSONS LEARNED**

Blueberries are slow growing, long lived perennials. Although these treatments did not impact plant growth in year one, potential effects will be monitored for an additional two seasons.

**CONTACT PERSON**

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**ADDITIONAL INFORMATION**



Figure 1. Biochar and humate products used in these trials



Figure 2. Biochar and humate trials 1-4 (clockwise from upper left).

**PROJECT TITLE: MICHIGAN CHERRY COMMITTEE – Partnering with Grower-Cooperators to Establish Trials to Determine the Profitability of Tart Cherry Production Using High-Density Orchard Designs - FINAL**

**PARTNER ORGANIZATION**

Dr. Nikki Rothwell, Northwest Michigan Horticulture Research Center, Michigan State University.

**PROJECT SUMMARY**

Tart cherries are an important crop and an economic driver in the state of Michigan where growers produce 75% of the nation's tart cherries. However, the Michigan tart cherry industry is in need of orchard modernization to remain globally competitive. This project is working toward evaluating a new orchard system that will bring plantings into production sooner, enabling growers to achieve a quicker return on investment. This project will encourage Michigan growers to transition from traditional low-density orchard systems to high-density tart cherry plantings that have the potential to optimize fruit quality, improve production efficiency, maximize land use, and increase farm profitability. Through an industry-grower-researcher collaboration, funds were used to plant four experimental high-density tart cherry orchards at grower cooperator sites in northwest and southwest Michigan. Additionally, we provided in-depth educational programming to introduce growers to high-density tart cherry systems at educational programs. We also hosted a planning meeting to develop high-quality protocols for the proposed orchard plantings with grower cooperators and industry representatives. This project has the potential to revolutionize the tart cherry industry and improve the economic viability of Michigan's tart cherry producers.

**PROJECT PURPOSE**

The Michigan Cherry Industry continues to face increasing challenges from globalization. Many parts of the world are growing and processing both sweet and tart cherries with production advantages such as inexpensive labor, more conducive growing seasons, and accessibility to suitable, inexpensive farmland. For Michigan to be successful in the future global cherry market, growers need to be on the cutting edge of cherry research and technology. This proposal requests funds to plant four experimental high-density tart cherry orchards at grower cooperator sites in northwest and southwest Michigan.

**PROJECT ACTIVITIES**

Because nursery tree propagation was delayed, we were able to deliver more educational programming and harvest and pruning demonstrations than we defined in the original grant proposal. In total, we provided 15 educational workshops and demonstrations throughout the duration of this project. We estimate that we communicated high-density tart cherry information with approximately 860 Michigan grower participants at these events. These events were conducted at venues across the state, and as a result, we now have four growers that have planted high-density tart cherry orchards, and high-density tart cherry acreage in Michigan now totals approximately 120 acres. Additionally, two new harvesters that have the capability to harvest high-density tart cherries have been purchased in Michigan. We also have a Michigan-based company that has been modifying current blueberry harvest technology for high-density tart cherry systems.

These funds were used to further develop modern horticultural systems for specialty crops. Although this project was initiated in 2017, we were able to deliver quality and relevant outreach programming to Michigan growers for the past four years. Additionally, now that the high-density orchards have been planted, we will collect data in these orchards for at least the next 10 years. We will use these data to guide and develop recommendations for managing high-density orchard systems; trial results can be extrapolated for different fruit growing regions of Michigan as well as for other perennial orchard cropping systems. With these funds, we have established the first experimental high-density

tart cherry orchards at grower sites in the country, and we foresee continued valuable information to be developed for many years to come. This project has tremendous potential to hasten grower adoption of modern orchards that in turn could lead to increased grower returns.

## **GOALS AND OUTCOMES ACHIEVED**

*Objective 1. Introduce high-density tart cherry orchard systems to the Michigan cherry industry at two key educational programs and one harvest demonstration field day.*

The MSU team (Rothwell, Lang, Perry, and Iezzoni) presented at two educational sessions in Michigan in December 2015 and January 2016. Dr. R. Perry presented his over-the-row harvester work at the 2015 Great Lakes EXPO in Grand Rapids, MI (110 participants). He and Dr. G. Lang also presented high-density tart and sweet cherry work at the 2016 Northwest Orchard and Vineyard Show in Acme, MI (250 participants). Additionally, in February 2016, we hosted a high-density tart cherry orchard stop on the 2016 International Tree Fruit Association (IFTA) post-conference tour at one of the grower cooperator's farm: Calvin Lutz, Lutz Farms. During this educational stop, Drs. Lang, Perry, and Rothwell discussed training strategies, fertility, and yield potential for this high-density tart cherry block with 45+ tour participants.

Drs. Perry and Rothwell hosted a demonstration of an over-the-row harvester in a block of high-density tart cherries at the NWMHRC during harvest in 2015 and 2016 (~30-40 participants, in both years). Drs. Perry and Iezzoni also presented their high-density tart cherry research and rootstock trials at the 2016 NWMHRC annual open house in August 2016. Dr. Rothwell held a small on-farm pruning demonstration with a grower that is an early adopter of high-density tart cherries; grower cooperators on the proposed project and researchers had further discussions on improving planting and management strategies for the 2017 plantings at this field demonstration (35 participants).

Dr. N. Rothwell also presented results from current ongoing high-density tart cherry products at the Utah State Horticulture Association in January 2017 (75 participants) and at the Michigan State University Tree Fruit IPM School in February 2017 (130 participants). Lastly, Drs. G. Lang and T. Einhorn from the MSU Department of Horticulture held a pruning demonstration on April 17, 2017 with over 50 participants in attendance at the Manistee and Antrim Counties pruning demonstration sites.

On March 24, 2016, we held an intensive brainstorming session with project cooperators, MSU researchers, and industry leaders. Michigan participants included the following: Dr. Nikki Rothwell, Emily Pochubay, Jim Nugent, Steve Grant, John Grant, Calvin Lutz II, Calvin Lutz III, Mike Evans, Dave White, Adele Wunsch, Dr. Ron Perry, Dr. Amy Iezzoni, Dr. Greg Lang, and Phil Korson. This session also included collaborators from Utah, another region with significant tart cherry acreage. The Utah contingent included horticulturist Dr. B. Black, and four grower cooperators that will also be planting high density tart cherry orchards in 2017: Chris Wall, Jeff Rowley, Dave McMullin, and Taun Beddes. Funding for the Utah experimental orchard blocks was supported by Utah Specialty Crop Block Grant Program dollars.

*Objective 2. Host a planning meeting for grower cooperators, industry leaders, and researchers to develop initial orchard design and management strategies for high-density tart cherry orchards to be planted in spring 2017.* On 24 March, 2016, Michigan grower collaborators, representatives from the Michigan Cherry Committee (MCC), industry leaders (Korson), and the Michigan State University (MSU) research team (Drs. Rothwell, Ron Perry, Greg Lang, and Amy Iezzoni) convened at the Northwest Michigan Horticultural Research Center to establish planting and management strategies for the high-density tart cherry orchards that will be installed in spring 2017. In addition to the Michigan contingent, Utah State University researchers (Dr. Brent Black) and growers joined the meeting via teleconference. High-density tart cherry plantings will also be installed in Utah at four different grower sites; these plantings are funded through other means of support. Rather than an in-

person meeting, which was not possible with the groups' time constraints, we held this meeting via teleconference for all participants.

We designed this multi-state collaboration to optimize research results in order to accelerate grower adoption of high-density tart cherry systems in two states with significant tart cherry acreage. Based on input from the growers and the researchers, we were able to establish a plan for orchard establishment and management for these experimental high-density tart cherry blocks. This portion of the project was crucial and was part of the Work Plan. The following general parameters for orchard establishment were determined at the March meeting: 1) all orchard plots will be irrigated, 2) orchards will be planted 12ft between rows and 5ft between trees, 3) all orchard ground will be fumigated prior to planting, 4) fertility programs will use recommended establishment rates with the intention to bring into bearing in 2020 (YR3 after planting), and 5) tree pruning and training strategies at the time of establishment through YR3 after planting. Results and recommendations from the ongoing evaluation of these orchards will be disseminated to both the Michigan and Utah cherry industries on an annual basis.

*Objective 3. Order trees for four high-density tart cherry orchards at grower sites in two fruit growing regions of Michigan.* Tree orders were originally place in fall 2015. However, due to challenges in budding novel, non-commercially available rootstocks, such as the MSU rootstocks, we were significantly delayed in receiving trees for planting on grower cooperator farms. We relied on the expertise and resources of commercial tree fruit nurseries, but as we learned through this project, these nursery operations do not often work with new rootstocks, (like the MSU stock) and as a result bud take and survivorship were unpredictable. The lack of success at budding these trees in the nursery resulted in planting delays. Trees were planted in April 2017. In late April 2017, Dr. T. Eihorn developed a replicated block design for each of the growers, and he is currently measuring bud hardiness and development on these newly planted blocks. Dr. N. Rothwell has also taken tree measurements at each of the grower sites in Michigan in April 2017.

*Objective 4. The long-term goal is to determine the effectiveness of management practices and harvest technologies in modern tart cherry plantings to advance commercial application and grower adoption.* Despite early setbacks caused by nursery tree shortages and unsuccessful tree budding, the high-density plantings are currently in place at grower sites in Michigan. Because Michigan produces tart cherries on 32,000 acres, most of which are grown in traditional low-density orchard systems, this project has the potential to stimulate the transition of those acres from low-density to high-density plantings. Shifting the production strategies of a perennial crop industry is not a quick transition. Furthermore, when researching new production techniques, researchers are often limited to testing one or two hypotheses resulting in slow adoption of new practices on farms. Conducting research on innovative planting systems at research station sites has been necessary to provide the measured, empirical data needed for growers to transition their orchards, but New York and Washington researchers were able to expedite grower adoption by planting these modern orchards at grower sites. We anticipate that placing novel plantings in the hands of growers will increase industry adoption of high-density tart cherries in Michigan as well. By moving these new orchard system designs onto grower sites, grower operators will take a more holistic and practical approach to managing orchards, thereby advancing system adoption. Grower observations will accelerate research efforts through identification of untested parameters, and with timely feedback and communication, researchers can incorporate grower-generated ideas and concepts into recommendations for new orchard plantings.

In the short-term, this project will introduce the Michigan tart cherry industry to high-density tart cherry systems through directed educational programming conducted on grower farms. The primary long-term impact of this project will be improving farm profitability by minimizing time to harvest and maximizing fruit quality and tree health for the life of the orchard. Our approach of blending applied

field research and real-life management strategies will be essential for growers to implement these new systems. Michigan growers are the national leaders of tart cherry production and their role in determining the opportunities and challenges of producing tart cherries in a new system will be critical and necessary to keep Michigan cherry growers competitive.

## **BENEFICIARIES**

Because the Michigan Cherry Committee is the primary supporter of this proposed project, the nine grower members of this board have received annual results from this project. This group is made up of grower representatives from the primary cherry growing regions of the state; these growers are responsible for prioritizing and funding production needs for the tart cherry industry. Beyond the Michigan Cherry Committee board, over 600 Michigan, Utah, and Wisconsin growers that participated in our educational outreach programming conducted during the reporting period have also received information and research results from this project. We also had 45 participants attend the annual IFTA post-conference tour. More directly, the Michigan and Utah grower cooperators (8) have participated in the planning process to design the test orchards and to establish a uniform management protocol to best care for these plantings. During this process, research results from other high-density plantings were disseminated, and these growers directly improved their knowledge of modern orchard systems. With the planting of these high-density orchard sites in Michigan, these growers will benefit from hands-on experience to plant, train, and manage high-density tart cherry orchard systems. These experiences will directly influence other Michigan growers, as we will host demonstration field days at these orchards. Participating growers will witness the challenges and successes of growing this type of system, which will directly impact grower adoption of high-density tart cherry orchard systems in Michigan.

## **LESSONS LEARNED**

The primary challenge of this project was obtaining nursery trees. As mentioned in previous reports, there is a shortage of available nursery trees, which has greatly impacted commercial tree fruit growers across the country. Unfortunately, researchers are not immune to this shortage. We have had difficulties in finding enough of the var. Montmorency budwood to make the trees needed to establish the proposed test orchards. In the end, we were able to source Montmorency on the traditional rootstock Mahaleb for the test plots as well as the German rootstocks: Gisela 3 and Gisela 5. Additionally, five of the rootstocks that were selected for the test orchards were special orders, and Dr. A. Iezzoni had to work closely with the nursery throughout the budding process to ensure we will receive the correct trees in 2017. These rootstocks will be planted at grower farms, and through another national project called the NC-140 Regional Research Project. NC-140 is designed to address a number of high-priority areas within the North Central Region, as well as, other parts of North America. This project seeks to enhance economically and environmentally sustainable practices in temperate fruit production by focusing on rootstocks. Participating grower cooperators will work closely with researchers associated with NC140: Drs. Nikki Rothwell, G. Lang, T. Einhorn, and B. Black from Utah State University.

We also learned how important grower participation and cooperation are to the success of these Specialty Crop Block Grant projects. In particular, the grower cooperators were critical to determining appropriate orchard design and management procedures that will provide empirical research results. Additionally, growers add a 'real-world' perspective that is necessary to ultimately increase grower adoption of these modern orchard systems.

## **Contact Person**

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## Additional Information

### PROJECT TITLE: CHERRY MARKETING INSTITUTE (CMI) - Run Red, Ride Red: Engaging Fitness Communities in Tart Cherries' Recovery Science - FINAL

#### PARTNER ORGANIZATION

Cherry Marketing Institute worked directly with Competitor Group, Inc. to execute a paid media partnership.

#### PROJECT SUMMARY

The Cherry Marketing Institute (CMI) continues to develop and sustain awareness through programming that introduces tart cherries' many health benefits to key consumer audiences.

The fiscal year following the 2014 harvest season presented a window of opportunity to increase demand for tart cherries with a growing niche audience – endurance athletes and fitness enthusiasts. A paid partnership with targeted media positioned tart cherries as a healthful and widely available fruit to be included in an athlete's nutrition regimen.

The media partnership included:

- Banner advertising in four online properties: <http://triathlon.competitor.com/>, <http://womensrunning.competitor.com/>, <http://velonews.competitor.com/>, and <http://running.competitor.com/>
- Tart cherries inclusion in five pieces of editorial content in four publications: *Competitor*, *Women's Running*, *Velo* and *Triathlete*
- Tart cherries in social media content and a social media contest, including social promotion on Triathlete, Competitor and Women's Running social media channels

By leveraging the growing body of science behind tart cherries, the media partnership highlighted new and existing research related to exercise recovery, including a recently released study that linked tart cherries to reduced inflammation and oxidative stress in cyclists.

#### PROJECT PURPOSE

Our objective was to build awareness around, and increase demand for, tart cherries among endurance athletes and fitness enthusiasts.

The increasing participation in endurance sports presented a new target audience for the tart cherry industry and an excellent opportunity to increase demand for tart cherries. Since 2004, marathon participation has increased by 40 percent, and since 2000, the number of half marathon finishers has increased by 307 percent. Similarly, over the past decade, participation in cycling races has increased by 66 percent, and triathlon participation has increased by 714 percent.

Athletes are increasingly conscious of their nutrition regimen and are constantly looking for healthful, functional foods to incorporate into training regimens. The media partnership acted as a significant driver in building a new audience of tart cherry advocates. The partnership educated endurance athletes and fitness enthusiasts about the important health benefits of tart cherries specific to

exercise-related pain, and highlighted tart cherries' year-round availability and versatile usage applications.

Through the media partnership, we were able to put tart cherries in front of a highly engaged audience that looks for resources for achieving optimum athletic performance. Positioning tart cherries within these relevant media outlets put a credible stamp of approval on tart cherries and helped drive demand.

## PROJECT ACTIVITIES

Since the grant period began, in accordance with the work plan outlined in the grant proposal, we have completed the following activities:

- Began outreach, negotiated, finalized partnership and purchased media plan, including advertorial content development.
- Shared messaging and creative assets with media partner.
- Secured banner advertising, advertorial content, and social media content with media partner.
  - We secured a total of five advertorial placements in four publications: *Competitor*, *Women's Running*, *Velo* and *Triathlete*
  - We secured sixteen (16) total banner advertisements across four properties: <http://triathlon.competitor.com/>, <http://womensrunning.competitor.com/>, <http://velonews.competitor.com/>, and <http://running.competitor.com/>
  - We secured social media promotion through 11 social media posts on social properties of *Triathlete*, *Competitor* and *Women's Running* social media channels, including a dedicated social media contest driving consumer engagement

To ensure all grant funding was used to enhance the competitiveness of the specialty crop, all funds were applied directly to the paid media partnership with Competitor Group, Inc. All other costs associated with this project were funded by the Cherry Marketing Institute.

## GOALS AND OUTCOMES ACHIEVED

Below we have outlined goals and outcomes achieved, as compared to original projected outcomes and goals in the grant application.

**Project Goal 1:** Raise awareness of tart cherries among endurance athletes and fitness enthusiasts, supported by paid partnership with strategic health and fitness media outlets.

- **Target:** Our target was to reach three million endurance athletes and fitness enthusiasts through a paid partnership with health and fitness media outlets.
- **Outcome:** Combined audience reach (impressions) for advertorial content, digital banner ads, and social media support was 8.2 million, exceeding our goal of reaching three million endurance athletes.
- **Performance Measure:** We measured performance through detailed reporting from Competitor Group, Inc.
- **Monitoring:** We obtained reports from the media partners, and captured screenshots or hard copies of the tart cherry content in the Competitor group publications.

**Project Goal 2:** Increase traffic to choosecherries.com by 25 percent by September 2015, allowing for the opportunity to educate more consumers about the health benefits of tart cherries. The increased web traffic and awareness should in turn, increase demand for tart cherries.

- **Target:** Our goal was to increase traffic to choosecherries.com by 25 percent by September 2015, compared to a benchmark of 3,000 unique monthly visitors during the period from October 1, 2013, to April 1, 2014.

- **Outcome:** Through our efforts, we increased traffic to the choosecherries.com website by 79 percent, driving an additional 2,938 visits per month.
- **Performance Measure:** Website traffic was measured by Google analytics, a standard measurement tool that reports unique monthly visitors to websites.
- **Monitoring:** Website traffic was measured and charted on a monthly basis to compare to the previous fiscal year's traffic.

**Project Goal 3:** Increase tart cherry category growth in Michigan based on industry analysis and statistics. Our goal was to increase sales by 10 percent across all product forms.

- **Target:** Our goal was to increase sales by 10 percent across all product forms.
- **Outcome:** Sales increased 20%. Total sales for 2014/15 fiscal year were 267.6 million pounds.
- **Benchmark:** 2013/14 sales fiscal year sales totaled 222.0 million pounds.
- **Performance Measure:** Sales were based on industry analysis and statistics.
- **Monitoring:** Sales were measured and compared to previous year's movement based on USDA figures.

## BENEFICIARIES

The ultimate goal of the project was to benefit tart cherry growers in Michigan by increasing demand for tart cherries, in order to keep the tart cherry industry in a healthy condition, to keep jobs and income flowing to the industry members. Michigan produces and processes more tart cherries than any other state (accounting for 75 percent of total U.S. tart cherry sales) with 420 tart cherry growers and 22 processors. If input suppliers are included (chemicals, petrol, nurseries, transportation, farm equipment, etc.), the cherry industry helps employ more than 10,000 people. The Michigan tart cherry industry benefited from the increased demand, increased awareness and usage, and reinforced positive attitudes toward tart cherries.

## LESSONS LEARNED

The one challenge we overcame was during the media partner negotiation process. We learned the budget breakout included in the original grant proposal was not in line with what Competitor Group, Inc. was able to offer to us. We found out that banner advertising would cost more than initially anticipated, due to high reach of online properties. We addressed this challenge by submitting a formal request to the Michigan Department of Agriculture & Rural Development to modify the budget breakout, and received approval in May 2015. The main lesson learned is to try to secure pricing at the time of the grant application.

On a positive note, we have found that applying for expense-only funding (i.e. not incorporating staff time into the grant application) creates a more streamlined process.

## CONTACT PERSON

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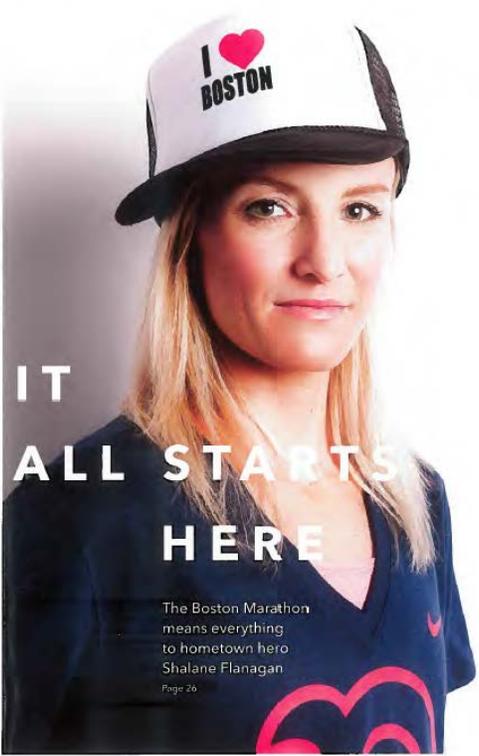
## ADDITIONAL INFORMATION

**Advertorial Placements; Banner Advertising; Social Media Screenshots**

Kara Goucher's  
running gear  
Page 20

APRIL 2015  
**competitor**

5 mental tips  
for runners  
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IMPROVE YOUR  
RUNNING FORM  
PAGE 42

IT  
ALL STARTS  
HERE

The Boston Marathon  
means everything  
to hometown hero  
Shalane Flanagan

Page 26

# MATT FITZGERALD

Elite Endurance  
Coach & Sports  
Nutritionist



I LOVE SNACKS THAT ARE EASY TO POP MID-WORKOUT. I KEEP A HALF DOZEN INDIVIDUALLY-WRAPPED **TART CHERRY GUMMIES WITH ME** ON LONG RUNS AND RIDES FOR AN EXTRA BOOST OUT ON THE ROAD.



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SPECIAL: THE BODY ISSUE

THE WORLD'S #1 TRIATHLON MAGAZINE

# triathlete

**SHAPE OF YOUR LIFE!**

**QUALIFY FOR KONA**  
Your game plan to get there  
PAGE 83

plus: **HOW THIS AGE-GROUPER PUNCHED HIS TICKET**

EAT FOR PERFORMANCE AND WEIGHT LOSS

BEST FOODS FOR TRIATHLETES

SIMPLE, DELICIOUS RECIPES

FUELING TIPS FROM (FOODIE) PROS

**HABITS OF THE SUPER-FIT AT ANY AGE**

**MATT FITZGERALD**

I like Endurance Coach & Sports Nutritionist!

**TRY TAKING A "SHOT" OF TART CHERRY JUICE CONCENTRATE (ABOUT 2 TABLESPOONS) BEFORE YOUR WORKOUT. IT'S PACKED WITH ABOUT 100 MONTMORENCY TART CHERRIES TO HELP AID RECOVERY AFTER INTENSE EXERCISE. YOU CAN ALSO MIX THE JUICE CONCENTRATE WITH WATER OR COMBINE WITH FROZEN TART CHERRIES IN A BLENDER FOR A SMOOTHIE.**

**TART CHERRY POWER SHOT**

Find thousands of other TART CHERRY recipes at [ChooseCherries.com](http://ChooseCherries.com)



**SHOP TALK**

I just read your Buyer's Guide, and wanted to point out a few corrections needed on your summary of the Felt 1A.

First, while this bike is quite aerodynamic, mechanically speaking, it is much easier to work on than other bikes in its class. I.e. Cervelo's P8, Trek's Speed Concept (especially the first generation) or the BMC TM01. I think this is one of the few companies who really spent a lot of time working with both the R&D engineering department as well as the mechanic's side of things (most notably the way the cables are run and the simplicity of the brake calipers). Last year's first generation was quite well thought out in this aspect; usually corrections/improvements take a year or two to be recognized and made.

Secondly, the basebar is fixed, just as any other, but it comes with various heights of spacers to go between it and the frame if you'd like to raise it. It also comes with a plethora of spacers, in 5mm increments, to raise the aerobars, separate from the basebar. It also comes with two different width mounts, used to space the aerobars farther apart from each other or closer together. Using those in conjunction with the two sets of bolt mounts on the aerobar clamps, and the six bolt holes in the armrests themselves, you can hit just about any adjustment needed for positioning. Sorry for picking bones, I just don't want anyone to miss out on this great bike due to misinformation.

ALEX WENZEL, SERVICE MANAGER, FULTON, BRUNSWICK, VA.

Thanks for the note, Alex. We asked our tech contributors, Aaron Harsh, to weigh in: Alex, you are right that there are comparable bikes that are much more

mechanically complex, but this bike sacrifices a bit of mechanical simplicity in favor of integration to increase aero performance. The integrated brakes are more difficult to position laterally than a standard external caliper, and a cover must be removed to perform any maintenance. Compared to the Specialized Shiv and the Cannondale Slice Black, for example, this is a simplicity sacrifice. Cable routing through the bar is also more complex than on those bikes.

Spacers can be used to raise the basebar—you're correct that it is only fixed in the horizontal dimension. The aerobars are quite adjustable as you mention, but that has become fairly standard among quality triathlon bikes. The reduced range of fit for the basebar, although not fully fixed, limits the bike's overall adjustability compared to the most adjustable on the spectrum. While the aero position is very customizable thanks to the bar, the brake grip position is moderately limited. Again, this bike is among the very best, so we are comparing it to other top performers.—Editor

**THINKING THRIFTY**

In his recent letter to the editor (April 2015 issue), Ramon Cevallos wrote about his utter disgust with the suggestion of finding a bike second-hand. He epitomizes everything about why I, personally, steer entirely clear of the classic "local bike shop" snobbery. When I began triathlon eight years ago, I walked out of my LBS in disgust and opted for an "online bike." Three years later, I built up my new triathlon bike by sourcing both new and secondhand parts online. My tri bike cost me about \$1,600 to build, but it's been priced by my homeowners insurance at no less than \$3,500. Ramon's letter clearly has one thing in mind—making a sale. By the way, Ramon, I support the local bike guy, too; I found a shop that does not do retail—they only service bikes. I advise readers to save their money and put it toward race entry fees.

—SCOTT LOUPE, WENFORD, ME.

**ERRATUM**

In our 2015 Triathlete Buyer's Guide special issue, we incorrectly stated that the Canyon GR 401 Hi-Mod bike can be built according to a rider's custom specifications; however, it is only available in PPA shop configuration.

We want to hear from you! Send your letters to [letters@triathlete.com](mailto:letters@triathlete.com). Please include your name and city. Letters may be edited for length and clarity.





strong presence in the marketplace. Using social media platforms such as Facebook, Twitter and Instagram to reach our audience is important, because it has a wide reach and it is measurable. Also, with these varied platforms, we were able to use photos, contests and advertising to help us educate consumers about identifying Michigan Apples.

## PROJECT PURPOSE

The ultimate purpose of this grant is to increase the number of consumers who choose to purchase Michigan Apples. Social media has provided us the opportunity to educate consumers about what to look for in the store and to educate and provide resources to encourage brand loyalty. Using social media platforms such as Facebook, Twitter and Instagram to reach our audience is important, because it has a wide reach and it is measurable. Also, with these varied platforms, we were able to use photos, contests, and advertising to help us educate consumers about identifying Michigan Apples.

Early on in the implementation of this grant project, we determined that a change of scope was needed to focus all of the funds directly on the social media portion of this project. The purpose of this project is to effectively and efficiently engage with our target audience through social media. Thankfully, the change of scope was approved, allowing us to shift funds initially aimed at in-store activities and advertising to the social media project as a way to pilot this approach.

MAC worked with a marketing firm to create a social media campaign to educate consumers and differentiate Michigan Apples from product grown elsewhere. Using social media platforms like Facebook, Twitter, Instagram and Pinterest to communicate messages as well as pictures, contests and social media advertising helped us to share information about varieties and flavor profiles as well as health benefits.

The objective of this project to more effectively focus efforts on engaging target consumers through social media includes:

- Social media campaign (\$75,000)

MAC hired a marketing firm to create a social media campaign to educate consumers and differentiate Michigan Apples from product grown elsewhere. Using social media platforms like Facebook, Twitter, Instagram and Pinterest to communicate messages as well as pictures, contests and social media advertising helped us to share information about varieties, flavor profiles, health benefits and how to identify Michigan-grown apples.

## PROJECT ACTIVITIES

A great deal of work was accomplished through this project. In the spring of 2015, MAC began working with global marketing and public relations firm Weber Shandwick. They helped us to pull together a social media campaign and strategy that encompassed three “mini-campaigns” that included an online sweepstakes. In addition to the strategy, graphics for posting on social media along with messages were created. The plans were finalized in August 2015 and the first mini-campaign, titled “Take Back Fall” was launched on September 1. The second mini-campaign was titled “Show Us Your Apples” and included an online photo sweepstakes as well as mobile advertising targeted to selected retailers in the local region. The third mini-campaign, “Breaking Traditions” highlighted apple cooking and baking traditions around the holidays and ran from November 1 to December 31.

Throughout the project, Weber Shandwick also helped us engage with consumers online with “surprise and delight” prizes for randomly drawn commenters, using user-generated content in the form of picture collages on Instagram, and monitoring engagement and reach through in-platform tools as well as additional tools the firm used regularly.

With an in-depth focus on the social media approach to consumer engagement, we were able to increase the number of consumers we engaged with online to educate them about Michigan Apples and how to find them in stores. Weber Shandwick helped us to measure an increase in reach and engagement across all of our social media platforms. Notably, engagements on tweets increased by 410 percent and engagements on Instagram posts increased by 755 percent. Across all platforms, post reach went up an average of 16 percent.

In September, “Take Back Fall” served as a rallying cry for apples to take back the role of being the flavor of fall from the pumpkin spice flavored products that seem to begin their “invasion” of grocery shelves as early as August. We asked consumers to talk about and share why they feel apples are the true flavor of fall, and we partnered with Biggby Coffee for social posts about their Caramel Apple Cider beverage, made with Michigan Apples.

The “Show Us Your Apples” Sweepstakes ran Oct. 1 - Oct. 23, 2015 and was supported by Facebook promoted posts, targeting Michigan and drive market residents, and a mobile advertising buy, targeting visitors of retailers in Michigan and Chicago. Entrants were encouraged to share pictures of their Michigan Apples, entering via direct upload on the sweepstakes page on MichiganApples.com or via hashtag on Twitter or Instagram. The winner was selected by random from the list of entries and will receive a hard cider tasting trip, courtesy of Michigan Apples (prizes were donated to MAC). The sweepstakes tallied 315 entries and garnered more than 9,100 page views on MichiganApples.com in the month of October. In addition, 10 percent of those visitors went on to visit other pages on the website.

Because October is the biggest marketing month for Michigan Apples, we also participated in mobile advertising, using geo-fencing to reach consumers on their mobile devices if they were at or near select targeted retailers. We tracked over two million impressions through the mobile advertising effort.

In November and December, the “Breaking Traditions” theme asked followers to share their holiday apple recipes, and MAC encouraged consumers to use apples in more unique applications, such as side dishes and salads.

We feel this project has been a positive effort for us, and something we will need to continue to focus on in order to move the needle in terms of increasing sales of Michigan Apples.

This project was solely focused on Michigan Apples, and there is no possibility of it benefitting non-specialty crop commodities.

#### GOALS AND OUTCOMES ACHIEVED

In an effort to increase MAC’s social media engagement, expand the digital audience and sustain audience interest over time, MAC implemented three themed mini-campaigns. Each included unique content ideas to increase engagement with the target audience. In addition, social media and mobile advertising was also implemented. These efforts included extensive measurement, as this project has served as a “pilot” for future work.

The goal of the project was to increase the number of consumers we engage with online/electronically, to educate them about why Michigan Apples are better and how to find them in stores. In order to do this, MAC implemented three mini-campaigns on the social media platforms Facebook, Twitter, Instagram and Pinterest. The mini-campaigns took place from Sept. 1, 2015 – Dec. 31, 2015.

The performance measure MAC set for this project, was to achieve a 10 percent increase in social media engagement on at least two of our social platforms. With an in-depth focus on the social media approach to consumer engagement, we were able to increase the number of consumers we engaged with online to educate them about Michigan Apples and how to find them in stores. Weber Shandwick helped us to measure an increase in reach and engagement across all of our social media platforms. Notably, engagements on tweets increased by 410 percent and engagements on Instagram posts increased by 755 percent. Across all platforms, post reach went up an average of 16 percent. In addition, followers on each of the four targeted platforms also increased significantly. Facebook followers increased by 20 percent over the course of the project; Pinterest followers increased by 14 percent; Instagram increased by 16 percent; and Twitter increased by 12 percent.

#### **Baseline data and increases:**

(Goal was to increase followers on at least two platforms by 10 percent.) Social Media Followers

##### Facebook

- August 2015 – 23,787
- December 2015 – 28,595
- Percent increase – **20.21%**

##### Pinterest

- August 2015 – 573
- December 2015 – 651
- Percent increase – **13.61%**

##### Instagram

- August 2015 – 948
- December 2015 – 1,100
- Percent increase – **16.03%**

##### Twitter

- August 2015 – 721
- December 2015 – 807
- Percent increase – **11.93%**

Tracking and measuring this social media activity and growth will inform our work for the future. This data will serve as a benchmark for work going forward.

#### **BENEFICIARIES**

Beneficiaries of this project include Michigan's 825 apple growers, as well as Michigan Apple shippers, processors and other industry partners.

Our job at the Michigan Apple Committee is to help set the stage for successful sale and marketing of apples at the retail level, by educating consumers about Michigan Apples. This project is one component that helps us to achieve that, which benefits the entire Michigan Apple industry.

#### **LESSONS LEARNED**

There were many lessons learned with this project. We feel that reaching out to consumers online has many benefits, as illustrated by the performance targets exceeded with this project. Using social media to educate consumers is helpful because you can use words, pictures and videos to educate them. Also, in comparison to other efforts, the cost is less for a large impact. This project has shown us that we need to continue in these efforts to cultivate more Michigan Apple consumers and grow brand loyalty.

Some unexpected outcomes included an increase awareness and education of our staff about the role of social media and particularly advertising within social media. The ability to target our audience based on demographics and geography has proven to be especially important.

#### **CONTACT PERSON**

Diane Smith, Executive Director  
800-456-2753  
Diane@MichiganApples.com

**ADDITIONAL INFORMATION**

**Social Media Measurements and Graphics**



**TOP POSTS PER CHANNEL**



TWITTER		PINTEREST		INSTAGRAM	
<p>It's apple cider season, so we're reaching for a @BIGGBYCOFFEE Caramel Apple Cider! Tag your apple pics #MIapples</p> <p><b>RETWEETS: 4</b> <b>FAVORITES: 3</b> <b>ENGAGEMENTS: 45</b></p>	<p>Did you know apple cores are good for your pup? It can help to clean residue of a dog's teeth, which helps to freshen her breath. Apples are a good source of fiber as well so vitamins A and C. Just make sure to remove core and seeds.</p> <p><b>REPINS: 3</b> <b>LIKES: 3</b></p>	<p><b>LIKES: 48   COMMENTS: 3</b></p>			
FACEBOOK					
<p><b>ORGANIC</b></p> <p><b>REACH: 23,481</b> <b>LIKES: 484</b> <b>SHARES: 352</b> <b>COMMENTS: 33</b></p>			<p><b>PAID</b></p> <p><b>REACH: 110,117</b> <b>LIKES: 4.7kk likes</b> <b>SHARES: 455</b> <b>COMMENTS: 264</b> <b>CPE: \$0.18</b></p>		



## FULL CAMPAIGN HIGHLIGHTS



- **TOTAL POST ENGAGED USERS:** 49,265 (0.7% higher than previous 4 month period)
- **TOTAL POST REACH:** 826,923 (15.6% higher than previous 4 month period)
- **PAGE GROWTH:** 4,800 page likes (20.2% increase)
- **AVG. PAID CPE:** \$0.20 (KPI: \$0.25 - \$1.50)



- **TOTAL TWEET ENGAGEMENTS:** 551 (410% higher than previous 2 month period)
- **PAGE GROWTH:** 68 followers (9.5% increase)
- *NOTE: Twitter metrics from September and October only.*



- **TOTAL POST ENGAGEMENTS:** 1,530 (754.7% higher than previous 4 month period)
- **PAGE GROWTH:** 191+ followers (20.5+% increase)
  - *Page growth from 11/1 through 12/31.*
- **TOTAL #MIAPPLES MENTIONS:** 1,057



- **TOTAL REPINS:** 8
- **TOTAL CLICKS:** 12
- *NOTE: Pinterest metrics from December only, Pinterest business account and analytics were set up beginning of December.*

## **PROJECT TITLE: MICHIGAN APPLE COMMITTEE – Trade Advertising for Promoting Michigan Apples - FINAL**

### **PARTNER ORGANIZATION**

Michigan Apple Committee

### **PROJECT SUMMARY**

The purpose of this project was to continue facilitating the resurgence of Michigan Apples into the marketplace after having lost a year of market presence in 2012. We accomplished this with an advertising campaign in the trade publication, The Packer. According to The Packer's 2014 media kit, they have a circulation of 13,039 readers – 8,747 of whom are retailers. MAC needs a consistently strong presence in trade advertising to garner the attention of retailers and rebuild confidence in the Michigan Apple industry.

MAC is continuing to work on rebuilding the Michigan Apple presence in the marketplace after 2012's crop loss. It takes a great deal of time and a focused presence for this to be successful. This project built on previous SCBGP-FB funded projects that have allowed us to continue to rebuild our presence in the marketplace.

Our job at Michigan Apple Committee is to help set the stage for successful sale and marketing of apples at the retail level. MAC, on behalf of Michigan Apple growers, must continue to have strong visibility with retail partners to assure them that high-quality Michigan-grown fruit and effective marketing programs will continue to be available to them. One of our key tactics for achieving this is advertising in trade publications, which allows us to share messages about available marketing programs, as well as crop updates and other industry information.

### **PROJECT PURPOSE**

The project has helped us to reinvigorate the Michigan Apple presence in the marketplace by continuing to cultivate a strong advertising campaign in trade publications in order to reach retailers and other partners with information about the Michigan Apple industry. As we continue to move forward from the 2012 crop loss, we must continue to concentrate resources on a strong presence in trade publications, reaching key retailers and partners.

### **PROJECT ACTIVITIES**

Using the \$35,000 in SCBG-FB (FY14) funding allowed MAC to purchase advertising space in The Packer. This publication reaches important audiences in the retail sector, including produce buyers. From the time frame of November 2014 to September 2015, MAC ran 12 ads in The Packer.

### **GOALS AND OUTCOMES ACHIEVED**

Using the \$35,000 in SCBG-FB (FY14) funding allowed MAC to purchase advertising space in The Packer. This publication reaches important audiences in the retail sector, including produce buyers. From the time frame of November 2014 to September 2015, MAC ran 12 ads in The Packer. Anecdotally, we received compliments from some industry members on the advertisements. Surveys were sent via email, using Survey Monkey, to 376 retailers on MAC's retailer email list.

The Michigan Apple industry is still working to regain the marketing momentum that was lost in 2012 when the crop was lost. This has been especially true in the retail sector, in which Michigan did not have a presence for nearly a full year. MAC will continue to rebuild marketing momentum over time through projects like this.

The goal of this project was to increase brand awareness among retailers. The performance measure was a 15 percent increase in brand awareness. We have not previously collected this information,

therefore the benchmark is zero. However in our survey, we did ask retailers to compare their brand awareness before and after seeing our trade advertisements. In our survey, 60 percent of respondents indicated that our advertisements raised their awareness of Michigan Apples, while 40 percent said they did not. We also asked retailers how effective were MACs ads in contributing to the success of Michigan Apples in the marketplace, and 80 percent indicated they were “somewhat effective” while 20 percent stated “no difference.” In our estimation, consistently applied pressure in advertising and reaching this audience will continue to be important going forward if we hope to increase brand awareness in the retail sector.

#### **BENEFICIARIES**

Beneficiaries of this project include Michigan’s 825 apple growers, as well as Michigan Apple shippers, processors and other industry partners.

#### **LESSONS LEARNED**

This project allows MAC to implement important work on behalf of Michigan’s Apple growers through marketing and communicating with retailers. Reaching them through trade publications is an effective and efficient way to communicate messages about the crop, consumer preferences, and marketing programs.

This project allowed us to build positive relationships with the trade publications and bring more attention to the Michigan Apple Industry.

#### **CONTACT PERSON**

Diane Smith, Executive Director  
800-456-2753  
Diane@MichiganApples.com

#### **ADDITIONAL INFORMATION**

MAC expended 100 percent of the grant funds by September 30, 2015.

#### **Advertisements**



## SUPPORT YOUR LOCAL APPLE

### Programs to show your support for locally grown!

Show consumers your support of locally grown Michigan Apples. Buying local is a top priority for most consumers, and the Michigan Apple Committee can help you with retail programs and consumer education messaging that highlights your commitment.

Make your fall plans today around the "Buy Local" theme, with fresh, quality fruit from the place where apples love to grow. For more information visit:

[MichiganApples.com/retail](http://MichiganApples.com/retail)



## THE FRESH TASTE OF MICHIGAN FUJIS

Michigan Fujis are a top-consumer favorite\* for good reason. Great size and color, perfect balance of sweet and tart and zesty flavor. Thanks to controlled atmosphere (CA) storage, you can crunch into a Fuji today and it's still taste "fresh-picked." Visit [MichiganApples.com/retail](http://MichiganApples.com/retail) for sourcing information from Michigan - where apples love to grow!

[MichiganApples.com](http://MichiganApples.com)



\*Consumer taste surveys performed by the Michigan Apple Committee, 2006-2015, in multiple locations, including Grand Rapids, Lansing, and Detroit, Mich., and Metro Chicago.



## CONSUMERS PREFER MICHIGAN APPLES

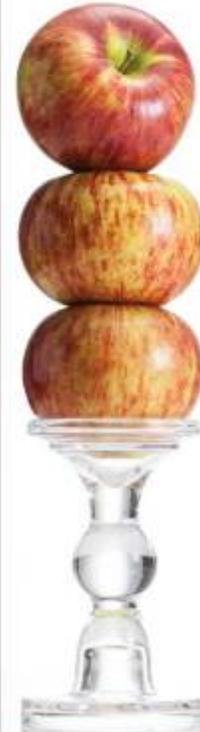
Consumer research shows that shoppers believe Michigan apples are fresher and taste better than the same varieties grown elsewhere.

Michigan Honeycrisp was the apple of choice in 9 out of 10 taste tests.

Other premium Michigan varieties like Jonagold and Fuji also consistently ranked higher with consumers.

Consumers consistently choose apples from the place where apples love to grow!

[MichiganApples.com](http://MichiganApples.com)



\*Consumer taste surveys performed by the Michigan Apple Committee, 2006-2015, in multiple locations, including Grand Rapids, Lansing, and Detroit, Mich., and Metro Chicago.



## Cheer in the New Year with Michigan Apples!



As we wrap up 2015, we know there are a lot of reasons why retailers are consistently stocking their shelves with Michigan Apples. Quality and freshness, dedicated growers, and many uses are just a few. We've compiled a top five list to cheer in the New Year from the place where apples love to grow.

### Top Five Reasons Why Michigan Apples Are the Best:

1. Michigan is the "apple state" with more than 15 varieties commercially available; there's a Michigan Apple to please even the pickiest eaters.
2. With sunny, warm summers and cool, crisp fall nights, nutrient-rich soil, and plenty of moisture from the Great Lakes, Michigan's climate and geography are ideal for growing flavorful apples.
3. With health benefits for just about every part of the body, Michigan Apples are an ideal health food!
4. Growers in Michigan's 250 apple growers are dedicated to providing the best quality apples with superior flavor and freshness. Look for apples marked "Michigan Apples".
5. They are preferred by consumers! In independently-conducted focus groups, consumers preferred Michigan Honeycrisp, Jonagold and Fuji when compared with the same varieties grown elsewhere.\*

Find more information on our website:

[MichiganApples.com](http://MichiganApples.com)



## Email Blast and Survey Screen Shots



MICHIGAN APPLE  
**RETAIL  
UPDATE**



**October 15, 2015**

Dear Retailer,

The Michigan Apple Committee would like your feedback regarding the success of our trade advertisement campaign. Please take a couple of minutes to complete and submit the online survey found [here](#). This survey will help us to determine the effectiveness of our trade advertisements, so your opinion is greatly appreciated!

Thank you in advance for taking the time to complete this survey. If you have any questions, feel free to contact the MAC office at 517-669-8353 or [staff@MichiganApples.com](mailto:staff@MichiganApples.com).

Thank you for your feedback.

Sincerely,

Diane Smith  
Executive Director

**MichiganApples.com**

## MAC Trade Advertising Survey

### Purpose

The Michigan Apple Committee (MAC) would like to hear your opinion regarding the success of the trade advertisements promoting Michigan Apples, beginning November, 2014. Please fill out this survey as completely and accurately as possible.



1. Did you find the ads were noticeable?

- Not noticeable
- Not very noticeable
- Somewhat noticeable
- Very noticeable

2. Did the ads encourage you to increase orders of Michigan Apples to sell in your store?

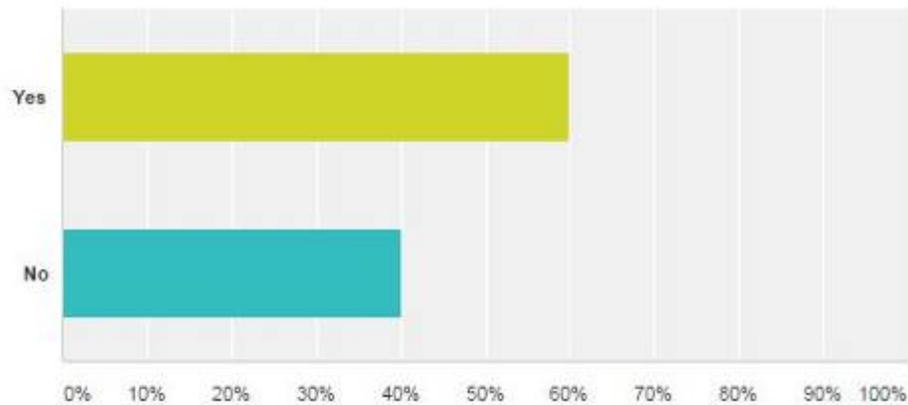
- Yes
- No

3. Did the ads raise your awareness about Michigan Apples?

## Survey Results

### Did the ads raise your awareness about Michigan Apples?

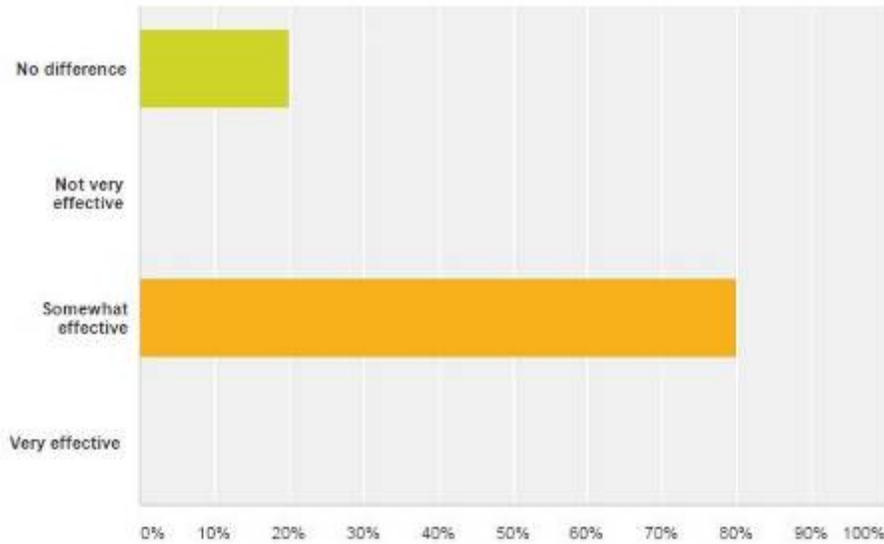
Answered: 5 Skipped: 0



Answer Choices	Responses
Yes	60.00% 3
No	40.00% 2
Total	5

**Overall, how effective were the trade advertisements for the success of Michigan Apples in the marketplace?**

Answered: 5 Skipped: 0



Answer Choices	Responses
No difference	20.00% 1
Not very effective	0.00% 0
Somewhat effective	80.00% 4
Very effective	0.00% 0
Total	5

**PROJECT TITLE: NATIONAL GRAPE GROWERS COOPERATIVE, INC. – Enhancing the Competitiveness of Niagara Grapes, Expanding Processing and Export Opportunities for Michigan Growers – FINAL**

**PARTNER ORGANIZATION**

National Grape Growers Cooperative, Inc.; OTHER PARTNERS- Michigan State University, Department of Food Science and Nutrition; Michigan State University, Product Center Food-Ag-Bio

**PROJECT SUMMARY**

This project was developed to identify processing opportunities for the Lawton, MI grape processing facility. At the time of the writing of this grant the facility was processing and concentrating Concord and Niagara grape juice. In addition, the facility was bottling sparkling grape juice for marketing under the Welch’s juice label.

The first objective of this project was to test the concentrate and juice quality produced by National Grape, Inc's current commercial process in its Washington State and Michigan plants and compare it to an alternative commercial process (centrifugation) that promises to provide a higher quality juice. In this case quality is determined by the level of browning present in the juice, as well as the consumer preference for juice flavors under alternative processing treatments.

Six samples of Niagara Grape Juice (NGJ) were treated and processed using commercial processing facilities, concentrated and bottled (16oz) into single strength juice and shipped to MSU for storage and evaluations. Three samples were from Michigan, treated and processed at the Lawton (LT), Michigan plant using CSP press: No SO<sub>2</sub> (LT No SO<sub>2</sub>), SO<sub>2</sub> treated (LT SO<sub>2</sub>), and ascorbic acid treated (LT AA). In Grandview (GV), Washington, grapes were treated (GVSO<sub>3</sub>) and AA (GVAA) with using a similar CSP processing, and another at Fruit Smart using the Decanter Process (DP), with AA treatment (FSAA). It was not possible to produce a SO<sub>2</sub> control using the FS DP because they did not possess the necessary equipment to complete both processes. The decanter process may be a more gentle type of processing because it uses a centrifugal type of juice extraction, however, there are other steps in the process that could affect the final juice quality to a lesser or greater extent. Thus this study was conducted to use real commercial processing along with the comparison of the SO<sub>2</sub> and AA treatment to evaluate sample differences, and storage at 72°F and 100°F accelerated storage. Results of this study produced real life, large scale comparisons based on knowledge gleaned from previous small scale or laboratory research.

Ultimately among the samples tested, those samples that use the current processing method were viewed most favorably or not significantly different from the samples with the new treatments (those with Ascorbic Acid added or those used that were produced with the DP).

This project also utilized a trained consumer panel to test the various samples for both taste and visual appeal. In the consumer panel results, juice produced using the existing process were rated most acceptable.

One of the goals of this project was to identify opportunities for export markets which have more stringent requirements related to added preservatives. The best outcome in this study was with the current handling method which uses sulfur dioxide during the early processing step to control browning. The addition of SO<sub>2</sub> is one of the major deterrents to export markets. Given this outcome, a second Specialty Crop Block Grant was proposed to further investigate processing methods to increase the appeal of Niagara grape juice to export markets, however this project was not accepted.

One outcome of this project which was unanticipated and also changed the focus somewhat was that Welch's and National Grape, Inc. moved ahead with investment in a centrifugation system at the Lawton plant during the time period of the grant (an investment of over \$100,000). Since one objective of the project was to detail the feasibility of investment in such a system, this changed the final deliverable in the feasibility study.

## PROJECT PURPOSE

Concord and Niagara grapes are the leading grapes produced for juice in Michigan, with 12,100 total acres in 2012. Niagara grapes account for about 29% of total juice grape acreage, or about 3,480 acres while the purple Concord variety accounts for the remaining acreage. National Grape Cooperative Association, Inc. (NGCA), and Welch's (National Grape's wholly-owned subsidiary) owns and operates a grape processing facility in Lawton, Michigan which employs 88 full time employees and an additional 20 seasonal employees that processes Niagara and Concord grapes. Annually the plant ships approximately 16 million gallons of grape juice concentrate from the facility to eastern U.S. markets as well as for export. Because of their high polyphenol content Niagara grapes, the primary

white grape variety grown in Michigan, have a greater tendency to brown during the crushing, de-stemming and juice extraction process. Currently the Welch's 7 plant in Lawton, Michigan utilizes a screw press, cylindrical filtration process that involves the use of paper and an extra heating process to extract remaining juice from the paper. This is a harsher process that is thought to contribute to the resultant darker color of the white grape juice. An alternate, more modern and less harsh decanting process that utilizes centrifugation for juice extraction has the potential to reduce the initial juice browning, avoid paper waste, and allow for grape seed recovery that can be sold for a high value product, grape seed oil production. This has the potential to make the process more sustainable and produce a higher quality white grape juice that is more competitive with varieties of white grapes grown in other states. By production of a higher quality juice, and alternative value added by products, the potential for greater utilization of the Lawton plant facility exists. The economic feasibility and quality assessment study proposed is needed prior to any commitment of capital investment into modernization.

## PROJECT ACTIVITIES

### **Technical Summary of Niagara Grape Juice Processing and Storage Study**

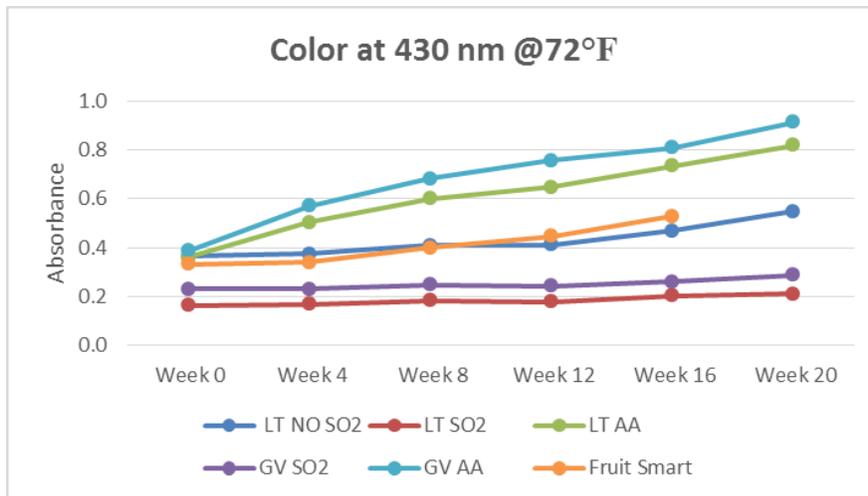
The objective of this study was to evaluate the commercial Niagara grape processing type and treatment for juice using both a conventional screw press (CSP) and decanter process (DP), with the commonly used sulfur dioxide (SO<sub>2</sub>) and anti-browning alternative, ascorbic acid treatment (AA). SO<sub>2</sub> has multiple functions that are hard to replace: anti-browning, bleaching, antifungal, enzyme reduction, and clarification. However, some studies have shown AA, a reducing agent, to be an acceptable replacement and because of the growing objection to SO<sub>2</sub> use because of allergic-like reactions of some when consuming products containing SO<sub>2</sub>. This also has implications for trade with other countries such as Japan, who are limiting the allowed amount of SO<sub>2</sub> into their imported foods.

Six samples of Niagara Grape Juice (NGJ) were treated and processed using commercial processing facilities, concentrated and bottled (16oz) into single strength juice and shipped to MSU for storage and evaluations. Three samples were from Michigan, treated and processed at the Lawton (LT), Michigan plant using CSP press: No SO<sub>2</sub> (LT No SO<sub>2</sub>), SO<sub>2</sub> treated (LT SO<sub>2</sub>), and ascorbic acid treated (LT AA). In Grandview (GV), Washington, grapes were treated (GV SO<sub>2</sub>) and AA (GV AA) with using a similar CSP processing, and another at Fruit Smart using the DP, with AA treatment (FS AA). It was not possible to produce a SO<sub>2</sub> control using the FS DP because they did not possess the necessary equipment to complete both processes. The decanter process may be a more gentle type of processing because it uses a centrifugal type of juice extraction, however, there are other steps in the process that could affect the final juice quality to a lesser or greater extent. Thus this study was conducted to use real commercial processing along with the comparison of the SO<sub>2</sub> and AA treatment to evaluate sample differences, and storage at 72°F and 100°F accelerated storage. Results of this study produced real-life, large-scale comparisons based on knowledge gleaned from previous small-scale or laboratory research.

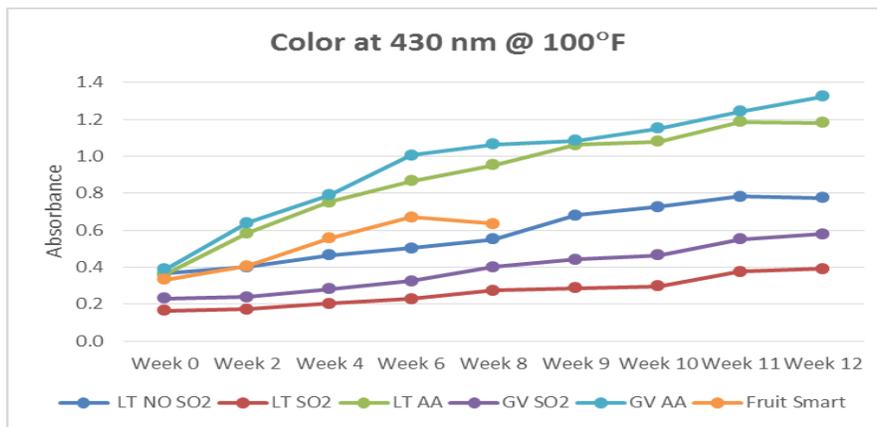
**Methods:** Methods used were those presented in the proposal. SO<sub>2</sub> concentrations ranged from 100 ppm in the field, up to 130 ppm during processing. AA concentrations were 500 ppm.

### **Results of Physiochemical Objective Evaluations**

Color Absorbance, 430nm:

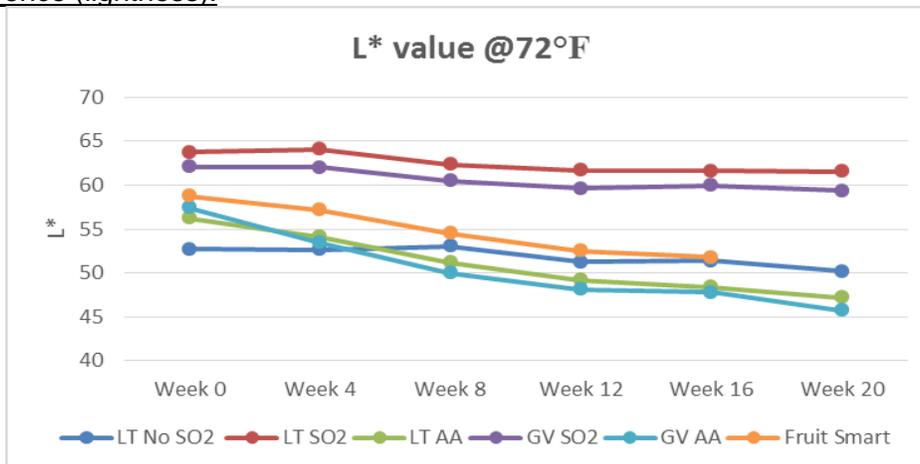


The general absorbance trend over time for the 72°F stored samples was (darkest to lightest): GV AA > LT AA > FS AA (slightly lower than LT No SO<sub>2</sub> until equal at week 4 then slightly higher) > LT No SO<sub>2</sub> > GV SO<sub>2</sub> > LT SO<sub>2</sub>.

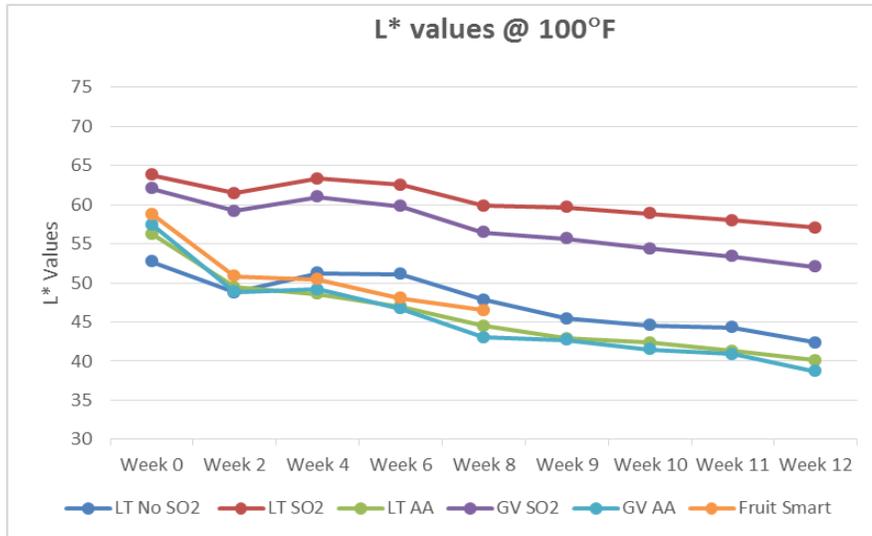


For the 100°F stored samples the trend was similar but there were significant differences essentially for all samples at each evaluation over the 12 weeks (darkest to lightest): GV AA > LT AA > FS AA > LT No SO<sub>2</sub> > GV SO<sub>2</sub> > LT SO<sub>2</sub>. The Fruit Smart AA processing//treatment samples had higher color absorbance than the SO<sub>2</sub> treated samples (CSP), but lower than the AA treated samples (CSP).

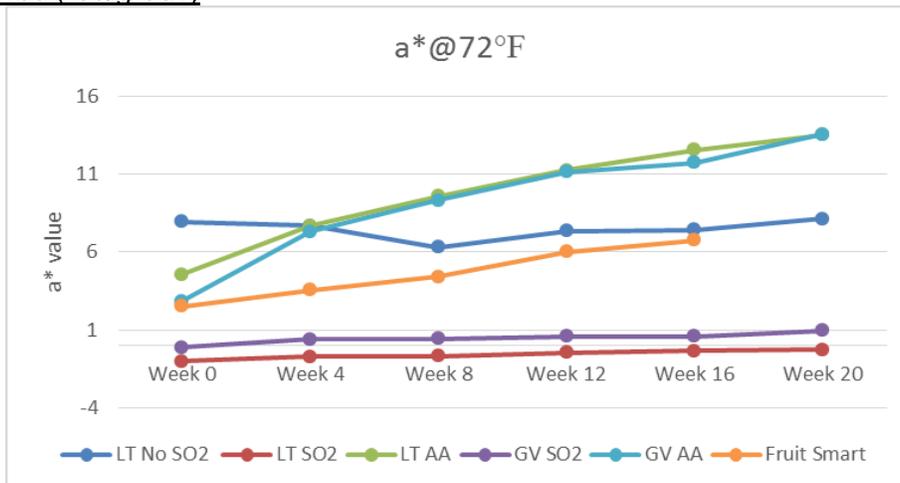
“L” Color Difference (lightness):



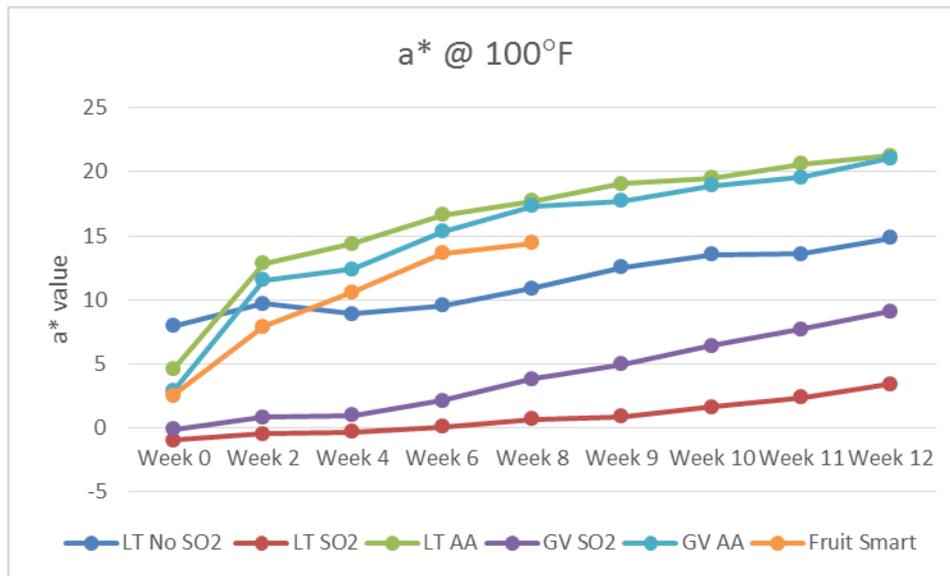
Higher L values are lighter on a 0-100 scale. The overall trend for both the 72°F and 100°F stored samples was (darkest to lightest but lowest L value to highest L value) GV AA < LT No SO<sub>2</sub> < LT AA < FS AA (up to 8 weeks) < GV SO<sub>2</sub> < LT SO<sub>2</sub>. Sulfur dioxide treatment has a bleaching property that lightens the juice while ascorbic acid can degrade over time, allowing for darkening. These results generally supported the Color Absorbance results.



a\* Color Difference (red/green)

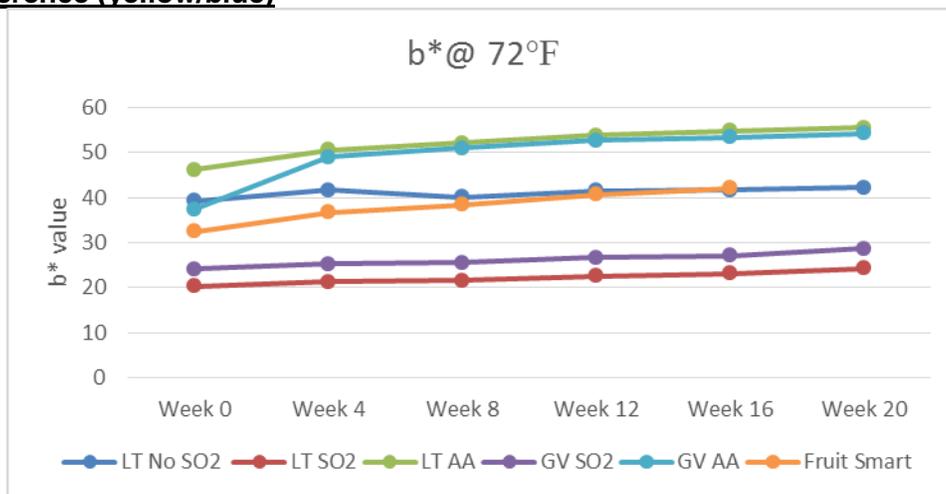


At 72°F, the a\* of SO<sub>2</sub> treated juices both LT SO<sub>2</sub> and GV SO<sub>2</sub> had slightly increased in red color. The AA treated juices: LT AA, GV AA and Fruit Smart trended to highly increase in a\* (more red color) with a darker brown color over the storage time.

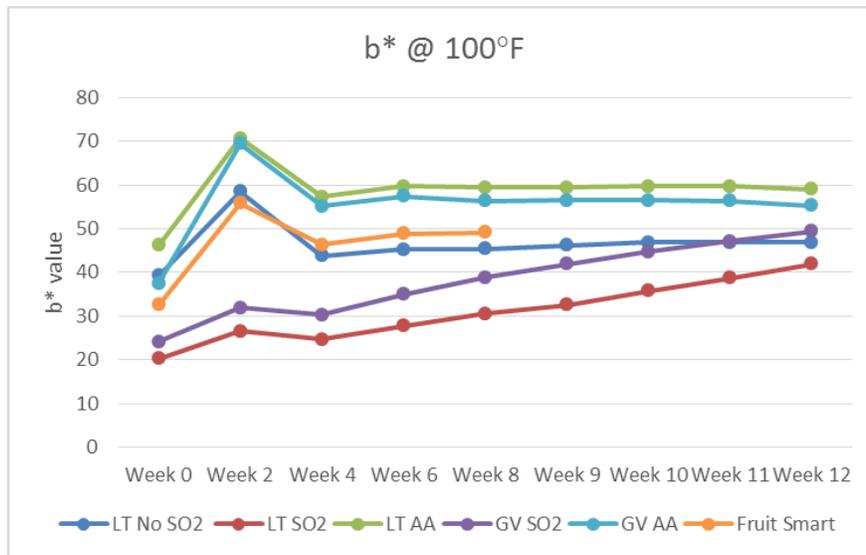


At 100°F, the a\* of SO<sub>2</sub> treated juices both LT SO<sub>2</sub> and GV SO<sub>2</sub> had slightly increased in red color. The AA treated juices: LT AA, GV AA and Fruit Smart tended to increase a\* with a darker brown color over the storage time. The trends were LT AA >GV AA> FS AA (after week 2)> LT No SO<sub>2</sub>> >GV SO<sub>2</sub>>LT SO<sub>2</sub>.

**b\* Color Difference (yellow/blue)**

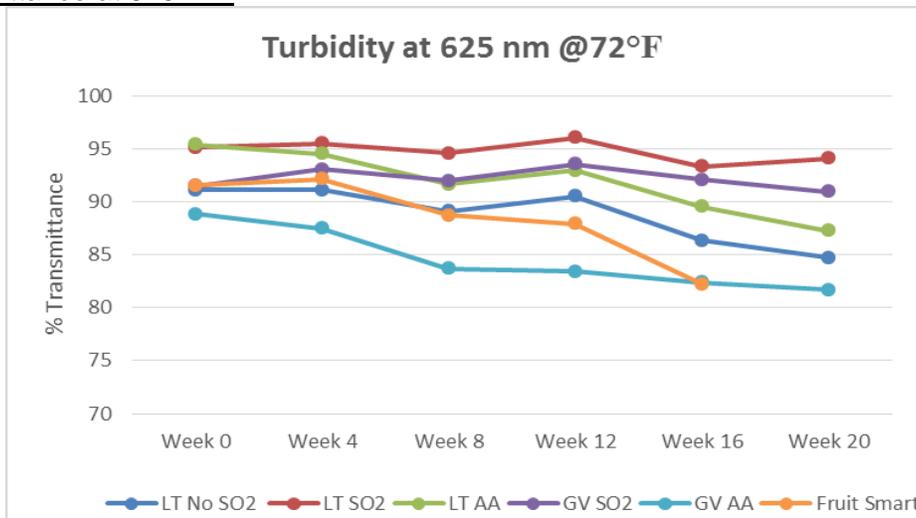


The b\* of SO<sub>2</sub> treated juices both LT SO<sub>2</sub> and GV SO<sub>2</sub> had a slightly increased yellow color. The AA treated juices: LT AA, GV AA and Fruit Smart tended to increase b\*, with darker brown color increasing over the storage time.



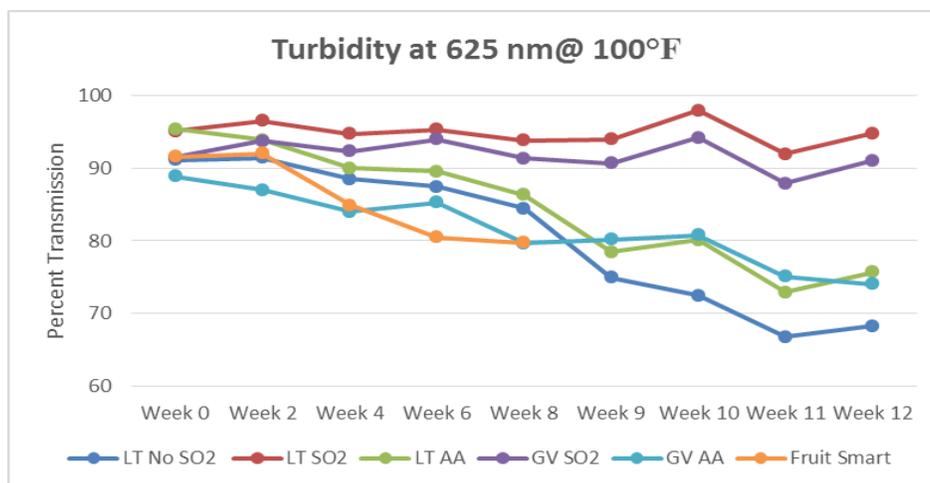
The b\* of SO<sub>2</sub> treated juices both LT SO<sub>2</sub> and GV SO<sub>2</sub> had constantly increased in yellow color over storage of time. The AA treated juices: LT AA, GV AA and Fruit Smart highly increase b\* in week 2 and then were stable over the storage time.

Clarity, Transmittance at 625 nm:



For 72°F, the trend of turbidity (% transmittance) of white grape juice decreased during the storage time. Juices treated with SO<sub>2</sub> both LT SO<sub>2</sub> and GV SO<sub>2</sub> slightly decreased compared to juices treated with AA. Fruit Smart had higher decreased from week 12 to 16 due to develop mold or fungi. Turbidity or haze may develop from unstable proteins that reacted with polyphenols, forming particles of 0.3-1.0 μm diameter and particles greater than 0.5 μm may settle out and form precipitates (Van Buren 1989; Girard and Fukumoto 2000).

The general trend was initially (cloudiest or lowest values to clearest or highest values): LT AA = LT SO<sub>2</sub> > GV SO<sub>2</sub> = LT No SO<sub>2</sub> = FS AA > GVAA. At week 16 storage at 72°F (cloudiest or lowest values to clearest or highest values): FS AA = GV AA < LT No SO<sub>2</sub> < LT AA < GV SO<sub>2</sub> = LT SO<sub>2</sub>. Over time, the LT AA dropped from the clearest to the third clearest sample. Other changes were more minor.



For 100°F, over time the LT SO<sub>2</sub> samples had the highest percent transmission values (significantly higher), and followed by the GV SO<sub>2</sub> samples, LT AA, and GV AA being not different. LT no SO<sub>2</sub> increased in turbidity. At week 8, FS AA samples had the same values as the GV AA (lowest of all samples for that week). Cloudiest or lowest to clearest or high values: GV AA=FS AA < LT No SO<sub>2</sub> < FS AA = GV AA. For 100°F storage at 12 weeks (cloudiest or lowest to clearest or high values): LT No SO<sub>2</sub> < GV AA = LT AA < GV SO<sub>2</sub> < LT SO<sub>2</sub>.

**Total Phenolics (TP):** Overall the GV AA had the highest TP values initially and over storage at 72°F, and 100°F while the LT No SO<sub>2</sub>, had the lowest values. The order for initial values was essentially: GV AA > GV SO<sub>2</sub> > LT AA > LT SO<sub>2</sub> > FS AA > LT No SO<sub>2</sub>. Over time the trend stayed essentially the same. FS AA samples were not evaluated after week 16 (72°F) and week 8 (100°F) due to poor quality and turbidity issues.

**TSS:** TSS increased slightly over time for the 72°F stored samples. No real changes for the 100°F stored samples.

**pH:** Not much difference at all. About pH 3.4 for 72°F and 100°F stored samples.

**TA:** No real change for samples stored at both temperatures.

### Sensory Evaluations

**Consumer Panel Results:** Consumer test ran on April 26, 2016, there were 102 panelists, samples stored at 72°F, on storage week 12. The attributes of color, cloudiness (turbidity), flavor, and overall acceptability were evaluated for consumer acceptance. The 9-point hedonic scale was used to evaluate.

The LT SO<sub>2</sub> samples received the highest overall acceptability of 6.73a/9. There were no significant differences in acceptability for LT No SO<sub>2</sub>ab = GV SO<sub>2</sub>ab = FS AAab juice samples. Sample GV AA received a 5.92b (but not statistically different from those three samples), followed by the lowest rating of LTAA, 5.25c. The statistically lowest flavor score for this sample may have driven down its overall acceptability rating. Adding AA, may have increased sourness and thus affected the flavor profile. The color acceptability values were not significantly different for samples except for GVAA (5.90/9bc) and LTAA (5.69c/9) which had the lowest scores. LT No SO<sub>2</sub> and GVAA juice samples were also not significantly different for color acceptability.



419=LT no SO<sub>2</sub>; 354=LT SO<sub>2</sub>; 659=GV SO<sub>2</sub>; (bottom row) 589= FruitSmart AA; 895=GVAA; 947=LT AA (top row)

**Trained Panel Results:** Test ran on February 4, 2016 to June 23, 2016, there were 10 trained panelists. The attributes of color, cloudiness (turbidity), grape odor and flavor, cooked-off odor and flavor, the other-off odor and flavor, and overall acceptability were evaluated for consumer

acceptance. The 15-point hedonic scale was used to evaluate. Color- Significant differences in color were found between most 72<sup>o</sup>F samples for each evaluation week. For the 100<sup>o</sup>F stored samples this was not as common. For both storage temperatures, the LT No SO<sub>2</sub> samples started fairly dark and did not increase until week 8 for 100<sup>o</sup>F stored samples. Most increased over time as expected. LT AA & GV AA samples started and continued to be the darkest, LT No SO<sub>2</sub>, started about the same darkness but over time leveled off, and FS AA samples were as darkness as LT AA and GV AA by week 8. For the 72<sup>o</sup>F LT AA and GV AA samples remained the darkest with LT No SO<sub>2</sub> slightly darker than the FS AA samples.

Consumer “color liking” scores agreed with these trained panel results by showing a significantly lower scores for the LT AA and GV AA samples that were shown to have the darkest trained panel scores. Objective color absorbance scores also agree with these results. Color Difference L Values had a similar trend with the GV AA samples having the lowest (darkest) L\* value, while the LT AA values were not significantly different than the LT no SO<sub>2</sub> samples (less dark than GVAA). For Clarity at 625 nm after storage, the LT SO<sub>2</sub> and GVSO<sub>2</sub> had the highest values (clearest) with FS AA and GV AA samples being the least clear. However, all clarity values were still fairly high except for evaluations closer to the last third period of evaluations, with the LT and GV SO<sub>2</sub> samples still holding at fairly clear. LT No SO<sub>2</sub> samples generally had slightly lower trained panel sensory scores than the FS AA samples with the LT SO<sub>2</sub> having the highest quality and trained panel sensory scores and GVSO<sub>2</sub> samples as high or slightly lower.

LT SO<sub>2</sub> and GV SO<sub>2</sub> samples had the lowest “cooked odor” sensory scores for both storage temperatures. There was not much change over time. A similar trend was seen for “cooked off flavor”, 72<sup>o</sup> and 100<sup>o</sup>F storage. LT SO<sub>2</sub> and GV SO<sub>2</sub> had the lowest scores. FS AA and GV AA scores were the next highest, followed by the highest scores for LT AA and LT No SO<sub>2</sub> samples.

There were no differences in the “grape odor”, “grape flavor, or “other off flavors” stored over time (72<sup>o</sup>F or 100<sup>o</sup>F) for juice samples. The “other off flavors” scores were low throughout storage. There were very few off flavors in the initial samples other than LT SO<sub>2</sub> juices, although those scores were still fairly low (3.6/15). Some panelists identified slight “sulfur” odors in these samples.

With the stored samples there were no significant sensory differences in “Overall quality Difference from Control” between samples at any week’s evaluation. Since color was the largest attribute affected by storage, it was only one of eight attributes evaluated, and it showed the greatest differences, the overall differences from control were not judged to be very large “overall” by the trained panelists.

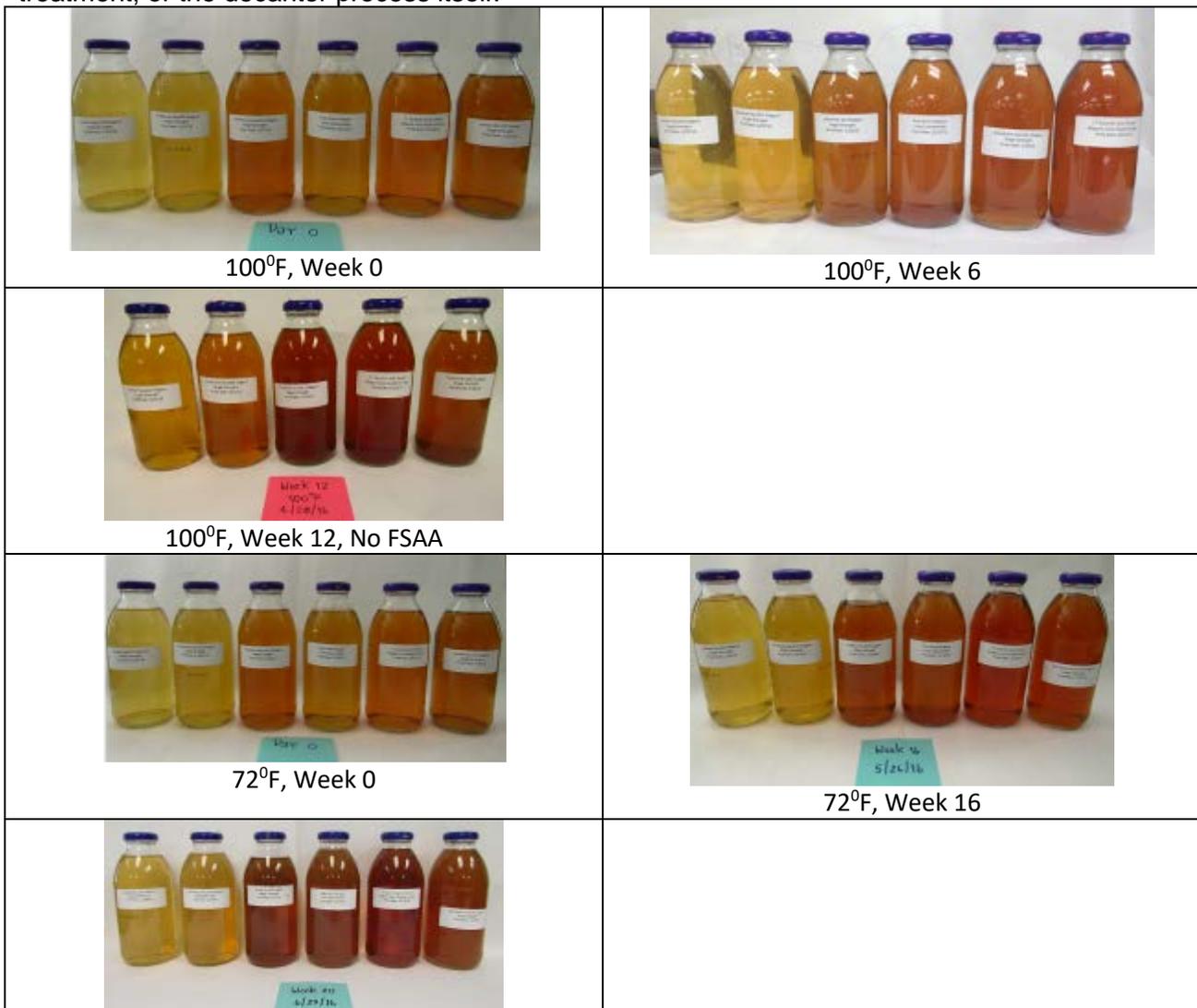
Fruit smart samples (FS AA) were not evaluated past week 16 for 72<sup>o</sup>F and 8 for 100<sup>o</sup>F storage due to issues with cloudiness and some spoilage. It is not clear if some of the caps had issues with micro perforations or filling issues for these samples, as all were hot filled at 185<sup>o</sup>F with 30 second inversion prior to cooling, as were all the samples. FS was made direct to concentrate and then diluted to single strength juice.

## **Summary**

In all cases, the traditional SO<sub>2</sub> treatments were of superior quality compared to the other four juice samples. The LT SO<sub>2</sub> treatment was either equal to or superior than the GV SO<sub>2</sub> juice samples. Although there were no significant differences in overall consumer acceptability scores of the juices for the LT SO<sub>2</sub> (a) and GV SO<sub>2</sub> (ab), FS AA (ab), and LT No SO<sub>2</sub> (ab), the GV AA (b) and LT AA(c) samples had the lowest scores. Consumer acceptance of the color and flavor showed a similar trend. Consumers tend to let attributes that influence them the most dominate the scores of other attributes.

The FS AA juice samples (decanter treated with AA) were most often found to be slightly better quality, than the samples treated with AA from Michigan (Lawton plant) or Washington State (Grandview plant) using the CSP processing. This is based on consumer and trained panel sensory testing and objective measurements. Often the No SO<sub>2</sub> treatment was similar to the FSAA samples, or slightly poorer quality. These samples were processed using “cold press” technology which included flash pasteurization (184-190°F/1min) and cooling to 32-32°F, which may have accounted for this outcome. This does not mean that the FSAA processing was superior to the conventional processed juices (CSP), but that it does show some promise. However, there were differences in the processes other than use of the decanter (DP) that would have to be studied in order to further explain this.

Because its method used “direct to concentrate” unlike the CSP method that had the extra holding step to help solids settle out, there was increased cloudiness. Also, the Fruit Smart DP used a carbon decolorization step that would have improved the initial color. A drawback of the FSAA processing was that the plant was Kosher approved and had to treat the juice to 185°F temperatures followed by cooling to 138-142°F. Also, the FSAA samples did not last until the end of testing, due to some fermentation type of off flavors, increased cloudiness. Thus, it needs to be determined what made the greatest difference, the “direct to concentrate,” the higher temperature/cooling method, the carbon treatment, or the decanter process itself.



72°F, Week 20	
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Niagara Juice Bottles After Storage. Lawton Reg SO <sub>2</sub> ; Grandview, Reg SO <sub>2</sub> ; Lawton, No SO <sub>2</sub> ; Fruit Smart AA from Concentrate, Lawton AA; Grandview AA. Hot filled 185°F.
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**References: Van Buren 1989; Girard and Fukumoto 2000**

## **FEASIBILITY OF INVESTING IN CENTRIFUGAL PROCESSING AT LAWTON MI PLANT:**

### Introduction:

As noted in the final report, Welch's and National Grape moved ahead with investment in a decanter process mid-project. This represents an investment of over \$100,000 in the Lawton processing facility.

Prior to this investment the project team was also interested in investment in a centrifugation process for concentrate, however, after repeated conversations with Welch's it became clear that this process was not feasible for the Lawton plant.

**As a result, for this project, we do not recommend investment in a centrifugation system at this time. There are several factors both in support and against the decision to invest in such a system:**

### In support of the system:

- A centrifugation system would thoroughly modernize the Lawton facility. Currently the facility uses a press system for juice extraction that heats the grapes over multiple steps and also that uses paper pulp for extraction.
  - Heating the grapes, particularly the Niagara variety, contributes to the browning process this project was developed to address.
- A centrifugation system would allow the plant to be flexible in producing other juice products. Michigan has a multitude of fruit and vegetable products which could be processed at the Lawton plant, especially during down times.

### Factors against investment in the system:

- Results from the food science research portion of this project are mixed with respect to how centrifugation might address the issue. The Fruitsmart plant, which was used for large scale production of the test product utilized a centrifuge. However, the plant is also certified Kosher which added heat to the processing system.
- There is not clear support for the centrifuge system at this time from Welch's, which is the marketing arm of National Grape Growers, Inc. For this reason, and at this time, the investment is not feasible because of a lack of operational support.

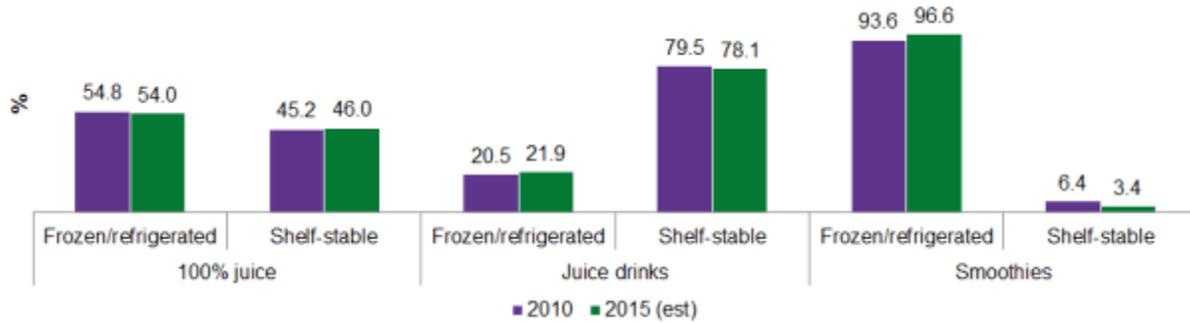
National grape has expressed interest in other lines of manufacturing either on site in Lawton or as an additional investment in a co-located facility that is not affiliated with Welch's. To this end we have provided a feasibility assessment of those options below. The options include a not-from-concentrate juice, cold pressed oils and grapeseed extract.

### **Market Feasibility:**

Other market areas of interest to this project include investment in further processing for ready to drink juices and grapeseed oil extraction.

Among juice and juice drink products, the categories with the only significant growth in the market place are frozen/refrigerated juice drinks and frozen or refrigerated smoothies. (Mintel "Juice and Juice Drinks", 2015).

**Figure 1. Sales of Juice and Juice Drinks by Segment, 2010 vs. 2015**

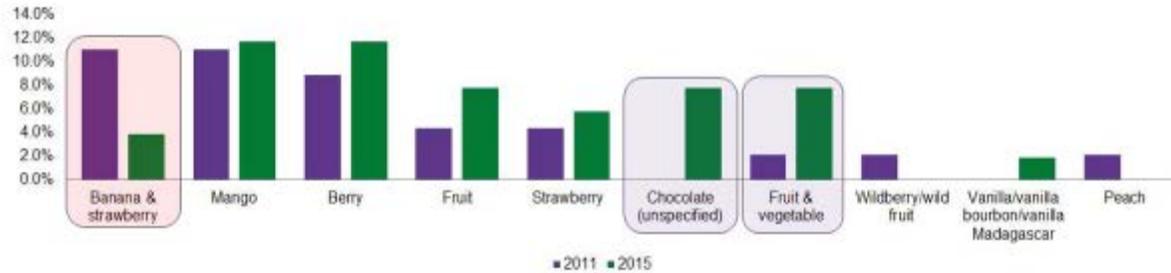


Source: Mintel “Juice and Juice Drinks”, 2015

Consumers are increasingly looking for products considered natural and fresh. Juice and juice drinks in the refrigerated section of stores and convenience stores are consistent with this perception among consumers.

There has been significant growth and interest in the smoothie category. Among top launches by type of ingredient, tropical flavors dominate the category. However, Berry and Fruit launches are in third and fourth place and significant growth is expected in chocolate flavors and fruit and vegetable blends. Partnering with a smoothie company might be an opportunity to add value to Niagara grape juice products since they have little color and fit with areas of growth predicted in the market place.

**Figure 2. Share of Smoothie Launches by Flavor**



\* rolling years October 2010-September 2015

Source: Mintel GNPD

Not from concentrate juice is a category that fits in the chilled/frozen segment and one that has experienced growth in recent years. Brands like Tropicana and Minute Maid, alongside private label brands have developed a number of new juices and juice blends for this segment.

The Lawton plant is well positioned to produce a not-from concentrate juice product under the Welch’s label using either Concord or Niagara grape juices. Globally, grape is not a growth flavor. However, regionally a not from concentrate grape juice could be attractive to North American consumers who are familiar with and fond of the flavor and also those who are familiar with the well-established health benefit attributes of grape juice.

Another market opportunity for the Lawton plant is for the facility to more fully capture its waste materials. A significant amount of pomace including grapeseeds is produced during processing. Currently the pomace is sold at a low price for livestock feed. A more strategic approach might be for the plant owners to develop a more robust market among area livestock producers through a bidding program or “shopping” the pomace around locally. Alternatively the plant could consider capturing the grapeseed for pressing or the pomace for grapeseed extract.

In a recent survey, 52% of consumers (1,800+ surveyed) indicated they bought an alternative type oil within a six month time period. Alternative oils include, coconut, hemp, peanut and grapeseed among other options. Consumers are increasingly aware of the quality of fats they use in cooking, as well as in health care products.

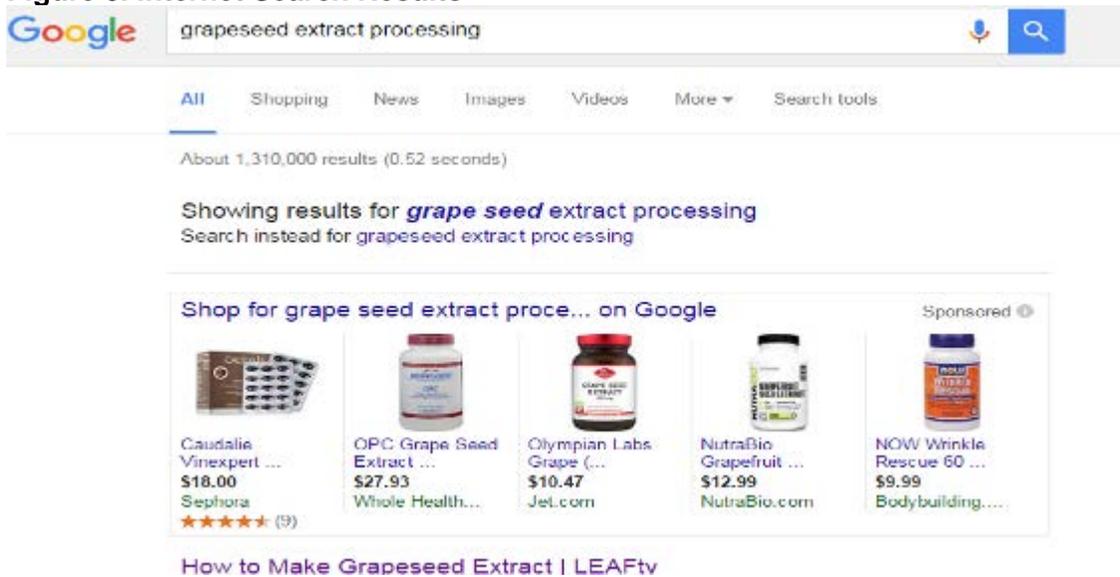
Grapeseed extract is an opportunity for utilizing the pomace waste from the Lawton plant. For both grapeseed oil and grapeseed extract, the majority of producers of these products are winegrape growers. In Michigan there are significantly more acres of juice grapes produced than wine grapes. In 2015, approximately 76,000 tons of grapes were processed for juice. Assuming a loss of ½ for juice production, about 32,000 tons of pomace were produced that could be recaptured for processing. The grapeseed extract process, in its simplest form follows this approach:

1. Pomace is collected for further processing
2. Pomace is separated, with skins and seeds retained
3. Seeds and skins are pressed to capture oil
4. Remaining product is dried and ground, then capsulated for sale

A simple internet search of grapeseed extract or oil for sale results in the following price points:

Source	Quantity/Strength	Price
Caudalie Vinexpert (Sephora)	60 capsules/938 mg	\$18.00
OPC Grapeseed Extract	180 capsules/180 mg	\$27.93
Olympian Labs Grapeseed Extract	100 capsules/200 mg	\$10.47
NOW Wrinkle Rescue	60 capsules/50 mg	\$9.99

**Figure 3. Internet Search Results**



In Michigan, there are currently several cold pressed oil producers and at least one processor that captures tart cherry skins for sale in capsule form. **It is our recommendation that National Grape, Inc. contact these processors to discuss a joint venture or sale opportunity for processing of the pomace produced at the Lawton facility.**

**Information on existing oil and extract processors:**

Company	Contact	Address	Phone
Grand Traverse Culinary Oils	Bill Koucky	2780 Cass Rd, Traverse City MI 49684	(231)590-2180

Zoye	Tom Postmus	Zeeland Farm Services, 2525 84 <sup>th</sup> Ave., Zeeland, MI 49464	(616)772-9042
CherryFlex	Bob Underwood	1275 Dracka Rd, Traverse City, MI 49685	(888)947-4047

### **OPERATIONAL FEASIBILITY**

Currently the juice processing plant in Lawton, Michigan seasonally employs about 80 people and serves as receiving and handling station and juice processing and concentrate facility. At one point the Lawton plant also processed jams under at least two different labels for Welch's and also bottled (and continues to bottle) sparkling grape juice.

There is an excess of capacity at the Lawton facility in terms of processing line space and refrigeration/freezer space. Currently, freezer storage space in Michigan rents for approximately \$0.02/lb per month of storage.

If National Grape were to move ahead with a cold pressed juice line, oil pressing or grapeseed extract production there would be more than enough floor and freezer space for any of these products.

#### **Cold pressed juice:**

Cold pressed juice is currently a growth category in among all juice products in the U.S. (see above from Mintel). Pasteurization of cold-pressed juices is most often by high pressure processing (hpp). The cost for the minimum commercial size HPP processor is \$1 million.

Welch's has access to an existing glass and plastic bottling line at the Lawton plant, so that most of the investment in such a line would be for the HPP processor. Additional fruit juices and flavors could easily be added to the juice line by buying concentrates and purees from local juice processors. At this time, in Michigan, the only HPP processor we are aware of is located in Suburban Detroit and was recently purchased by Campbell's, Inc. as part of their commitment to modernize their product offering.

#### **Pressed Grapeseed Oils:**

Equipment to start a small scale oilseed processing facility would cost approximately \$342,000. Since space at the Lawton plant is not an issue, we assume the plant could facilitate a small scale press which would be used to cold-press grapeseed oil. This scale press could process approximately 1 ton of grapeseed per hour or about 2,000 ton per year. Assuming a 67% yield, this would yield about 1,340 ton of oil per year, or about 2.6 million pounds of oil (340,000 gallons).

Currently there is adequate bottling or other packaging capacity (glass) at the Lawton facility.

One issue would be the cyclical nature of the availability of grapeseed, since harvest happens only during a three month window in the fall. The seeds could be frozen at the Lawton facility and then processed as needed throughout the year.

### **FINANCIAL FEASIBILITY**

Perhaps the greatest barrier to investment in both of the options mentioned above is uncertainty about the potential returns to the investment. The grapeseed oil market is well developed; and as such, there would be significant competition for retail space and consumer share. Cold press juices are a growth market also experiencing significant competition from major juice players as well as from more organic growth companies. In both examples National Grape has a major advantage of being able to use the Welch's brand name to market products. Should National Grape members decide to move ahead with investment without involving Welch's, it will be very important for the cooperative to also invest in marketing the product.

Table 1. Income Statement for an Average HPP Juice Processing line at Lawton, MI Plant

<b>Income Statement</b>	
<b>Item</b>	<b>Amount</b>
Total Revenue	\$1,600,000
Cost of raw materials (grapes)	\$91,875
Income before Expenses	\$1,508,125
<b>Expenses</b>	
Wages	\$247,500
Interest (annual)	\$33,224
Depreciation	\$100,000
Marketing	\$160,000
Rent and Utilities (cold storage fees)	\$4,000
Other Costs (Materials for bottling)	\$48,000
Total Costs	\$592,724
Net Income	\$915,401

Assumptions:

Retail Juice Price- \$.50/fl ounce

Wholesale Price- \$.25/fl ounce

Bottles - \$.10/unit for 20 oz bottle

Labeling-\$.05/unit

Product Produced- 50,000 gallons (6.4 million ounces, 320,000 units)

Raw Product- 15 lbs grapes per gallon of juice

Raw Product Cost- \$245 per ton/\$.1225 per Lb

Wages- 15 employees on line for 4 months, \$20.00 wage rate plus additional 25% for benefits

Interest- 6% on \$1,000,000 loan for equipment (assume 10 year payoff term and annual interest charge, compounded monthly)

Depreciation- Straight line on HPP Processing equipment, assume unit has 10 year life

Marketing- 10% of wholesale price of all product

Rent and Utilities- Cold storage costs, \$.02 per gallon per month

Table 2. Income Statement for a Cold Pressed Oil line at Lawton, MI Plant

<b>Income Statement</b>	
<b>Item</b>	<b>Amount</b>
Total Revenue	\$2,048,000
Cost of raw materials (grapeseed)	\$1,440,000
Income before Expenses	\$608,000
<b>Expenses</b>	
Wages	\$260,000
Interest (annual)	\$9,424
Depreciation	\$32,000
Marketing	\$200,000
Rent and Utilities (cold storage fees)	\$1,200
Other Costs (Materials for bottling)	\$48,000
Total Costs	\$550,624
Net Income	\$57,376

### Assumptions:

Retail Juice Price- \$.64/fl ounce

Wholesale Price- \$.32/fl ounce

Bottles - \$.10/unit for 20 oz bottle

Labeling-\$.05/unit

Product Produced- 50,000 gallons (1,920 tons seed)

Raw Product- 1 ton seed equals 26 gallons oil

Raw Product Cost- \$750 per ton/\$1.92 per gallon (Currently the seed is sold at a very low prices as part of the pomace from processing. This high charge assumes that the seed will be separated from the pomace and re-sold back to National Grape for processing)

Wages- 5 employees on line for 12 months, \$20.00 wage rate plus additional 25% for benefits

Interest- 6% on \$320,000 loan for equipment (assume 10 year payoff term and annual interest charge, compounded monthly)

Depreciation- Straight line on cold press Processing equipment, assume unit has 10 year life

Marketing- 10% of wholesale price of all product

Rent and Utilities- Cold storage costs, \$.02 per gallon per month

It is important to note that the income statements in Table 1 and Table 2 are an estimate and actual costs for National Grape/Welch's will vary. National grape and Welch's have a significant advantage compare to the competition in that they are able to utilize existing resources and name brand recognition to enter the market for HPP processed juice and cold pressed oils. The juice plant at Lawton is underutilized currently as well as the cold storage facilities. Adding either of these lines would be a natural fit with Welch's existing offering of products.

The costs presented in Table 1 and Table 2 will vary depending on how National Grape and Welch's decide to process and market the product. More spending on marketing would certainly be justified, especially in the first 2-3 years of production. Charges for utilities and rent could be considerable higher too, depending on how National Grape and Welch's agree to share the current processing facility.

### **MANAGEMENT FEASIBILITY**

The structure and composition of employee types and job descriptions at the current processing plant in Lawton is a good fit with both of the projects analyzed in this report. There would be little or no additional hiring required to meet the needs of either enterprise. Since current operations in Lawton are relatively seasonal, either line would be a good addition to the processing mix.

One potential conflict with current operations would be with the HPP processing line for grapes. This line could have the potential to conflict with existing operations and compete for labor resources. The grapeseed oil line could actually be run during down times at the Lawton plant and so could provide employment for workers otherwise laid off.

One key issue would be developing an operating agreement between National Grape and Welch's.

### **Technical Summary of Niagara Grape Juice Processing and Storage Study**

The objective of this study was to evaluate the commercial Niagara grape processing type and treatment for juice using both a conventional screw press (CSP) and decanter process (DP), with the commonly used sulfur dioxide (SO<sub>2</sub>) and anti-browning alternative, ascorbic acid treatment (AA). SO<sub>2</sub> has multiple functions that are hard to replace: anti-browning, bleaching, antifungal, enzyme reduction, and clarification. However, some studies have shown AA, a reducing agent, to be an acceptable replacement and because of the growing objection to SO<sub>2</sub> use because of allergic-like

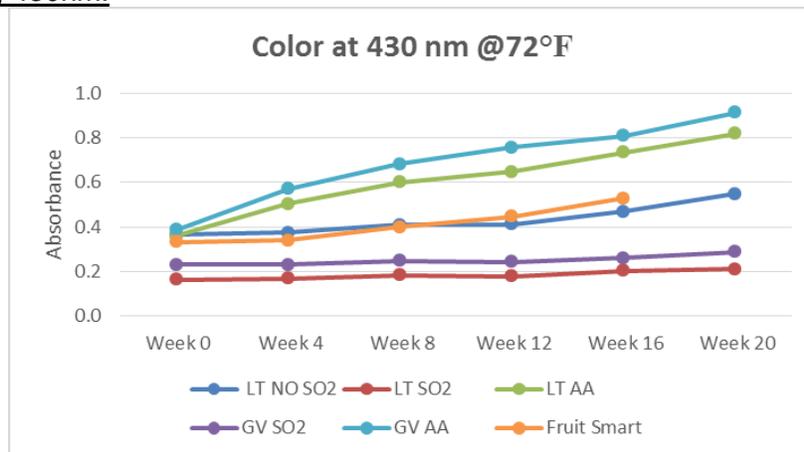
reactions of some when consuming products containing SO<sub>2</sub>. This also has implications for trade with other countries such as Japan, who are limiting the allowed amount of SO<sub>2</sub> into their imported foods.

Six samples of Niagara Grape Juice (NGJ) were treated and processed using commercial processing facilities, concentrated and bottled (16oz) into single strength juice and shipped to MSU for storage and evaluations. Three samples were from Michigan, treated and processed at the Lawton (LT), Michigan plant using CSP press: No SO<sub>2</sub> (LT No SO<sub>2</sub>), SO<sub>2</sub> treated (LT SO<sub>2</sub>), and ascorbic acid treated (LT AA). In Grandview (GV), Washington, grapes were treated (GV SO<sub>2</sub>) and AA (GV AA) with using a similar CSP processing, and another at Fruit Smart using the DP, with AA treatment (FS AA). It was not possible to produce a SO<sub>2</sub> control using the FS DP because they did not possess the necessary equipment to complete both processes. The decanter process may be a more gentle type of processing because it uses a centrifugal type of juice extraction, however, there are other steps in the process that could affect the final juice quality to a lesser or greater extent. Thus this study was conducted to use real commercial processing along with the comparison of the SO<sub>2</sub> and AA treatment to evaluate sample differences, and storage at 72°F and 100°F accelerated storage. Results of this study produced real life, large scale comparisons based on knowledge gleamed from previous small scale or laboratory research.

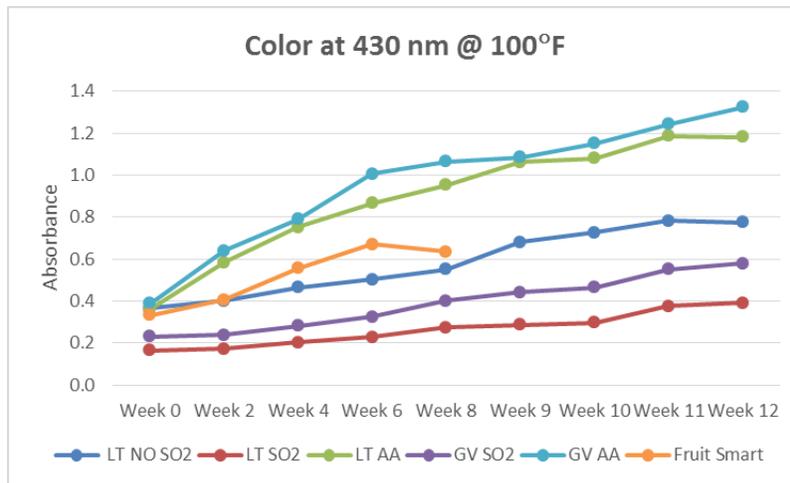
**Methods:** Methods used were those presented in the proposal. SO<sub>2</sub> concentrations ranged from 100 ppm in the field, up to 130 ppm during processing. AA concentrations were 500 ppm.

### Results of Physiochemical Objective Evaluations

#### Color Absorbance, 430nm:

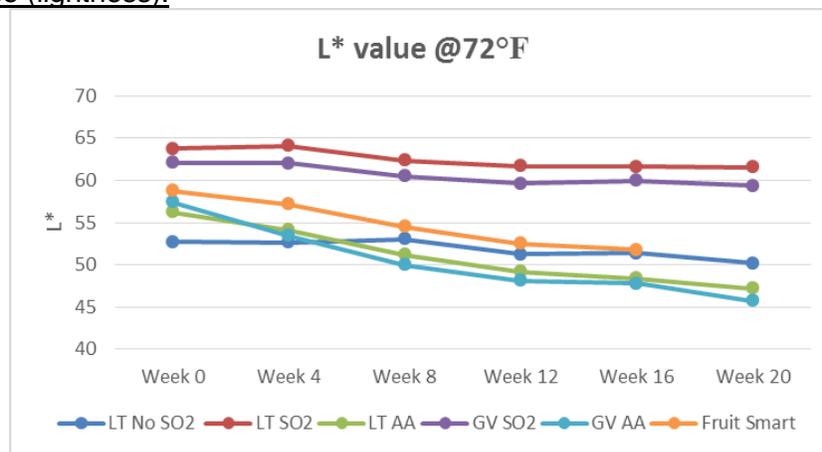


The general absorbance trend over time for the 72°F stored samples was (darkest to lightest): GV AA > LT AA > FS AA (slightly lower than LT No SO<sub>2</sub> until equal at week 4 then slightly higher) > LT No SO<sub>2</sub> > GV SO<sub>2</sub> > LT SO<sub>2</sub>.

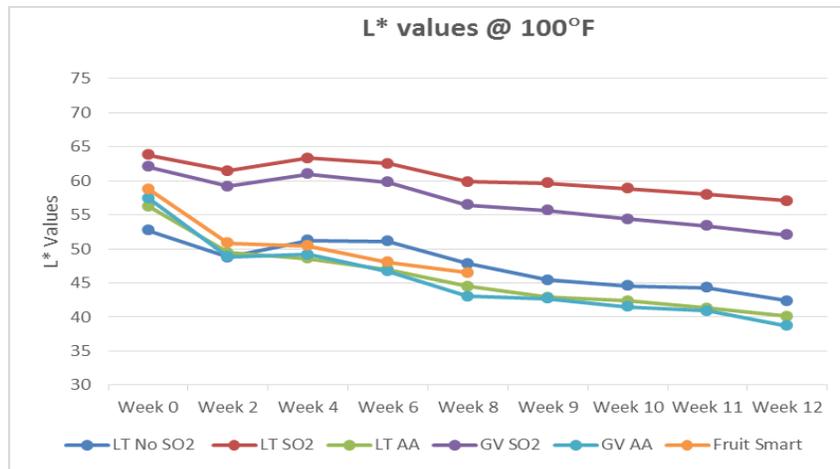


For the 100°F stored samples the trend was similar but there were significant differences essentially for all samples at each evaluation over the 12 weeks (darkest to lightest): GV AA > LT AA > FS AA > LT No SO<sub>2</sub> > GV SO<sub>2</sub> > LT SO<sub>2</sub>. The Fruit Smart AA processing/treatment samples had higher color absorbance than the SO<sub>2</sub> treated samples (CSP), but lower than the AA treated samples (CSP).

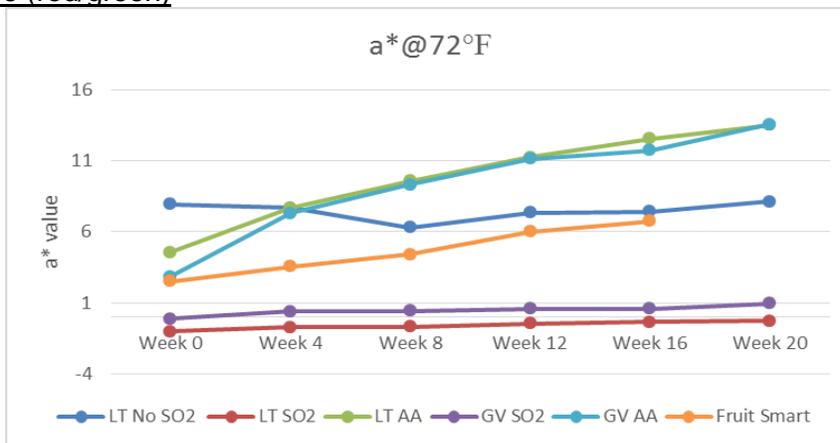
“L” Color Difference (lightness):



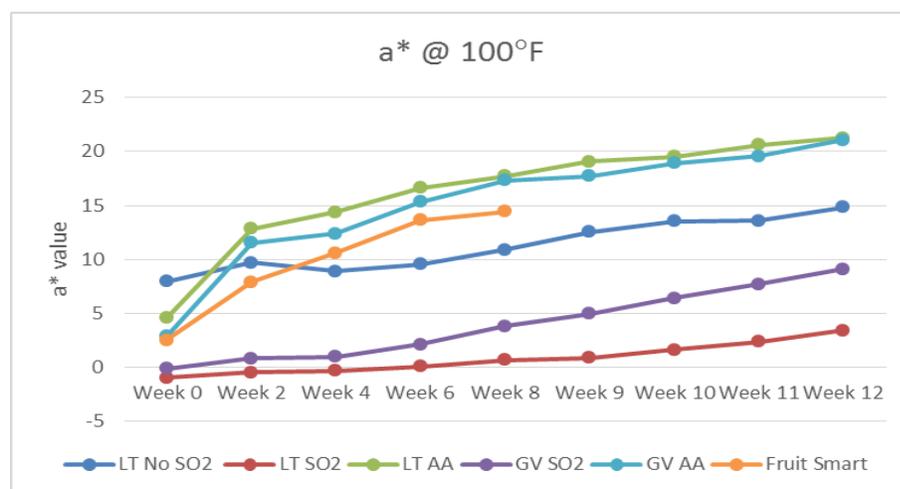
Higher L values are lighter on a 0-100 scale. The overall trend for both the 72°F and 100°F stored samples was (darkest to lightest but lowest L value to highest L value) GV AA < LT No SO<sub>2</sub> < LT AA < FS AA (up to 8 weeks) < GV SO<sub>2</sub> < LT SO<sub>2</sub>. Sulfur dioxide treatment has a bleaching property that lightens the juice while ascorbic acid can degrade over time, allowing for darkening. These results generally supported the Color Absorbance results.



a\* Color Difference (red/green)

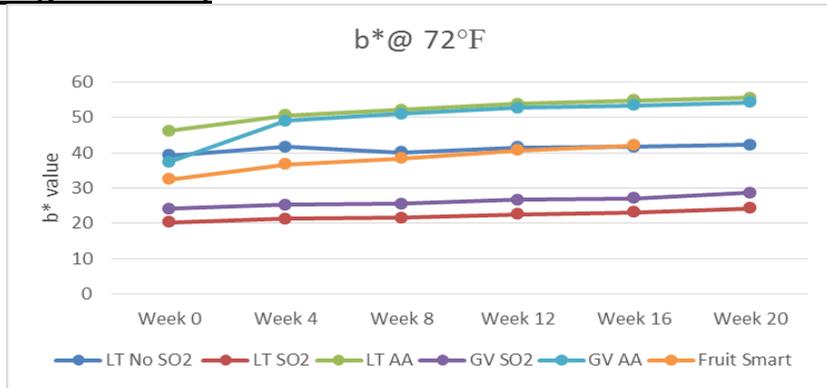


At 72°F, the a\* of SO<sub>2</sub> treated juices both LT SO<sub>2</sub> and GV SO<sub>2</sub> had slightly increased in red color. The AA treated juices: LT AA, GV AA and Fruit Smart trended to highly increase in a\* (more red color) with a darker brown color over the storage time.

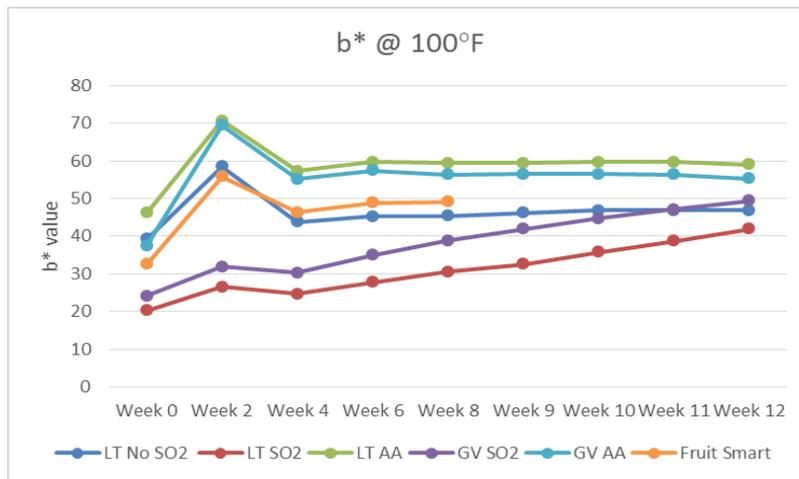


At 100°F, the a\* of SO<sub>2</sub> treated juices both LT SO<sub>2</sub> and GV SO<sub>2</sub> had slightly increased in red color. The AA treated juices: LT AA, GV AA and Fruit Smart trended to increase a\* with a darker brown color over the storage time. The trends were LT AA >GV AA> FS AA (after week 2)> LT No SO<sub>2</sub>> >GV SO<sub>2</sub>>LT SO<sub>2</sub>.

**b\* Color Difference (yellow/blue)**

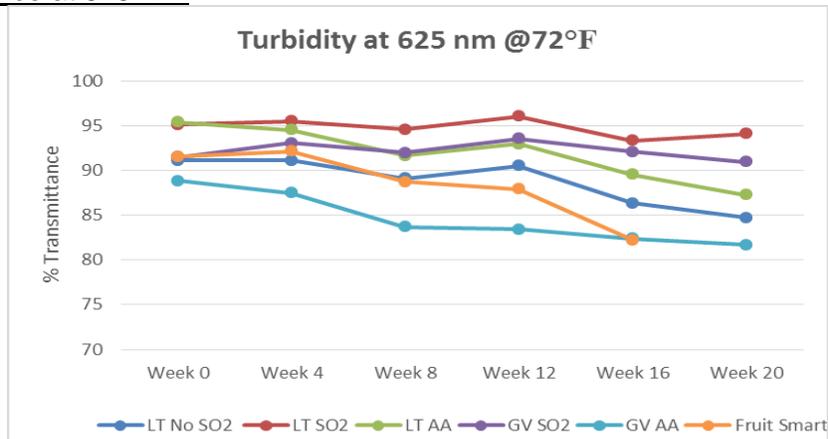


The b\* of SO<sub>2</sub> treated juices both LT SO<sub>2</sub> and GV SO<sub>2</sub> had a slightly increased yellow color. The AA treated juices: LT AA, GV AA and Fruit Smart tended to increase b\*, with darker brown color increasing over the storage time.



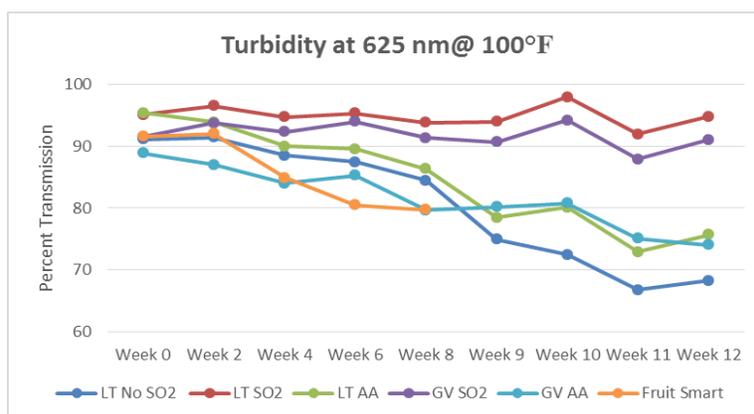
The b\* of SO<sub>2</sub> treated juices both LT SO<sub>2</sub> and GV SO<sub>2</sub> had constantly increased in yellow color over storage of time. The AA treated juices: LT AA, GV AA and Fruit Smart highly increase b\* in week 2 and then were stable over the storage time.

**Clarity, Transmittance at 625 nm:**



For 72°F, the trend of turbidity (% transmittance) of white grape juice decreased during the storage time. Juices treated with SO<sub>2</sub> both LT SO<sub>2</sub> and GV SO<sub>2</sub> slightly decreased compared to juices treated with AA. Fruit Smart had higher decreased from week 12 to 16 due to develop mold or fungi. Turbidity or haze may develop from unstable proteins that reacted with polyphenols, forming particles of 0.3-1.0 μm diameter and particles greater than 0.5 μm may settle out and form precipitates (Van Buren 1989; Girard and Fukumoto 2000).

The general trend was initially (cloudiest or lowest values to clearest or highest values): LT AA = LT SO<sub>2</sub> > GV SO<sub>2</sub> = LT No SO<sub>2</sub> = FS AA > GVAA. At week 16 storage at 72°F (cloudiest or lowest values to clearest or highest values): FS AA = GV AA < LT No SO<sub>2</sub> < LT AA < GV SO<sub>2</sub> = LT SO<sub>2</sub>. Over time, the LT AA dropped from the clearest to the third clearest sample. Other changes were more minor.



For 100°F, over time the LT SO<sub>2</sub> samples had the highest percent transmission values (significantly higher), and followed by the GV SO<sub>2</sub> samples, LT AA, and GV AA being not different. LT no SO<sub>2</sub> increased in turbidity. At week 8, FS AA samples had the same values as the GV AA (lowest of all samples for that week). Cloudiest or lowest to clearest or high values: GV AA=FS AA < LT No SO<sub>2</sub> < FS AA = GV AA. For 100°F storage at 12 weeks (cloudiest or lowest to clearest or high values): LT No SO<sub>2</sub> < GV AA = LT AA < GV SO<sub>2</sub> < LT SO<sub>2</sub>.

**Total Phenolics (TP):** Overall the GV AA had the highest TP values initially and over storage at 72°F, and 100°F while the LT No SO<sub>2</sub>, had the lowest values. The order for initial values was essentially: GV AA > GV SO<sub>2</sub> > LT AA ≥ LT SO<sub>2</sub> ≥ FS AA > LT No SO<sub>2</sub>. Over time the trend stayed essentially the same. FS AA samples were not evaluated after week 16 (72°F) and week 8 (100°F) due to poor quality and turbidity issues.

**TSS:** TSS increased slightly over time for the 72°F stored samples. No real changes for the 100°F stored samples.

**pH:** Not much difference at all. About pH 3.4 for 72°F and 100°F stored samples.

**TA:** No real change for samples stored at both temperatures.

## Sensory Evaluations

**Consumer Panel Results:** Consumer test ran on April 26, 2016, there were 102 panelists, samples stored at 72°F, on storage week 12. The attributes of color, cloudiness (turbidity), flavor, and overall acceptability were evaluated for consumer acceptance. The 9-point hedonic scale was used to evaluate.



The LT SO<sub>2</sub> samples received the highest overall acceptability of 6.73a/9. There were no significant differences in acceptability for LT No SO<sub>2</sub>ab = GV SO<sub>2</sub>ab = FS AAab juice samples. Sample GV AA received a 5.92b (but not

statistically different from those three samples), followed by the lowest rating of LTAA, 5.25c. The statistically lowest flavor score for this sample may have driven down its overall acceptability rating. Adding AA, may have increased sourness and thus affected the flavor profile. The color acceptability values were not significantly different for samples except for GVAA (5.90/9bc) and LTAA (5.69c/9) which had the lowest scores. LT No SO<sub>2</sub> and GVAA juice samples were also not significantly different for color acceptability.

419=LT no SO<sub>2</sub>; 354=LT SO<sub>2</sub>; 659=GV SO<sub>2</sub>; (bottom row) 589= FruitSmart AA; 895=GVAA; 947=LT AA (top row)

Trained Panel Results: Test ran on February 4, 2016 to June 23, 2016, there were 10 trained panelists. The attributes of color, cloudiness (turbidity), grape odor and flavor, cooked-off odor and flavor, the other-off odor and flavor, and overall acceptability were evaluated for consumer acceptance. The 15-point hedonic scale was used to evaluate. Color- Significant differences in color were found between most 72<sup>o</sup>F samples for each evaluation week. For the 100<sup>o</sup>F stored samples this was not as common. For both storage temperatures, the LT No SO<sub>2</sub> samples started fairly dark and did not increase until week 8 for 100<sup>o</sup>F stored samples. Most increased over time as expected. LT AA & GV AA samples started and continued to be the darkest, LT No SO<sub>2</sub>, started about the same darkness but over time leveled off, and FS AA samples were as darkness as LT AA and GV AA by week 8. For the 72<sup>o</sup>F LT AA and GV AA samples remained the darkest with LT No SO<sub>2</sub> slightly darker than the FS AA samples.

Consumer “color liking” scores agreed with these trained panel results by showing a significantly lower scores for the LT AA and GV AA samples that were shown to have the darkest trained panel scores. Objective color absorbance scores also agree with these results. Color Difference L Values had a similar trend with the GV AA samples having the lowest (darkest) L\* value, while the LT AA values were not significantly different than the LT no SO<sub>2</sub> samples (less dark than GVAA). For Clarity at 625 nm after storage, the LT SO<sub>2</sub> and GVSO<sub>2</sub> had the highest values (clearest) with FS AA and GV AA samples being the least clear. However, all clarity values were still fairly high except for evaluations closer to the last third period of evaluations, with the LT and GV SO<sub>2</sub> samples still holding at fairly clear. LT No SO<sub>2</sub> samples generally had slightly lower trained panel sensory scores than the FS AA samples with the LT SO<sub>2</sub> having the highest quality and trained panel sensory scores and GVSO<sub>2</sub> samples as high or slightly lower.

LT SO<sub>2</sub> and GV SO<sub>2</sub> samples had the lowest “cooked odor” sensory scores for both storage temperatures. There was not much change over time. A similar trend was seen for “cooked off flavor”, 72<sup>o</sup> and 100<sup>o</sup>F storage. LT SO<sub>2</sub> and GV SO<sub>2</sub> had the lowest scores. FS AA and GV AA scores were the next highest, followed by the highest scores for LT AA and LT No SO<sub>2</sub> samples.

There were no differences in the “grape odor”, “grape flavor, or “other off flavors” stored over time (72<sup>o</sup>F or 100<sup>o</sup>F) for juice samples. The “other off flavors” scores were low throughout storage. There were very few off flavors in the initial samples other than LT SO<sub>2</sub> juices, although those scores were still fairly low (3.6/15). Some panelists identified slight “sulfur” odors in these samples.

With the stored samples there were no significant sensory differences in “Overall quality Difference from Control” between samples at any week’s evaluation. Since color was the largest attribute affected by storage, it was only one of eight attributes evaluated, and it showed the greatest differences, the overall differences from control were not judged to be very large “overall” by the trained panelists.

Fruit smart samples (FS AA) were not evaluated past week 16 for 72<sup>o</sup>F and 8 for 100<sup>o</sup>F storage due to issues with cloudiness and some spoilage. It is not clear if some of the caps had issues with micro perforations or filling issues for these samples as all were hot filled at 185<sup>o</sup>F with 30 second inversion

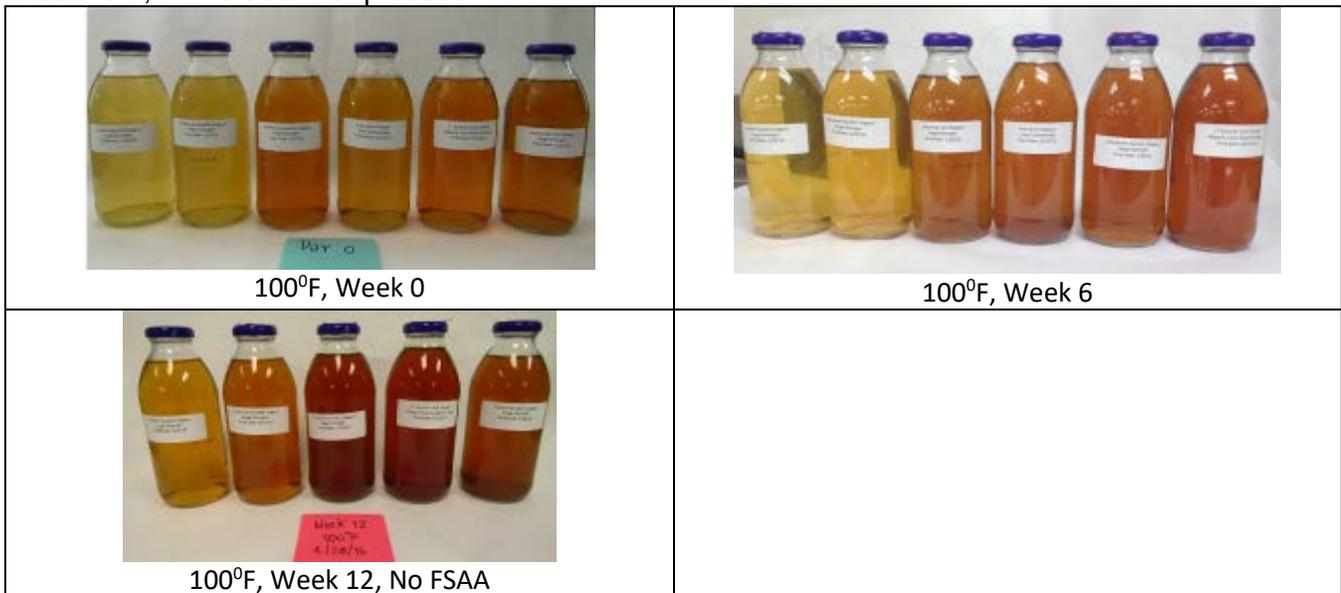
prior to cooling, as were all the samples. FS was made direct to concentrate and then diluted to single strength juice.

**Summary**

In all cases, the traditional SO<sub>2</sub> treatments were of superior quality compared to the other four juice samples. The LT SO<sub>2</sub> treatment was either equal to or superior than the GV SO<sub>2</sub> juice samples. Although there were no significant differences in overall consumer acceptability scores of the juices for the LT SO<sub>2</sub> (a) and GV SO<sub>2</sub> (ab), FS AA (ab), and LT No SO<sub>2</sub> (ab), the GV AA (b) and LT AA(c) samples had the lowest scores. Consumer acceptance of the color and flavor showed a similar trend. Consumers tend to let attributes that influence them the most dominate the scores of other attributes.

The FS AA juice samples (decanter treated with AA) were most often found to be slightly better quality, than the samples treated with AA from Michigan (Lawton plant) or Washington State (Grandview plant) using the CSP processing. This is based on consumer and trained panel sensory testing and objective measurements. Often the No SO<sub>2</sub> treatment was similar to the FSAA samples, or slightly poorer quality. These samples were processed using “cold press” technology which included flash pasteurization (184-190°F/1min) and cooling to 32-32°F, which may have accounted for this outcome. This does not mean that the FSAA processing was superior to the conventional processed juices (CSP), but that it does show some promise. However, there were differences in the processes other than use of the decanter (DP) that would have to be studied in order to further explain this.

Because its method used “direct to concentrate” unlike the CSP method that had the extra holding step to help solids settle out, there was increased cloudiness. Also, the Fruit Smart DP used a carbon decolorization step that would have improved the initial color. A drawback of the FSAA processing was that the plant was Kosher approved and had to treat the juice to 185°F temperatures followed by cooling to 138-142°F. Also, the FSAA samples did not last until the end of testing, due to some fermentation type of off flavors, increased cloudiness. Thus, it needs to be determined what made the greatest difference, the “direct to concentrate,” the higher temperature/cooling method, the carbon treatment, or the decanter process itself.



 <p>72°F, Week 0</p>	 <p>72°F, Week 16</p>
 <p>72°F, Week 20</p>	
<p>Niagara Juice Bottles After Storage. Lawton Reg SO<sub>2</sub>; Grandview, Reg SO<sub>2</sub>; Lawton, No SO<sub>2</sub>; Fruit Smart AA from Concentrate, Lawton AA; Grandview AA. Hot filled 185°F.</p>	

**References: Van Buren 1989; Girard and Fukumoto 2000**

### **FEASIBILITY OF INVESTING IN CENTRIFUGAL PROCESSING AT LAWTON MI PLANT:**

#### Introduction:

As noted in the final report, Welch's and National Grape moved ahead with investment in a decanter process mid-project. This represents an investment of over \$100,000 in the Lawton processing facility.

Prior to this investment the project team was also interested in investment in a centrifugation process for concentrate, however, after repeated conversations with Welch's it became clear that this process was not feasible for the Lawton plant.

**As a result, for this project, we do not recommend investment in a centrifugation system at this time. There are several factors both in support and against the decision to invest in such a system:**

#### In support of the system:

- A centrifugation system would thoroughly modernize the Lawton facility. Currently the facility uses a press system for juice extraction that heats the grapes over multiple steps and also that uses paper pulp for extraction.
  - Heating the grapes, particularly the Niagara variety, contributes to the browning process this project was developed to address.
- A centrifugation system would allow the plant to be flexible in producing other juice products. Michigan has a multitude of fruit and vegetable products which could be processed at the Lawton plant, especially during down times.

#### Factors against investment in the system:

- Results from the food science research portion of this project are mixed with respect to how centrifugation might address the issue. The FruitSmart plant, which was used for large scale production of the test product utilized a centrifuge. However, the plant is also certified Kosher which added heat to the processing system.

- There is not clear support for the centrifuge system at this time from Welch's, which is the marketing arm of National Grape Growers, Inc. For this reason and at this time the investment is not feasible because of a lack of operational support.

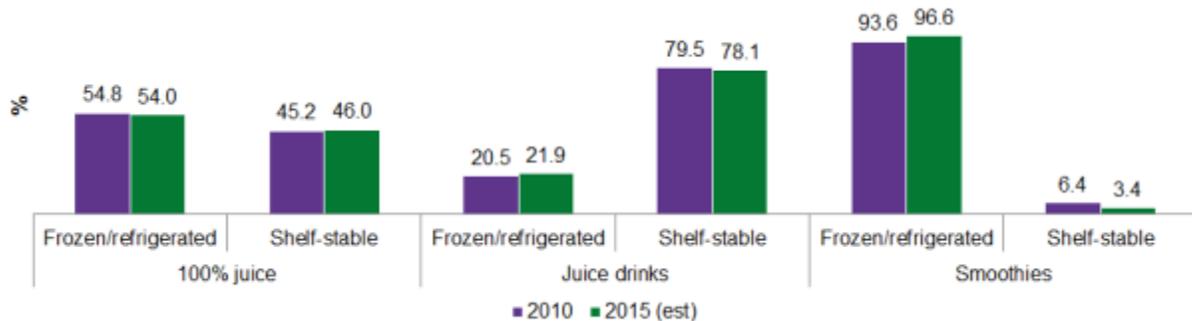
National grape has expressed interest in other lines of manufacturing either on site in Lawton or as an additional investment in a co-located facility that is not affiliated with Welch's. To this end we have provided a feasibility assessment of those options below. The options include a not-from-concentrate juice, cold pressed oils and grapeseed extract.

**Market Feasibility:**

Other market areas of interest to this project include investment in further processing for ready to drink juices and grapeseed oil extraction.

Among juice and juice drink products, the categories with the only significant growth in the market place are frozen/refrigerated juice drinks and frozen or refrigerated smoothies. (Mintel "Juice and Juice Drinks", 2015).

**Figure 1. Sales of Juice and Juice Drinks by Segment, 2010 vs. 2015**

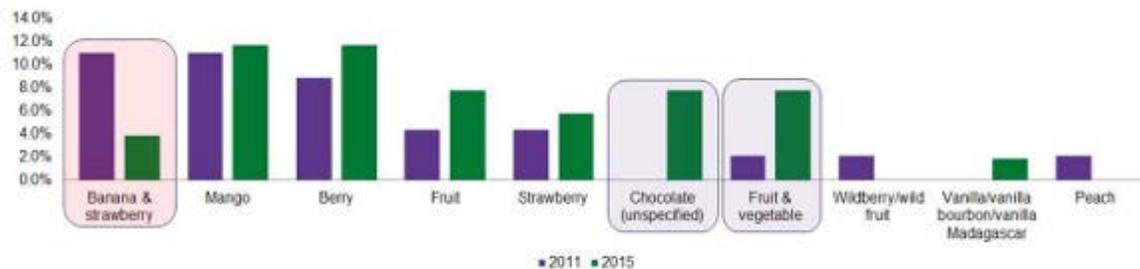


Source: Mintel "Juice and Juice Drinks", 2015

Consumers are increasingly looking for products considered natural and fresh. Juice and juice drinks in the refrigerated section of stores and convenience stores are consistent with this perception among consumers.

There has been significant growth and interest in the smoothie category. Among top launches by type of ingredient, tropical flavors dominate the category. However, Berry and Fruit launches are in third and fourth place and significant growth is expected in chocolate flavors and fruit and vegetable blends. Partnering with a smoothie company might be an opportunity to add value to Niagara grape juice products since they have little color and fit with areas of growth predicted in the market place.

**Figure 2. Share of Smoothie Launches by Flavor**



\* rolling years October 2010-September 2015  
Source: Mintel GNPD

Not from concentrate juice is a category that fits in the chilled/frozen segment and one that has experienced growth in recent years. Brands like Tropicana and Minute Maid, alongside private label brands have developed a number of new juices and juice blends for this segment.

The Lawton plant is well positioned to produce a not-from concentrate juice product under the Welch's label using either Concord or Niagara grape juices. Globally, grape is not a growth flavor. However, regionally a not from concentrate grape juice could be attractive to North American consumers who are familiar with and fond of the flavor and also those who are familiar with the well-established health benefit attributes of grape juice.

Another market opportunity for the Lawton plant is for the facility to more fully capture its waste materials. A significant amount of pomice including grapeseeds is produced during processing. Currently the pomice is sold at a low price for livestock feed. A more strategic approach might be for the plant owners to develop a more robust market among area livestock producers through a bidding program or "shopping" the pomice around locally. Alternatively the plant could consider capturing the grapeseed for pressing or the pomice for grapeseed extract.

In a recent survey, 52% of consumers (1,800+ surveyed) indicated they had bought an alternative type oil within a six month time period. Alternative oils include, coconut, hemp, peanut and grapeseed among other options. Consumers are increasingly aware of the quality of fats they use in cooking as well as in health care products.

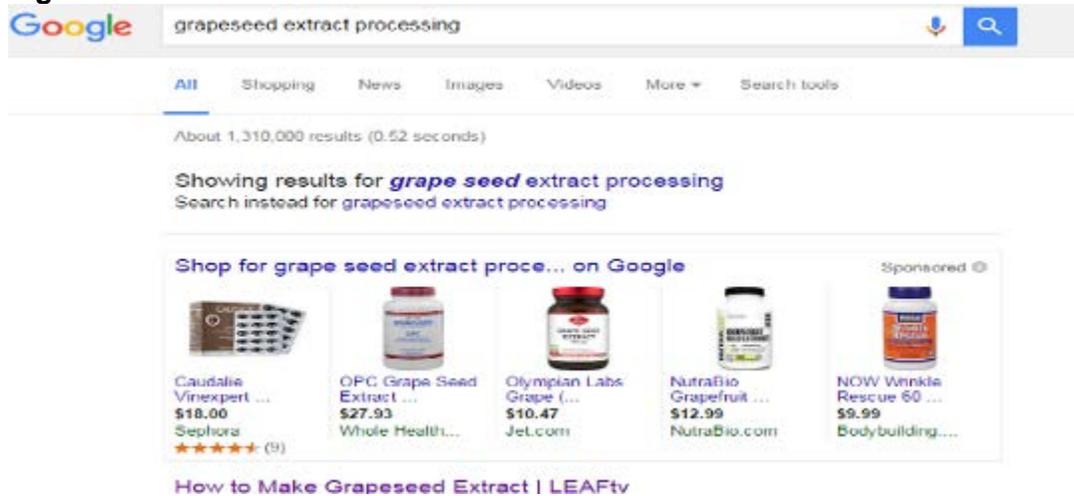
Grapeseed extract is an opportunity for utilizing the pomice waste from the Lawton plant. For both grapeseed oil and grapeseed extract, the majority of producers of these products are winegrape growers. In Michigan there are significantly more acres of juice grapes produced than wine grapes. In 2015, approximately 76,000 tons of grapes were processed for juice. Assuming a loss of ½ for juice production, about 32,000 tons of pomice were produced that could be recaptured for processing. The grapeseed extract process, in its simplest form follows this approach:

5. Pomice is collected for further processing
6. Pomice is separated, with skins and seeds retained
7. Seeds and skins are pressed to capture oil
8. Remaining product is dried and ground, then capsulated for sale

A simple internet search of grapeseed extract or oil for sale results in the following price points:

Source	Quantity/Strength	Price
Caudalie Vinexpert (Sephora)	60 capsules/938 mg	\$18.00
OPC Grapeseed Extract	180 capsules/180 mg	\$27.93
Olympian Labs Grapeseed Extract	100 capsules/200 mg	\$10.47
NOW Wrinkle Rescue	60 capsules/50 mg	\$9.99

**Figure 3. Internet Search Results**



In Michigan, there are currently several cold pressed oil producers and at least one processor that captures tart cherry skins for sale in capsule form. **It is our recommendation that National Grape, Inc contact these processors to discuss a joint venture or sale opportunity for processing of the pomice produced at the Lawton facility.**

**Information on existing oil and extract processors:**

Company	Contact	Address	Phone
Grand Traverse Culinary Oils	Bill Koucky	2780 Cass Rd, Traverse City MI 49684	(231)590-2180
Zoye	Tom Postmus	Zeeland Farm Services, 2525 84 <sup>th</sup> Ave., Zeeland, MI 49464	(616)772-9042
CherryFlex	Bob Underwood	1275 Dracka Rd, Traverse City, MI 49685	(888)947-4047

**OPERATIONAL FEASIBILITY**

Currently the juice processing plant in Lawton, Michigan seasonally employees about 80 people and serves as receiving and handling station and juice processing and concentrate facility. At one point the Lawton plant also processed jams under at least two different labels for Welch’s and also bottled (and continues to bottle) sparkling grape juice.

There is an excess of capacity at the Lawton facility in terms of processing line space and refrigeration/freezer space. Currently, freezer storage space in Michigan rents for approximately \$0.02/lb per month of storage.

If National Grape were to move ahead with a cold pressed juice line, oil pressing or grapeseed extract production there would be more than enough floor and freezer space for any of these products.

**Cold pressed juice:**

Cold pressed juice is currently a growth category in among all juice products in the U.S. (see above from Mintel). Pasteurization of cold-pressed juices is most often by high pressure processing (hpp). The cost for the minimum commercial size HPP processor is \$1 million.

Welch’s has access to an existing glass and plastic bottling line at the Lawton plant, so that most of the investment in such a line would be for the HPP processor. Additional fruit juices and flavors could easily be added to the juice line by buying concentrates and purees from local juice processors. At

this time, in Michigan, the only HPP processor we are aware of is located in Suburban Detroit and was recently purchased by Campbell's, Inc as part of their commitment to modernize their product offering.

**Pressed Grapeseed Oils:**

Equipment to start a small scale oilseed processing facility would cost approximately \$342,000. Since space at the Lawton plant is not an issue, we assume the plant could facilitate a small scale press which would be used to cold-press grapeseed oil. This scale press could process approximately 1 ton of grapeseed per hour or about 2,000 ton per year. Assuming a 67% yield, this would yield about 1,340 ton of oil per year, or about 2.6 million pounds of oil (340,000 gallons).

Currently there is adequate bottling or other packaging capacity (glass) at the Lawton facility.

One issue would be the cyclical nature of the availability of grapeseed, since harvest happens only during a 3 month window in the fall. The seeds could be frozen at the Lawton facility and then processed as needed throughout the year.

**FINANCIAL FEASIBILITY**

Perhaps the greatest barrier to investment in both of the options mentioned above is uncertainty about the potential returns to the investment. The grapeseed oil market is well developed and as such there would be significant competition for retail space and consumer share. Cold press juices are a growth market also experiencing significant competition from major juice players as well as from more organic growth companies. In both examples National Grape has a major advantage of being able to use the Welch's brand name to market products. Should National Grape members decide to move ahead with investment without involving Welch's, it will be very important for the cooperative to also invest in marketing the product.

Table 1. Income Statement for an Average HPP Juice Processing line at Lawton, MI Plant

<b>Income Statement</b>	
<b>Item</b>	<b>Amount</b>
Total Revenue	\$1,600,000
Cost of raw materials (grapes)	\$91,875
Income before Expenses	\$1,508,125
<b>Expenses</b>	
Wages	\$247,500
Interest (annual)	\$33,224
Depreciation	\$100,000
Marketing	\$160,000
Rent and Utilities (cold storage fees)	\$4,000
Other Costs (Materials for bottling)	\$48,000
Total Costs	\$592,724
Net Income	\$915,401

Assumptions:

- Retail Juice Price- \$.50/fl ounce
- Wholesale Price- \$.25/fl ounce
- Bottles - \$.10/unit for 20 oz bottle
- Labeling-\$.05/unit

Product Produced- 50,000 gallons (6.4 million ounces, 320,000 units)  
 Raw Product- 15 lbs grapes per gallon of juice  
 Raw Product Cost- \$245 per ton/\$.1225 per Lb  
 Wages- 15 employees on line for 4 months, \$20.00 wage rate plus additional 25% for benefits  
 Interest- 6% on \$1,000,000 loan for equipment (assume 10 year payoff term and annual interest charge, compounded monthly)  
 Depreciation- Straight line on HPP Processing equipment, assume unit has 10 year life  
 Marketing- 10% of wholesale price of all product  
 Rent and Utilities- Cold storage costs, \$.02 per gallon per month

Table 2. Income Statement for a Cold Pressed Oil line at Lawton, MI Plant

<b>Income Statement</b>	
<b>Item</b>	<b>Amount</b>
Total Revenue	\$2,048,000
Cost of raw materials (grapeseed)	\$1,440,000
Income before Expenses	\$608,000
<b>Expenses</b>	
Wages	\$260,000
Interest (annual)	\$9,424
Depreciation	\$32,000
Marketing	\$200,000
Rent and Utilities (cold storage fees)	\$1,200
Other Costs (Materials for bottling)	\$48,000
Total Costs	\$550,624
Net Income	\$57,376

Assumptions:

Retail Juice Price- \$.64/fl ounce  
 Wholesale Price- \$.32/fl ounce  
 Bottles - \$.10/unit for 20 oz bottle  
 Labeling-\$.05/unit  
 Product Produced- 50,000 gallons (1,920 tons seed)  
 Raw Product- 1 ton seed equals 26 gallons oil  
 Raw Product Cost- \$750 per ton/\$1.92 per gallon (Currently the seed is sold at a very low prices as part of the pomace from processing. This high charge assumes that the seed will be separated from the pomace and re-sold back to National Grape for processing)  
 Wages- Five employees on line for 12 months, \$20.00 wage rate plus additional 25% for benefits  
 Interest- 6% on \$320,000 loan for equipment (assume 10 year payoff term and annual interest charge, compounded monthly)  
 Depreciation- Straight line on cold press Processing equipment, assume unit has 10 year life  
 Marketing- 10% of wholesale price of all product  
 Rent and Utilities- Cold storage costs, \$.02 per gallon per month

It is important to note that the income statements in Table 1 and Table 2 are an estimate and actual costs for National Grape/Welch's will vary. National grape and Welch's have a significant advantage compare to the competition in that they are able to utilize existing resources and name brand recognition to enter the market for HPP processed juice and cold pressed oils. The juice plant at

Lawton is underutilized currently as well as the cold storage facilities. Adding either of these lines would be a natural fit with Welch's existing offering of products.

The costs presented in Table 1 and Table 2 will vary depending on how National Grape and Welch's decide to process and market the product. More spending on marketing would certainly be justified, especially in the first 2-3 years of production. Charges for utilities and rent could be considerable higher too, depending on how National Grape and Welch's agree to share the current processing facility.

### **MANAGEMENT FEASIBILITY**

The structure and composition of employee types and job descriptions at the current processing plant in Lawton is a good fit with both of the projects analyzed in this report. There would be little or no additional hiring required to meet the needs of either enterprise. Since current operations in Lawton are relatively seasonal, either line would be a good addition to the processing mix.

One potential conflict with current operations would be with the HPP processing line for grapes. This line could have the potential to conflict with existing operations and compete for labor resources. The grapeseed oil line could actually be run during down times at the Lawton plant and so could provide employment for workers otherwise laid off.

One key issue would be developing an operating agreement between National Grape and Welch's.

### **GOALS AND OUTCOMES ACHIEVED**

**Goal:** Review of food science literature to identify alternatives to SO<sub>2</sub> treatment. Tests of these treatments against SO<sub>2</sub> method at two processing facilities.

**Indicator:** Literature review identified Ascorbic Acid and decanter/centrifugation as alternative to screw press with SO<sub>2</sub> processing. Tests were performed on samples from Lawton, MI plant and Grandview, WA plant. Ultimately new treatments and processes tested in this program did not perform as well as traditional method.

**Data:** Lab results from MSU food science tests of juice from different processing sites and methods.

**Results:** SO<sub>2</sub> and screw type processing at Lawton plant performs better than other methods. While this juice is acceptable for domestic market it is not for export markets. Other options still need to be explored to encourage market growth for Niagara grape growers in Michigan.

**Goal:** Consumer panel analysis of grape juice samples from Lawton, MI and Grandview, WA plants

**Indicator:** Panelists were trained and recruited specifically this project. Consumers evaluated the products for color and overall acceptability of the juice. Panelists found the traditionally processed juice to be most acceptable. There was no statistically significant difference in liking between juices from Lawton without SO<sub>2</sub> added and juice from Washington produced with or without SO<sub>2</sub>.

**Data:** ANOVA analysis of consumer panel results between all samples tested. ANOVA is a statistical method for identifying differences in data sets. In this case it was used to identify differences in results from the consumer panel.

**Results:** The traditional processing method from Lawton, MI with the addition of SO<sub>2</sub> was the overall most "liked" product. T

**Goal:** Feasibility and Market analysis of demand for additional processing and by-product processing at Lawton, MI plant.

**Indicator:** Results for this objective are divided into results for the traditional processing ongoing at Lawton and results for use of by-products from Pomice. Part of the feasibility analysis was for the installation of a centrifugation/decanter process at the existing plant. The goal was to evaluate the opportunity to produce a higher quality juice without SO<sub>2</sub> for export markets. Results from the lab tests at MSU Food Science and the consumer panel ranking indicate that, at least for this study this

objective is not feasible. Additional work is needed to evaluate other processing options. This study does highlight opportunities for additional research and potential processing of pomice.

**Data:** After extensive conversations with Welch’s executives it was clear that processing with the decanter method was not an option. At that point this research then focused on other opportunities for handling pomice or producing juice in other forms. Data was collected from Mintel reports on Juice and Juice Drink consumer surveys and Butter, Oils and Spreads consumer surveys. Response rates for these surveys are over 1800 consumers nationwide.

**Results:** It is our opinion that there are very good opportunities for utilizing pomice from the current grape juice processing methods at the Lawton, MI plant. The market for grapeseed oil and grapeseed extract is high value and growing. National Grape, Inc should consider a full feasibility analysis of this opportunity.

#### BENEFICIARIES

The beneficiaries of this work are National Grape, inc, its growers members and its wholly owned subsidiary Welch’s. In Michigan there are more than 300 grower members producing grapes on over 12,000 acres. Production of grapes for juice represents more than 80% of total grape production in Michigan.

#### LESSONS LEARNED

This study highlights the importance of continuing research in support of more technologically advanced processing and also exploring opportunities for adding value to agriculture. National Grape, Inc. grower members are efficient producers of a safe and healthy product. Continuing support for more research to help growers market their products and develop new ones is imperative for the survival of our agricultural industry in Michigan and the U.S.

#### CONTACT PERSON

Mr. Terry Holloway  
National Grape Cooperative  
Berrien Springs, MI 49103  
Email: tholloway@welchs.com

#### ADDITIONAL INFORMATION

**PROJECT TITLE: MICHIGAN FOOD AND FARMING SYSTEMS – Building a Competitive Pathway for Underserved Michigan Specialty Crop Farmers - FINAL**

#### PARTNER ORGANIZATION

Michigan Integrated Food and Farming Systems

#### PROJECT SUMMARY

The 2007 Ag Census indicated that 615 small Michigan farms have a Hispanic/Latino individual as the primary operator. 107 (17%) of these farms are located in just one county, Van Buren, and are members of (or are eligible to be members of) Farmers On The Move (FOTM), a Spanish speaking cooperative that produces and markets specialty crops. Language barriers, cultural reticence to interact with government officials and lack of funding to make basic farm upgrades means most farms are unable to implement a documented Quality Management System, thus reducing competitiveness and viability in the marketplace. This project built an outreach team to develop a “benefit focused”

communication plan, on-farm demonstrations, and one-on-one coaching to teach specialty crop producers how to move through 3 phases: 1) USDA registration, 2) voluntary Michigan Agriculture Environmental Assurance Program (MAEAP) verification including accompanying documentation, and 3) examination of the key elements included in a GAP (Good Agricultural Practices) audit through implementation of Safe Food\*A\*Syst practices. By doing so, these farms had access to tools and hands-on experiences to enhance their competitiveness and sales of the specialty crops they grow, such as blueberries and a variety of vegetables.

## PROJECT PURPOSE

Managing a small, specialty crop farm is never an easy task. Historically underserved farmers, for example those who primarily speak Spanish, face the same barriers as other small-scale farmers, but with added cultural and language barriers that at times seem insurmountable. These farmers experience cultural discomfort in speaking with government and agency personnel, as well as mistrust in signing and submitting documentation, especially away from the farm property. There is an inherent hesitancy, based on misinformation and/or misconceptions, for new farmers to participate in USDA programs due to fear of regulatory blowback. This puts non-participatory farms at a disadvantage in the marketplace. This is true of all specialty crop producers including new and beginning farmers, historically underserved farmers, and those specialty crop producers who do not have a history of working with government agencies. All of the farmers served through this project will fit into at least two of these categories.

This project will connect Spanish-speaking, U.S. citizen farmers with existing resources, in order to reduce on-farm risks associated with water quality, environmental compliance, and food safety. An increased participation in currently available programs (including voluntary MAEAP Verification and new 2014 Farm Bill programs) will boost competitiveness and viability in the marketplace, and connect the project's target audience with larger volume specialty crop buyers. Many best practices, critical for participating in growing markets, are a part of MAEAP and the 2014 Farm Bill. For example, MAEAP is centered around water quality management; 75% of good food agricultural practices for on-farm Food Safety can be directly tied to water quality issues and best management practices for water quality. By successfully managing water quality issues on the farm, there is better understanding and awareness of how to identify food safety risks and implement solutions. Farmers On The Move (FOTM) is a cooperative of fourteen (14) farms owned and operated by Spanish-speaking U.S. citizens located in Van Buren county. FOTM is the only cooperative of Hispanic farmers in Michigan that is on a mission to provide locally grown, sustainable produce and preserve Michigan's farmland. FOTM aggregates and markets specialty crop fruits and vegetables to customers in Michigan and the Chicago area. When selling, customers frequently ask for some type of verification or certification that proves produce was grown using sound practices. Without this documentation, farms experience greatly reduced market viability.

According to Filiberto Villa Gomez, a MIFFS employee and FOTM President, "Human resources are part of the inventory of the farm." Villa Gomez has reached out to many Hispanic/Latino farmers over the past several years, encouraging them to participate in the Michigan Family Farms Conference, Meet the Buyers at the Fruit & Veggie EXPO, and multiple agricultural workshops. Even though he is not working as a farmer, he has established himself as a person who truly cares about the success of the producers and about their long-term viability. This project will increase the value of the human resources involved in specialty crop businesses, by arming selected "Cultivators" (cultivadores is Spanish for farmers) who are already embedded in the community with the skills they need to help their fellow farmers in communicating more effectively among one another, as well as with MAEAP technicians, agency personnel, and others with whom they may experience language and/or cultural barriers. Preparing and mobilizing trusted individuals as cultivators will build and strengthen relationships between specialists and practitioners. Farm Liaison, Stephen Arellano (a bilingual small scale farmer), will be engaged and work cooperatively with Villa Gomez in order to teach these skills

and help organize one-on-one, on-farm trainings and consultations. Villa Gomez feels that this will not only strengthen individual farms, but will have a tangential success of creating stronger collaborations between farms. In his view, individual success is good; working together is even better.

## PROJECT ACTIVITIES

<b>MIFFS Specialty Crop Block Grant ~ Proposed Work Plan</b>	
<b>Tasks</b>	<b>Status &amp; notes</b>
Hold a full partners meeting/teleconferences ~ review roles & responsibilities, communication norms, and deliverables	Completed
Identify embedded FOTM individuals to serve as on-farm Cultivators	Completed
Review materials to determine translation needs	Completed
Train Cultivators in how to work with other farmers as well as communicate with evaluator	Completed
Train Cultivators, Farm Liaison, Evaluator and Program Manager in how to collaborate with Conservation District and Agency (USDA) staff	Completed - <b>Four farms registered</b> with USDA Farm Services Agency and at least 1 farm applied for NRCS Cost share
Track all trainings, on-farm consultations, and progress toward outcomes.	Completed
Assist FOTM members in registering with USDA FSA.	Completed – There is significant cultural reticence for Spanish speaking producers to cooperate and trust government agencies. This presented a hurdle to identifying farms that wanted to apply for programs even if they saw a benefit.
MAEAP Farm Risk Assessments	Completed - <b>13 one-on-one farmer meetings</b>
On-Farm improvements identified by Risk Assessment	Completed - <b>Three farms</b> later went on to obtain MAEAP Verifications for their farms
Demonstrations	Completed - <b>18 Spanish-speaking farmers</b> from Southwest Michigan participated in the event that included presentations from multiple agency personnel as well as a focused seminar on pest management for blueberries. Two additional workshops/individual farmer discussions ~ <b>48 attendees</b>
Safe Food *A*Syst Risk Assessment demonstration	<b>Three producers</b> implemented at least two risk reduction measures
FOTM beginning to integrate individual farmer quality management systems into a cooperative set of standards	Completed – Needs Assessments conducted to identify further training needs in order to accomplish this will drive training beyond the life of this grant
Collection of experiences & stories, translated into Spanish & posted on the MIFFS website ~ Multicultural Spanish page	Completed
Process project invoices, financial reporting and prepare grant reports	Completed

## GOALS AND OUTCOMES ACHIEVED

### Objective 1

#### One-on-one farmer coaching and assistance to become registered as farms through the USDA Farm Service Agency.

**GOAL:** Farm registration with USDA Farm Services Agency (FSA) by FOTM farms.

**TARGET:** 100% of participants will be registered as farms.

**BENCHMARK:** Of fourteen current FOTM members, currently 3-4 are registered.

- A primary goal of this project was to help bridge the gap between state and federal agencies/programs and Spanish-speaking farmers. The first workshop that kicked off this project purpose occurred on, May 2, 2015 in Paw Paw, MI. It was designed to bring these farmers together before the growing season to hear about the range of resources and support available from MAEAP, and USDA agencies, specifically FSA & NRCS.
  - **18 Spanish-speaking farmers** from Southwest Michigan participated in the event that included presentations from multiple agency personnel as well as a focused seminar on pest management for blueberries. (Agenda, Addendum A)
  - By listening to the presentation from MAEAP all participants received the educational credit that is the first step in the MAEAP verification process. (A prerequisite to achieving Objective #2)
- Promotion and discussion of registration benefits of USDA Programs through word of mouth and at new partner meetings/workshops
  - **13 one-on-one farmer meetings**
  - Two additional workshops/individual farmer discussions ~ **48 attendees**
    - 2.18.16 Adrian, MI-WISEWOMEN planning meeting- nine growers
    - 3.18.16 South Haven, MI -Blueberry IPM for Hispanic Growers -39 growers
- **Four farms registered with UDSA Farm Services Agency and at least 1 farm applied for NRCS Cost share.** We believe two farms applied for NRCS cost share but were unable to confirm the second due to the confidentiality policies of USDA. project confirmed that Spanish speaking farmers are either reticent to share this information or reticent to actually register with FSA. The FSA staff regionally and at the state office are being consulted on this issue.

### Objective 2

#### Participation in MAEAP, a voluntary program.

**GOAL:** Completion of on-site MAEAP risk assessment with a technician.

**TARGET:** 60% of FOTM members will have completed an on-site risk assessment and will be actively working towards MAEAP Verification.

**BENCHMARK:** As of April 1, 2014, one FOTM producer is currently working towards MAEAP Verification.

- In order to encourage farmers to continue working with MAEAP for verification, the second project event, June 20, 2015 in Bangor MI, focused on what to expect during the on farm inspection with MAEAP.
  - **16 Spanish-speaking farmers** attended the event. The meeting began with an informational presentation and proceeded as a mock inspection of a farm, owned by a Farmers on the Move member and project Cultivatore. Farmers in attendance were engaged and appreciated the chance to see the process without the pressure of it being at their farms. (Agenda, Addendum B)
  - The second half of the event took place at a different farm nearby where the farmer has already been verified by MAEAP. The farmer is Spanish-speaking and he spoke with enthusiasm about working with MAEAP. He spoke of his experience obtaining

- verification, clarified issues that commonly prevent farmers from working toward verification, and attested to the positive impact on his productivity and profitability.
- One of the most important developments of the project was bringing the workshops into the field where farmers can most relate to the information and deal with individual and practical farm issues. With the demonstrated enthusiasm from the in-field June 20<sup>th</sup> event, Filiberto Villa Gomez, MIFFS bilingual assistant, and Stephen Arellano, farmer liaison, led the Cultivadores to continue with the following:
    - Distribution of MAEAP information
    - Meetings with MAEAP representatives
  - As a result of these efforts:
    - **13 farmers** were contacted and encouraged to participate in MAEAP
    - **10 farmers** scheduled one-on-one farm visits/risk assessments with the local MAEAP technician
    - **Three farms** later went on to obtain MAEAP Verifications for their farms
    - A water sample was taken on one farm and the process of submitting to the lab was explained. This was the first time this process was explained to and performed by this farmer.
  - In addition, in the spring of 2016, **48 producers and gardeners** attended a workshop and a planning meeting which also promoted engagement in MAEAP and USDA programs to gain access to technical assistance (Workshop Agenda, Addendum C).

### Objective 3

#### Increase outreach to Hispanic/Latino producers

**GOAL:** Invitation to USDA and MAEAP technicians to come onto Hispanic/Latino farms in Van Buren County to offer technical assistance.

**TARGET:** 30% of non-coop members will invite a visit, and begin working towards on-farm improvements; Google analysis of MIFFS new Multicultural Spanish web-page to determine number of visits to that information and its potential effectiveness.

**BENCHMARK:** As of April 1, 2014, two Hispanic, non-FOTM producers are engaged in MAEAP. There is no benchmark for the web page, launched in 2014.

- The spring planning meetings and events also opened up group discussion about crop diversification, organic production, and season extension.
  - Filiberto Villa-Gomez and Stephen Arellano worked with the FOTM Cultivadores to build FOTM's reputation and capacity as a farmer cooperative that brings connections to expertise and resources for its members.
  - MIFFS connected a Michigan State University Student Organic Farm (MSU SOF) educator to the workshop. He discussed educational services available through MSU SOF outreach programs. The MSU SOF educator agreed to look for local farmer expertise in organic production and season extension.
  - Organic opportunities for technical assistance were both researched and offered.
- Outreach to **six producers** participating in Farmers on the Move showed a marketing need to create farm stands and Farmer Market stalls.
- A mid-project strategy to identify partners outside of FOTM Cultivadores SW MI and outside of the region (moving first to SE MI) was developed and launched.
  - Our network of Spanish speaking producers was greatly expanded and now includes pockets of producers located in other areas of the state including Adrian and Grand Rapids MI
  - 48 Hispanic farmers newly engaged in a workshop and a planning meeting.
- The MIFFS Website was expanded to include a Multicultural Farmers page that is translated to Spanish. [http://www.miffs.org/services/farmer\\_networks/multicultural\\_farmers](http://www.miffs.org/services/farmer_networks/multicultural_farmers)

- A story about the Multicultural Farmers workshops was created and published to the MIFFS Multicultural Farmers Page [http://www.mifffs.org/uploads/files/Specialty\\_Crops\\_Story\\_93015.pdf](http://www.mifffs.org/uploads/files/Specialty_Crops_Story_93015.pdf)
- A Group GAP presentation, offered in SE MI in English, was translated into Spanish (See Addendum F)
- F. Villa-Gomez has reported that the farmers are not connecting through the internet. They still rely on communication in-person and via the phone. The internet outreach was the least productive strategy in this project.

#### **Objective 4**

##### **Begin creating food safety plans on more farms.**

**GOAL:** Engagement in food safety practices identified on the Safe Food Checklist (Safe Food \*A\*Syst), identify one farm employee to be in charge of that plan, documenting risk reductions and best practices.

**TARGET:** 60% will take steps to implement at least two risk reduction measures & begin a food safety plan.

**BENCHMARK:** There is no benchmark established.

- Despite the strong enthusiasm in the spring of 2015, minimal energy for this work characterized the 2015 growing season. Initially, we attributed that to the farming hours required during the growing season, but realized after harvest that even with the contractual agreements in place, we were not seeing the expected activities. The Cultivadores made efforts but not to the level necessary for truly engaging farmers in MAEAP and/or getting the farmers to go to the USDA offices and sign up for federal programs.
  - **Three producers** implemented at least two risk reduction measures
  - It is unclear how many producers began creating food safety plans at this time.
- Because of this, MIFFS revised our project plans.
  - First we shifted outreach responsibilities to F. Villa-Gomez, S. Arellano, and others on the MIFFS team who spoke Spanish and could reach out to farmers in other state regions. New “pockets” of Spanish-speaking farmers were identified and initial outreach conducted.
  - Second, five MAEAP technicians, the MAEAP Education Coordinator, and MIFFS representatives began meeting to connect the items in MAEAP verifications with the food safety self-assessment, Safe Food \*A\* Syst. As the work of this group progresses, MIFFS will share our results with the county service offices and with the farmers. Since the UP Food Exchange Group GAP pilot had success engaging farmers in food safety and MAEAP through the connection of these tools, we believe the same will be true in the Lower Peninsula. We have also learned that the Safe Food \*A\* Syst is currently viewed nationally as a highly respected tool for on-farm pre-assessment by the Food and Drug Administration for the Food Safety Modernization Act. Plans are being put in place to offer these evolving tools in English and Spanish. Both will be posted on the MIFFS website, allowing educators to download and make copies when necessary.

#### **BENEFICIARIES**

**Farmers on The Move** was able to identify that at this time, participation in a cooperative farm model was not a desirable strategy for many Spanish speaker growers in Southwest Michigan. This allowed them to avoid costly investments in creating infrastructure for a cooperative farm distribution center. The leader of FOTM, Filiberto Villa-Gomez, learned that he needed to work outside of the FOTM coop and create a new strategy for engaging Spanish speaking farmers in MIFFS Multicultural Farmer Program. Mr. Villa-Gomez discovered more effective ways to engage these producers through successful outreach and recruitment strategies. This project allowed MIFFS Multicultural Farmers

Program to significantly expand its network of growers and shift to delivering more on farm outreach and one-on-one technical assistance.

**WISEWOMAN Program** provides chronic disease risk factor screening and healthy lifestyle behavior support to Michigan women. An Adrian Michigan group of **Nine WISEWOMAN Program participants** met to identify the agricultural needs of their group. The top five educational requests were:

- 1.- Soil Management and fertilization
  - 2.- Vegetables production and diversification
  - 3.- Food Safety
  - 4.- Cottage Food Law
  - 5.- Marketing (different types of market).
- All eight of these participants have committed to exploring using farming and gardening to raise awareness about chronic disease risk factors and healthy lifestyle behavior in partnership with MIFFS. These women attended the 2016 Michigan Family Farms conference (2016 MFFC Agenda Spanish version: [http://www.mifffs.org/uploads/files/MFFC\\_Program\\_Spanish\\_2016\\_v1.pdf](http://www.mifffs.org/uploads/files/MFFC_Program_Spanish_2016_v1.pdf) ) and plan to engage in ongoing work at MIFFS farm incubator site in Ann Arbor Township (Tilian Farm Development Center). More information about the WISEWOMAN Program can be found here: [http://www.michigan.gov/mdhhs/0,5885,7-339-71550\\_2955\\_2975-269287--,00.html](http://www.michigan.gov/mdhhs/0,5885,7-339-71550_2955_2975-269287--,00.html) Plans are being developed to expand the engagement of the WISEWOMAN Program participants in future MIFFS programs. These women along with others from various Spanish-speaking communities throughout Michigan's Lower Peninsula will train with MIFFS as Community Navigators to offer technical assistance to Spanish Speaking producers and gardeners in their local communities.

This project reconfirmed that farmers are more receptive to being educated on the land versus a classroom setting. Creating avenues to carry out this work is well underway and should be considered a major success of the project.

**Michigan State University Extension** partnered on this project to create workshops that met the direct needs of Spanish Speaking growers in Western Michigan. They benefited from the receipt of direct feedback and identification of skills needed by growers in the target audience. They also benefited by lessons learned through evaluations about how to best reach and educate this underserved community. A total of 66 Spanish Speaking growers attended 6 workshops that MSUE partnered on for this project.

**Michigan Food and Farming Systems** increased its network of Spanish Speaking growers by connecting with a new community of growers through the WISEWOMEN program, and initiating outreach to new groups in Western and South Western Michigan. It also brought 48 additional growers into the network through workshop attendance and farm field days. Completion of this project allowed MIFFS to redesign outreach strategies for Spanish Speaking growers and develop new efforts for collaboration and expanded statewide engagement. MIFFS also identified essential updates that are needed for the Michigan Safe Food Risk Assessment and has formed a workgroup to address this need. This project had a large impact on shaping our work with multicultural farmers and is reflected in our plan of work for the next three years.

**USDA Field Offices** benefitted in participating in this project by gaining a better understanding of barriers for Spanish speaking farmers that wish to participate in USDA programs. They directly benefited by having four new Spanish Speaking farms register with USDA and at least one apply to participate in USDA programs with NRCS. The total numbers of farms that went on to work with

NRCS was not possible to obtain due to the confidentiality policies of USDA and reticence of farmers to share information.

## LESSONS LEARNED

- One of the most important lessons of the project was the need to bring the workshops into the field where farmers can most relate to the information and deal with individual and practical farm issues.
- The vast majority of MIFFS' Hispanic grower network still does not utilize the internet to learn about workshops. We learned that these growers must be personally called and alerted to upcoming workshops, often multiple times before an event, to secure their participation. With this understanding, we are also working to connect farmers to basic computer classes to help build technical skills (Photo, Addendum E).
- Hispanic growers largely prefer to learn information from their peers and trusted agency staff and tend to avoid reading information online or in emails.
- At this time, a cooperative farm model is not a viable option for the previously engaged Hispanic producers in Southwest MI. Moving forward, MIFFS will continue to work with leadership of the organization and its network; however, the work will now be more focused directly on individuals, those formerly associated with Farmers on the Move and reaching out to new farmers who have chosen to stay separate from the cooperative.
  - Part of the hope of this project is that the increased support and partnership with Farmers on the Move would help to bring energy and capacity to help the organization grow, but the challenges were beyond the scope of what could be achieved through this project.
  - MIFFS continues to facilitate discussions between Farmers on the Move and Michigan State University's Product Center. Collectively, we all provided technical assistance on nonprofit governance and also negotiating the cooperative's financial affairs. Currently, MIFFS is working directly with Farmers on the Move leadership to resolve its affairs while continuing to support the energy for serving Spanish-speaking farmers statewide.
- Persistence and repeated one-on-one meetings with growers are requirements for any agency working with Hispanic farming communities.
- A great deal has been learned about serving this population of farmers and part of the process will be trying and failing even with well-planned and well-executed programming. Many of these farmers are older (aged in the 50's and 60's) with no clear younger person to take over farm operations. Culturally there continues to be a significant gap between government-related agents and Spanish speaking farmers (i.e. presentations and written materials in English). This group of farmers responds better to in the field as opposed to in the classroom/meeting room. Even when shared widely, on farm success stories have not garnered the projected increase of participation in the MAEAP and USDA programs to date.

Two evolving, revised strategies:

- With USDA's recent launch of Group GAP and the efforts of Cherry Capital Foods (a MI-based food distributor) engaging farmers in the Lower Michigan Peninsula with Group GAP activities, we are working to connect Spanish speaking farmers to this work. The presentation about Group GAP was given in Detroit on August 21, 2015. Filiberto Villa Gomez attended, began building a stronger working relationship with Cherry Capital Foods personnel, and was given permission to translate, replicate, and distribute the information in Spanish (See Addendum F)
- MIFFS has begun working with MAEAP technicians around the state to develop a tool for connecting the self-assessment tool, Food Safe \*A\* Syst, with the verification tools in the MAEAP program. In 2016, we will work to translate some of this work into Spanish, and assess if this new "connecting mechanism" will be useful for engaging Spanish speaking farmers in Objectives #2 & #4.

#### CONTACT PERSON

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[michelle@miffs.org](mailto:michelle@miffs.org)

#### ADDITIONAL INFORMATION

See Addendum documents below and links to additional information noted in the text of this report.

#### ADDENDUM A: MICHIGAN FOOD & FARMINGS SYSTEMS-MIFFS

##### FARMERS ON THE MOVE COOPERATIVE

AGENDA.

#### (PROGRAMA DE REUNION)

TIME HORA	SPEAKER CONFERENCISTA	TOPIC TEMA
10:00 – 10:15 am. (introduccion)	MIFFS representative	Introduction
10:00 – 10:45 am.	Kyle Mead, GWT.Van Buren Conservation District.	MAEAP Verification <b>(Verifiacion MAEAP)</b>
10:45 - 11:20 am..	Estanislado Munoz, FSA Representative.	Microloans, and other Program <b>Microprestamos y otros Programas)</b>
11:20 - 12:00 am.	Frank Velazquez, NRCS Representative	USDA Registration and Program <b>(Rigistro de la Granja en el USDA y otros programas)</b>
12:00 – 1:00 pm.	<b>Lunch</b>	
1:00 – 3:00 pm.	Mark Longstroth, MSUE Small Fruit Educator:	Blueberry Pre-bloom, Pest & Diseases. Pre and Post Calibration equip. Weed Control. - <b>Blueberry: Plagas y enfermeda Des antes de floracion.</b> - <b>Calibracion de equipo, antes y Después.</b>

3:00 Adjourn  
3:00 Terminacion.

Addendum B

**MICHIGAN FOOD & FARMINGS SYSTEMS-MIFFS**  
**FARMERS ON THE MOVE COOPERATIVE**

AGENDA.  
(PROGRAMA DE REUNION)  
JUNE 20, 2015.

TIME HORA	SPEAKER CONFERENCISTA	TOPIC TEMA
<b>FIRST LOCATION: ( Meeting) 63143 M-43, Bango, MI49013</b>		
9:00 – 9:15 am..	MIFFS representative	Introduction (introduccion)
9:15:00 – 10:00 am..	Kyle Mead, GWT.Van Buren Conservation District.	MAEAP Verification (Verifiacion MAEAP) review step by step at the Farm
<b>SECOND LOCATION: (Tour and conversation. )</b>		
10:10 - 11:0 am..	Kyle Mead, Van Buren County Conser vation District Sigifredo Morales ( Blueberry Farmer) Filiberto Villa Gomez, MIFFS	MAEAP Certified Farm Review and Explanation and Share the experience of the Farmer.
11:00 Adjourn		

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Addendum C: **March 19, 2016 Workshop Agenda,  
Very Blue Farms** (a new partner)

Time	Topic	
10 to 10:15 AM	Registration	Filiberto & Jesus
10:15: 10:30 AM	Market update	Jesus & Pedro
10:30-11:00 AM	Blueberry diseases update: Disease in Spanish; Fungicides in English.	Carlos & Mark
11:00-12:00 Noon	Blueberry pest control update: CBFW, CFW, SWD. Spanish	Carlos
12:00-1:00 PM	Lunch: Provided	
1:00-1:30 PM	Food Safety: English with translation	Phil Tocco & Carlos
1:30-2:00 PM	Food Safety; Traceability: Spanish.	Carlos

40 producers attended the workshop.

Addendum D:

**MIFFS CONDUCTS SPECIALTY CROPS WORKSHOP**

This Workshop was in partnership with a program for specialty crop farmers and was held at Van Buren Mental Health Department 801 Hazen St. Paw Paw, Michigan. The farmers in attendance were predominantly Latino. The agenda focused on getting farmers to increase their participation in USDA programs and state-wide conservation programs. We had speakers from partner agencies including Kyle Mead, Groundwater Technician with Michigan Agricultural Environmental Assurance Program (MAEAP), Leslie Warner, USDA Farm Service Agency County Executive Director, Frank Velazquez, Soil Conservationist USDA Natural Resources Conservation Service and Mark Longstroth, Michigan State University Extension Small Fruit Educator. These professionals were instrumental in reaching and communicating the various programs to the farmers in attendance. Kyle Mead explained MAEAP verifications, how crops can be grown successfully while also protecting natural resources, and how farmers can be certified as a part of this program. He explained that farmers who are participating in USDA programs, applying conservation practices, and participating in education programs offered by Michigan State University Extension would have an excellent chance of being MAEAP verified. Farmers who are verified by the Michigan Department of Agriculture and Rural Development receive a MAEAP sign for display at their farm (As the number of verified farms rises over 2,000, this is a coveted recognition throughout the state).

Leslie Warner talked about the Farm Service Agency (FSA) and encouraged farmers to visit their office and get a farm number and become a participant in the FSA program. Leslie went on to talk about Micro Loans, and explained that these loans were designed to assist small farmers in getting started with startup expenses, annual expenses for operating, seeds, fertilizer, family living and for minor farm improvements. The farmers were very interested in this presentation.

Frank Velazquez talked to the farmers about the Natural Resources Conservation Service programs and how a farmer can benefit from NRCS. He explained the Conservation Planning process and how NRCS representatives work with the farmer by scheduling an appointment to complete an on- site assessment. He explained that this on site assessment could result in the farmer developing a conservation plan. The conservation plan is what determines the various practices that the farmer applies. Frank was able to teach in Spanish. It was clear that the level of comprehension rose when the material was presented in the farmers' native tongue.

Mark Longstroth, MSU Extension Small Fruit Educator always draws the attention of the farmers since a high percentage of them are blueberry producers. Mark brings the latest information about blueberry production and the most up to date information about any pests that the farmer needs to be aware of as well as ways that the farmers can develop control measures. He stated that for several producers the dominant pests of concern have been the spotted wing drosophila and the brown marmorated stink bug. He explained ways to control these insects. There is no way to eradicate them, but they can be controlled.

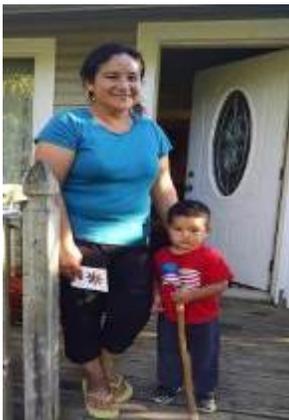
Following up with farmers who attended the workshop, Francisco Sanchez along with his wife Carolina are now involved with NRCS in developing a conservation plan for his farm in South Haven, Michigan. They have 26 acres total and 10 acres of blueberries. Carolina Sanchez has been active in attending many MIFFS workshops over the years and has served as a translator at times for MIFFS. The Sanchez's have applied for a loan once through The Farm Service Agency and did not follow through, they will be looking into applying again.

Francisco and Carolina are also members of Farmers on The Move Cooperative (FOTM). Farmers on The Move started its operation in 2009 with 11 farmers and has had challenges, but is still assisting farmers in marketing their crops and in sharing equipment. Mrs. Sanchez says they have attended many Michigan Family Farm Conferences and plan to continue attending. She says the conferences are very helpful. She would like a workshop at the conference on growing blueberry transplants.

Maria Luisa attended the workshop and is a blueberry farmer who has been growing for six years. She has implemented some programs as a result of attending workshops focused on food safety. She specifically mentioned the Good Agriculture Practices (GAP) program that has taught her how to restrict people from accessing her crops fields during the growing season. This helps to protect her produce from becoming infected with any diseases from those who are accessing the crop before they are harvested.

Juan Perez says he likes farming and grows blueberries. He and his wife Elvira have been growers for seven years. He has attended Michigan State University Extension Programs and the Specialty Crops Workshop but has not followed up with USDA NRCS yet. He said he would be doing that soon. He would like to look into a Seasonal High Tunnel green house.

Antonia Morales was clearing her blueberries of weeds when we Filiberto Villa-Gomez and I visited her as a follow up to the workshop. She has small 2.5-acre farm. She has not followed up with FSA or NRCS as a result of the workshop. Filiberto translated for me as she talked about her farming operation. She offered us both boiled Mexican corn as we left. I had never had it, and it was another nice cultural experience for me.



*Figure 1 Carolina Sanchez and son Damian*



*Figure 2 Juan Perez at his shop in Covert, Michigan*



*Figure 3 Antonia Morales clearing fall weed from blueberries*

Addendum E:



## Addendum F: Spanish Group Gap Presentation

“

### INTRODUCCION AL GRUPO DE BUENAS PRACTICAS AGRICOLAS (GAP).

”

Juntos - con usted y nuestros productores estamos construyendo un Sistema alimentario resistente y socialmente justo en Michigan

### QUE SON LAS BUENAS PRACTICAS AGRICOLAS O EL GAP?

- ▶ Conjunto de las mejores practicas disenadas para reducir el riesgo de contaminacion por patogenos en productos frescos.
- ▶ Higiene, saneamiento, calidad del agua, enmiendas de suelo, trazabilidad, etc.
- ▶ Varias normas y estandares (Buenas Practicas Agricolas (GAP), Buenas Practicas de Manejo (GHP), Buenas Practicas Agricolas Armonizadas..)

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## QUE ES EL GRUPO BUENAS PRACTICAS AGRICOLAS O GAP?

- ▶ Todo eso + administracion
- ▶ Auditorías Internas, Documentacion, etc. (mas tarde)
- ▶ El papel del USDA
- ▶ El grupo esta certificado como un todo
- ▶ Actualmente esta en un Segundo año de la fase piloto.

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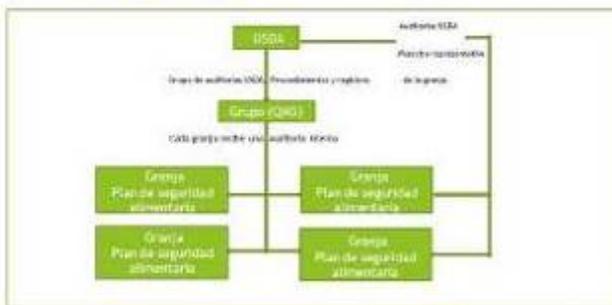
## QUE ES EL GRUPO BUENAS PRACTICAS AGRICOLAS O GAP?

- ▶
- ▶



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## QUE ES EL GRUPO BUENAS PRACTICAS AGRICOLAS O GAP?



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## POR QUE EL GRUPO DE BUENAS PRACTICAS AGRICOLAS O GAP?

- ▶ Esfuerzo en grupo
- ▶ Contruido en asistencia tecnica y capacitacion
- ▶ Mayor nivel de verificacion
- ▶ Grupo de compra
- ▶ Que pasa con el costo?
- ▶ Historia en La Peninsula Superior

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## TUERCAS Y TORNILLOS - QMS

- ▶ Sistema de manejo de calidad
- ▶ Definir las características del grupo
- ▶ Grado de calidad que reuna el requerimiento del cliente
- ▶ Manejo intensionalmente logrado
- ▶ Sistema conjunto de procesos interrelacionados

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## PREGUNTAS?

Por favor sientase libre de hacer preguntas o ponase en contacto con nosotros en [info@cherrycapitalfoods.com](mailto:info@cherrycapitalfoods.com)

## TUERCAS Y TORNILLOS - QMS

- ▶ Siguiendo el modelo de ISO9001
- ▶ Procedimientos y Registros Específicos
- ▶ Control y registro de documentos
- ▶ Auditoría Interna
- ▶ Control de producto no conformado
- ▶ Acciones preventivas y correctivas
- ▶ Organigrama, manejo de revisiones
- ▶ Separado de las actividades de la granja.

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## TUERCAS Y TORNILLOS - QMS



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## TUERCAS Y TORNILLOS - AUDITORIAS

- ▶ Auditorías internas de granja- Actividades primarias de Sistemas de Manejo de Calidad (QMS).
- ▶ Los mismos Procesos/Criterios como una Auditoría de USDA.
- ▶ Todas las granjas reciben una auditoría interna de la finca.
- ▶ Quién puede llevar a cabo la auditoría?
- ▶ Auditoría Interna de Sistema de Manejo de Calidad (QMS).

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## TUERCAS Y TORNILLOS - AUDITORIAS

- ▶ Auditorias de la Granja USDA.
- ▶ Auditorias de Sistema de manejo de Calidad (QMS).
- ▶ El proposito de esas auditorias es evaluar los sistemas del grupo en su conjunto.

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## PREGUNTAS?

Por favor sientase libre de hacer preguntas o pongase en contacto con nosotros a [info@cherrycapitalfoods.com](mailto:info@cherrycapitalfoods.com)

## IMPLEMENTATION

- ▶ Capacidad Administrativa
- ▶ Llevarlo en etapas:
  - Viabilidad e interes
  - Entrenamiento y fortalecimiento del Sistema
  - Asistencia tecnica y Auditoria Interna.
  - Auditorias USDA
  - Evaluacion y mejoramiento

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## RECURSOS DISPONIBLES

- ▶ Cherry Capital Foods
- ▶ Potencial para un grupo en todo el estado

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# GRACIAS!

Por favor sientase libre de hacer preguntas o pongase en contacto con nosotros a [info@cherrycapitalfoods.com](mailto:info@cherrycapitalfoods.com)

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Battle Creek, Michigan

Octubre 26, 2015

## **PROJECT TITLE: MICHIGAN POTATO INDUSTRY COMMISSION – Increase Awareness and Expand Understanding of Factors that Influence Post – Harvest Tuber Quality in Potato - FINAL**

### **PARTNER ORGANIZATION**

Michigan State University

### **PROJECT SUMMARY**

An important goal of the Michigan potato industry is to provide potatoes out of storage for an extended time. A survey of potato growers was carried out to determine tuber losses in storage caused by dehydration and tuber rot and to learn more about current storage practices. The survey indicated that dehydration caused a 5-7 percent loss in storage. The variety Pike was reported to be most prone to tuber rots in storage. Because the skin of potato tubers is the major water vapor barrier for tubers as well as a barrier to infection, we examined the effect of time of harvest after vine kill on skin maturation and other factors related to skin set. Leaving tubers in the ground for several weeks after vine kill tended to enhance skin set, and this enhances the ability of the tubers to resist pathogens and water loss. The development of resistance to tuber rotting *Fusarium* at wound sites occurred faster in the variety Manistee than Lamoka, and this relates to observed storage performance. Infections at bruise sites were also lower in Manistee. These results will help the industry in understanding physical and biological factors needed for long term storage of potatoes.

### **PROJECT PURPOSE**

The tuber losses experienced by potato growers can generally be associated with two primary phenomena; tuber dehydration or water loss and storage tuber diseases. It is estimated that in any given storage season, six percent of the total storage crop will be lost due to pathogens and an additional six percent due to dehydration. Reports of Michigan potato production estimate that 11 million century weight (cwt.) of potatoes are stored in the state for a period of 2-9 months. Based on these numbers, 600 thousand cwt. of potatoes are lost annually as a result of tuber decay. The economic value of loss due to storage breakdown can easily be placed at 6 million dollars. This value does not take into account the amount of financial loss related to tuber dehydration. On average, a single potato producer in Michigan experiences 150 thousand dollars in lost revenue annually as a result of tuber dehydration and disease. The larger potato growers may experience closer to 0.5-1 million dollars in lost revenue annually.

Gathering information about grower practices that influence post-harvest crop loss is useful in understanding the causes of tuber loss and would help identify possible prevention methods. Creating a set of basic information about current, commercially utilized varieties and their responses to bruising, wound healing and suberization rate, and rate of water loss would be useful information in reducing post-harvest crop losses. The results of this block grant will add potato producer's understanding of the varieties they are growing and help them identify varieties that have resistance or tolerance to black spot bruising and tuber dehydration. This study has also tested a means to quantify skin set (periderm formation), and suberization or wound healing rate for each variety tested. The research also examined the effects of simulated bruising on the infection of tuber tissue by *Fusarium*. The information generated from this research would help potato producers better understand what production factors are influencing tuber decay and dehydration, as well as, better understand what varieties are more suited for post-harvest storage. This information would lead to a reduction in post-harvest losses. The high value of the potato crop requires that every effort be taken to address tuber losses in storage.

Thus, the overall objective is to reduce post-harvest storage losses of potato by identifying production practices and varietal genetic characteristics that predispose the potato crop to post-harvest loss.

## PROJECT ACTIVITIES

### Skin Set Evaluation

A mature tuber skin and periderm helps protect the tuber against infection by tuber rot pathogens and also serves as a water vapor barrier that reduces water loss during storage. Killing of the vines prior to harvest promotes the maturation of the tuber and skin set. A mature skin at the time of harvest reduces skinning and other types of damage that can reduce the quality of tubers in storage. To evaluate the effects of timing of harvest and skin set, four varieties of potato (Pike, Snowden, Manistee and Lamoka) were tested. Tubers harvested from each variety at 7, 14, 21 and 28 days after vine killing.

Skin set was tested using a Halderson shear tester that tested the amount of force that is needed to “shear” skin off of the surface of the tuber.

Variety	7 days	14 days	21 days	28 days
Snowden	0.99	1.15	1.31	1.18
Manistee	0.91	1.05	0.99	1.05
Lamoka	1.13	0.99	0.97	0.87
Pike	0.99	1.10	1.25	1.42

The results of this test indicated that the force (torque) required to shear off skin from the tubers generally increased over time from one to four weeks after vine kill. However, the variety Lamoka exhibited the reverse trend. These results generally support the need to allow time for skin to mature prior to harvest. Future tests will also include samples taken just before vine kill to assess the state of the skin prior to this treatment.

Periderm disks (1.5 cm) were prepared from tubers from each date of harvest for analysis of suberin content. The disks were prepared by enzymatically releasing the periderm from the underlying flesh using cell wall degrading enzymes. The chemical analyses of the disks are ongoing. These results will be used along with the shear data to better understand the skin maturation process as it develops after vine killing.

### Formation of wound periderm

Tubers that are damaged by wounding or bruising need to repair the damage by forming a new skin or periderm at the damage site. Wound periderm formation and resistance to *Fusarium* infection was used as a means of evaluating the rate of wound healing. Tuber tissue was inoculated at intervals after wounding with the dry rot pathogen *Fusarium sambucinum*. Figure 1 shows the infection of Lamoka and Manistee tuber tissue at 24 or 48 hours after wounding. Lamoka was infected at both time periods whereas Manistee was resistant to infection at 48 hours after wounding. This indicates that Manistee is able to more quickly develop a wound induced barrier to infection as compared to Lamoka, and thus able to heal wound damage more quickly. The chemical nature of this barrier formation is being examined in these two varieties as well as Pike and Snowden.



Figure 1. Effect of time after wounding on infection of Lamoka and Manistee tuber tissue by *F. sambucinum*. L= Lamoka; M=Manistee; 24 and 48 are hours after wounding and when the tuber tissues were inoculated. Disease symptoms are the brown discolored areas.

#### Effect of Simulated Bruising.

Bruise damage was simulated by dropping a weight from a set distance. The bruised sites were inoculated with *F. sambucinum* to determine if there were differences in varieties or date of harvest with regard to infection through bruises. Infection occurred in all varieties from all harvest dates if the tubers were inoculated at the time of bruising. However, the Manistee variety showed the lowest amount of infection while Lamoka consistently showed the most infection. Snowden and Pike were intermediate in response. This information is of value as it demonstrates that bruising, which can cause small breaks in the periderm in addition to damaging tuber tissue, can readily result in infection even if no obvious wound is present.

The results of this research indicates the need for time to allow the periderm (skin) to mature prior to harvest. Although the results of this research is preliminary, it provides the foundation for further studies on the relation between vine killing and tuber maturation. The studies on wounding and bruising, wound healing and infection show the need to handle tubers at harvest and while be handled to minimize damage that can allow infections to occur. The results of this research also show that there are differences in how quickly varieties respond to wounding and how this response can be involved in stopping infection. These studies also provide the foundation for educational programs.

## GOALS AND OUTCOMES ACHIEVED

### Survey results

The first objective of this grant was to develop and conduct a survey of the Michigan Potato Industry. The goal of the survey was to establish base-line industry post-harvest storage practices and quantify potato tuber loss due to dehydration and or tuber rot in four commercial chip processing varieties. Four growers completed the survey representing 16,125 acres and totaling approximately 5.3 million cwt. of chip processing potatoes. The goal set in this project was to survey 70 percent of the total chip production in Michigan. Currently, about 42 percent of the production has been surveyed. The electronic version of the survey was not made public due to the lack of interest by growers to conduct the on-line survey. This decision was based on personal communications between Chris Long and industry representatives. Personal contact has proven the most effective for grower survey work in Michigan from past experience.

Results from the surveys reveal that on average the growers are experiencing five to seven percent weight loss due to tuber dehydration in storage regardless of variety. Three varieties were specifically addressed in the survey and the grower responses were relatively similar regarding tuber dehydration. When the growers were asked about which of these varieties experienced more break down due to storage pathogens the responses was unanimous. Pike was implicated as having a 50 percent higher tuber break down rate then the next closest variety. Growers indicated that they are using Ridomil Gold® fungicide, a Syngenta product, during the production season to control fungi responsible of tuber decay in storage. The growers mentioned Pythium leak, tuber soft rot and black leg bacterium as causal agents in tuber break down in storage. Of additional interest from the survey was a response from one grower that mentioned the physical limitation of the potato storage facility to control free moisture on potatoes resulting from tuber temperature differences at the time of pile filling. These temperature differences occur when cold potatoes are place on warm potatoes that were harvested the previous day. The grower appears to advocate for the ability to apply high volumes of dry air on these areas of the potato pile that have high free moisture present. Technology has just been introduced to the industry in 2015 to equalize the temperature in the potato pile interface between warm and cold tubers, thus eliminating free moisture accumulation. Free moisture on the tuber periderm is believed to be a major driver in tuber break down and pile collapse.

## BENEFICIARIES

Potato growers and processors. Roughly 80 potato growers in the state of Michigan and over two dozen processors and packagers of potatoes benefited from this project.

Though a better understanding of the need for good skin set, the parameters needed to achieve this (i.e. time after vine kill) and the fact that not all varieties respond the same in terms of skin set and wound and bruise repair. Based on the survey results, the potato chip industry can choose varieties that are less susceptible to dehydration and disease. This study has helped to identify those varieties that are less susceptible to these disorders. By growing Manistee a grower could potentially reduce tuber loss in storage resulting in significant economic savings not only in reduce tuber loss but in any field or storage chemicals that are used to control disease.

## LESSONS LEARNED

The goals of the work were, in general, achieved. It is difficult with this type of research to form any firm conclusions from one year of study, but the research has provided a framework for further research and further interactions with the industry on issues related to tuber damage and losses in storage. This project has served to lay the foundation for future variety breeding work effecting methodology and selection criteria to identify new germplasm that is resistant to tuber dehydration and tuber disease.

As noted, the study has provided a good foundation for future research and has established the tools needed to continue this type of work which will require several growing seasons to allow us to develop firm recommendations on specifics, such as varietal responses. However, it is clear that proper maturation of tubers through vine killing is needed to ensure that tubers can be harvested at a time when they are at lower risk of damage.

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## ADDITIONAL INFORMATION

**PROJECT TITLE: MICHIGAN FLORICULTURE GROWERS COUNCIL – Producing Nursery and Greenhouse Plants in Michigan that are Safe for Pollinators - FINAL**

## PARTNER ORGANIZATION

Michigan Floriculture Growers Council

## PROJECT SUMMARY

Two experiments were designed to test the impact of imidacloprid drenches applied to greenhouse or nursery plants on bumble bees after plants are sold. A third experiment was conducted to determine how long before shipping should growers avoid using a foliar spray of a standard insecticide in order to avoid leaving harmful residues on flowers.

A more rapid decline in colonies of bumble bees caged for three weeks with annual flowers in pots drenched with imidacloprid, compared with colonies caged with flowers soil-drenched with water suggests that soil drenches of imidacloprid made in spring of the year that annuals or perennials are

sold will be harmful to bees feeding on those flowers later in spring or summer. This conclusion is supported by the greater number of dead bees found in colonies held with imidacloprid-treated plants, and high levels of imidacloprid in the dead bees.

Excellent survival of bumble bees after being confined with *Tilia* trees which had been treated the previous year in early July with an imidacloprid drench suggests that treatments made a year before trees are sold will not be harmful to bees. However, some questions remain about the levels of active imidacloprid metabolites found in *Tilia* nectar one year after treatment, and how this did not seem to affect the bumble bees. More work is needed to compare the nectar-wash method with the amount of imidacloprid found in pure nectar.

The results of an experiment with four types of annual flowers indicates that annual flowers can be sprayed three or more weeks before the shipping date without leaving harmful residues on flowers. Systemic movement of imidacloprid to flowers following a foliar spray did not appear to be a problem.

As research continues on how to produce greenhouse and nursery plants that will be safe for pollinators after they are sold and planted in the yard and garden, it is becoming increasingly clear that growers should focus their efforts on plants that are highly attractive to bees. Many of the most popular annual flowers and many trees and shrubs are not frequently visited by bees, and therefore production practices are not expected to impact bees. However many perennials, some trees and shrubs, and a few annual flowers are highly attractive to bees. For these plants it is important to avoid soil applications of a systemic insecticide in spring of the same year that they are sold, and avoid spraying open flowers the least three weeks before shipping.

## PROJECT PURPOSE

- Determine the impact of an imidacloprid soil drench made to annual flowers growing in pots or to container-grown trees on bumble bees visiting the same plants after they are sold at a garden center.
- Determine the impact of a foliar spray of imidacloprid to annual flowers on bumble bees when sprays are applied at one, two, or four weeks before the shipping date

## PROJECT ACTIVITIES

**1. Impact of an imidacloprid basal drench applied to annual flowers grown in 12” pots on bumble bees.** One popular cultivar each of petunia, verbena, geranium, marigold, portulaca, salvia and begonia were grown in the greenhouse with standard production practices (Figure 1). At five weeks before the finish date, half of all the plants were drenched with imidacloprid at the labeled rate. The remaining plants were drenched with water. One week after the finish date, four plants of each type were put into 16 different screen tents (Figure 2). Half of the tents were filled with imidacloprid-treated plants and half with control plants. One bumble colony was placed in each screen tent for three weeks. After the exposure period, bumble bee colonies were moved to shelters and allowed to forage freely.

### **Results**

Of the seven types of annuals grown in pots, four of them absorbed imidacloprid from the soil and transported it to flower tissues, as determined by analysis of whole flowers collected during the screen-tent exposure period. The concentration of imidacloprid found in whole

Figure 1. Marigold, geranium (below) and five other popular annual flowers were grown in 12” pots. Half of all pots received a soil drench treatment of imidacloprid at 5 weeks before shipping.



Flowers varied from 0 for geranium and marigold, to 292 ppb in petunia (Table 1). Imidacloprid concentrations in whole flowers of petunia, verbena, portulaca and begonia were high enough ( $> 25$  ppb) that undesirable levels imidacloprid could appear in nectar or pollen, although pollen and nectar samples were not collected and analyzed in this study. Because imidacloprid was found in whole flowers of marigold or geranium, and only five ppb in whole flowers of salvia, it is possible that these types of plants could be treated with an imidacloprid soil drench in the greenhouse or nursery without posing any risk for pollinators after the plants are shipped and sold (Table 1). One of the active imidacloprid metabolites, imidacloprid-OH, was found in low concentrations in salvia and begonia. The olefin metabolite of imidacloprid was not detected in the same flower samples.



Figure 2. Potted annuals were kept in screen tents with one bumble bee colony per tent for an exposure period of 10 days.

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Table 1. Concentrations of imidacloprid and imidacloprid 5-OH found one week after shipping in the whole flowers of seven types of annual flowers treated five weeks prior to the shipping date with an imidacloprid soil drench at the labeled rate. Data are means  $\pm$  SE imidacloprid in ppb (parts per billion).

Plant type	Imidacloprid (ppb)	Imidacloprid 5-OH (ppb)
Petunia	292 $\pm$ 108	0
Verbena	51 $\pm$ 5.0	0
Geranium	0	0
Marigold	0	0
Portulaca	30 $\pm$ 11.1	0
Salvia	5 $\pm$ 2.0	1.0 $\pm$ 0.4
Begonia	34 $\pm$ 7.8	13 $\pm$ 5.6

The number of bees per colony declined in both treatments, but colonies in screen tents with imidacloprid-drenched plants declined more rapidly (Figure 3). In the first half of this experiment (until a Julian day of 170) bumble bees were held in a cold room (3°C) for 20 – 30 minutes for marking with a dot of paint and counting. However, because all colonies were declining in numbers we switched to using a CO<sub>2</sub> method, which was less harmful to the bees. After that time (day 170) the number of bees per colony in the control treatment remained fairly stable, while the number of bees continued to

decline in the imidacloprid-drench treatment (Figure 3). Also, more dead bees were found in screen tents with treated plants, and the dead bees contained fairly high levels of imidacloprid and the five-hydroxy metabolite of imidacloprid (Table 2).

Figure 3. Survival of bumble bee colonies confined in screen tents with annual flowers for three weeks in June, 2015, then moved to shelters and allowed to forage freely outdoors in a pasture area. Each screen tent contained twenty 12" pots of flowers previously drenched with imidacloprid or with water (Control). Data are mean number of bees per colony (n = 8). A star above a pair of data points indicates that the control mean was significantly different from the treatment mean on that date (P = 0.05).

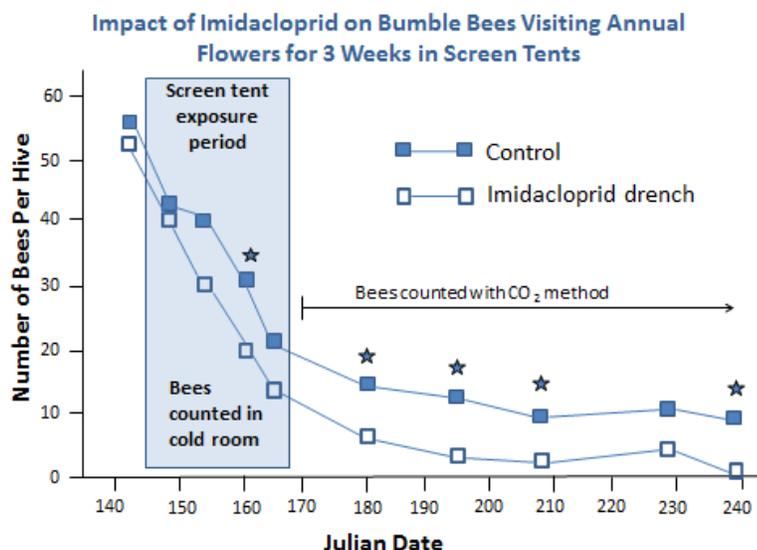


Table 2. Dead bees collected from screen tents at end of ten-day exposure period with imidacloprid-drenched plants or control plants. Data are means  $\pm$  SE amount of imidacloprid, olefin metabolite or 5-hydroxy metabolite found in dead bees.

Treatment	Number of dead bees collected	Imidacloprid (ppb)	Imidacloprid olefin (ppb)	Imidacloprid 5-hydroxy (ppb)
Imidacloprid basal drench	3.86 $\pm$ 0.69	83.0 $\pm$ 63.5	16.5 $\pm$ 12.3	119.4 $\pm$ 61.5
Control	1.38 $\pm$ 0.25	0	0	0

**2. Impact of an imidacloprid basal drench applied to base of container-grown *Tilia* trees in early July 2014, on bumble bees caged with the same trees in June 2015.** *Tilia americana* and *Tilia cordata* trees were grown in pot-in-pot containers at the Horticulture Farm at Michigan State University. Half of the trees received a basal soil drench of imidacloprid, applied at the labeled rate, in early July, 2014, after the trees had finished blooming and most of the flowers had dropped. The *Tilia* trees were moved into screen tents on June 15, 2015, when they first started blooming. One bumble bee colony was placed into each screen tent at this time and remained in the tents for 10 days. Bumble bees were counted weekly or biweekly for the rest of the summer, until August 27<sup>th</sup>. Queen cells were counted at the end of the summer. *Tilia* flowers from all trees in screen tents were collected on day 5 of the 10-day exposure period. A nectar wash method was used to determine the amount of imidacloprid in the nectar.

Figure 4. Screen tents used for enclosing bumble bee colonies with treated or control *Tilia* trees for a 10-day period. Clean marigold and portulaca were included as a source of pollen.



**Results**

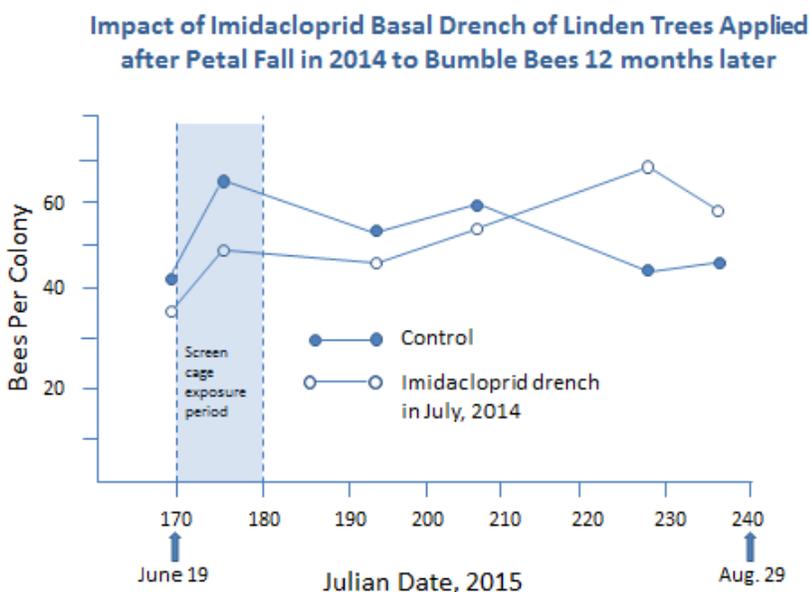
Bumble bee survival was very good in both treatments. All counts were made using the CO<sub>2</sub> method, which suggests that using CO<sub>2</sub> is far better for the bees than counting them in a cold room, as we did in the beginning of the previous experiment. Imidacloprid drenches made a year earlier had no impact on the number of bumble bees per colony throughout the growing season, or on the number of queens produced per colony (Figure 4).

Control colonies averaged 7.8 new queens produced per colony at the end of the summer, while colonies in the imidacloprid treatment averaged 5.8 queens per colony. No imidacloprid metabolites were found in nectar from flowers on control trees. The nectar from trees that had received a soil drench of imidacloprid one year earlier contained a mean of 313 ppb of the 5-OH metabolite of imidacloprid, and 514 ppb of imidacloprid-olefin. Imidacloprid parent compound was not detected in the nectar. It is possible that some of metabolites detected in the nectar wash had leached from flower petals or sepals, which were immersed in distilled-water wash for five minutes.

Figure 4. Survival of bumble bees after being caged with *Tilia* trees for 10 days in June, 2015, when the trees were blooming. Trees in the imidacloprid drench treatment were drenched in early July, 2014. Data are means of four colonies per treatment.

**3. Dislodgable residue of imidacloprid on the flowers of annuals sprayed one, two, and four weeks before shipping.**

In a third experiment flowers were sprayed with imidacloprid at one, two, and four weeks prior to shipping. This experiment was conducted in spring of 2015, with four types of annual flowers grown by Dr. Eric Runkle in the MSU horticulture greenhouses. Plants were grown with standard grower production practices. Whole flowers were collected on the shipping date, dried, weighed, covered with dichloromethane and agitated for 30 s. The solvent was decanted and reduced before HPLC analysis for imidacloprid residue.



## Results

Very little dislodgable residue was recovered from flowers sprayed four weeks or more before shipping (< 2 ppb), and it is unlikely that this would have any impact on bees (Table 3). Some dislodgable residue was recovered from flowers sprayed one or two weeks before shipping (< 6 ppb), but it is not known if this enough to affect bees. These results suggest that it would be safe for bees to land on flowers sprayed a week or more before shipping with imidacloprid, but more research is needed to determine the concentration of imidacloprid in pollen or nectar following foliar sprays applied at one to four weeks before shipping.

Table 3. Results from a 2015 experiment designed to determine how much dislodgable residue is present on flowers sprayed at one, two, or four weeks before shipping.

Weeks before shipping	Plant type	Olefin (ppb)	Imidacloprid (ppb)
1	Portulaca	0	5.4 ± 1.7
1	Verbena	0	4.0 ± 0.8
1	Salvia	0	0.7 ± 0.2
1	Marigold	0	1.8 ± 1.1
2	Portulaca	0	5.8 ± 0.8
2	Verbena	0	3.4 ± 0.4
2	Salvia	0	0.9 ± 0.3
2	Marigold	0	0.3 ± 0.2
4	Portulaca	0	1.8 ± 1.0
4	Verbena	0	1.1 ± 0.52
4	Salvia	0	1.9 ± 0.9
4	Marigold	0	0.8 ± 0.3

## GOALS AND OUTCOMES ACHIEVED

Results of this research provides some practical guidelines for greenhouse and nursery growers that want to produce annual flowers, perennials, shrubs and trees that are safe for pollinators. These guidelines can be summarized by the following bullet points:

- Focus efforts on flowering plants that are highly attractive to pollinators. A list of highly attractive plants can be downloaded free at this website: [http://msue.anr.msu.edu/resources/how\\_to\\_protect\\_and\\_increase\\_pollinators\\_in\\_your\\_landscape](http://msue.anr.msu.edu/resources/how_to_protect_and_increase_pollinators_in_your_landscape)  
For highly attractive plants, consider the following best management practices:
- Avoid spraying flowers or flower buds the last three weeks before shipping
- Do not use a soil drench of a systemic insecticide in spring of the same year they are sold
- For perennials, trees and shrubs that are attractive to pollinators, do not use a soil drench of a systemic insecticide in the last nine months before they are sold.

## BENEFICIARIES

Greenhouse and nursery growers, extension agents and other farm advisors, retail stores with garden centers, independent garden centers, beekeepers, gardeners and homeowners.

## LESSONS LEARNED

Greenhouse and nursery plants can be grown in a way that will minimize the impact on pollinators by using best management practices.

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## ADDITIONAL INFORMATION

**PROJECT TITLE: ALLEN NEIGHBORHOOD CENTER – Providing Place-Sensitive Marketing and Other Services to Mid-Michigan Specialty Crop Growers to Increase Visibility, Capacity and Competitiveness - FINAL**

**PARTNER ORGANIZATION**

Allen Neighborhood Center

**PROJECT SUMMARY**

In October 2014, the Allen Market Place (AMP) received funding to offer integrated services to Mid-Michigan specialty crop growers. A multi-functional food resource center and food hub located in Lansing, Michigan, the AMP facility is operated by Allen Neighborhood Center, a non-profit community development agency serving the northeast quadrant of the Capital City.

The menu of services included the Exchange (our on-line wholesale food hub, offering promotion, aggregation, distribution services); easy and affordable access to our licensed incubator kitchen for creation of salable, value added product; a year round farmers market; and educational training and practical assistance for small urban, rural, and beginning farmers in mid-Michigan.

In carrying out grant activities, we paused several times to review our progress. A re-evaluation at the mid-point of the grant cycle led to our adding significant programmatic and physical infrastructure to improve our capacity to provide essential services. The changes and improvements are detailed, herein.

Overall, we are pleased with our accomplishments in meeting grant objectives. Receipt of the Specialty Crop Grant leaves us poised to build on the extensive work and learnings of the past two years in order to better support the success of mid-Michigan specialty crop growers.

**PROJECT PURPOSE**

**Overall:** In late 2013, Allen Neighborhood Center opened its new Allen Market Place (AMP) facility and, with support from Michigan Department of Agriculture and Rural Development, began to provide integrated services to mid-Michigan growers and food producers. These services included the Exchange (our on-line wholesale food hub, offering promotion, aggregation, distribution services); easy and affordable access to our licensed incubator kitchen for creation of salable, value added product; a year round farmers market; and educational training and practical assistance for small urban, beginning, and rural farmers in mid-Michigan.

***Important and timely***

In researching regional growers' requirements over several years and crafting a working model in the AMP to help grow economic activity within the sector, we had been struck by the need consistently expressed by small farmers for assistance in growing their businesses. Many had great technical knowledge and farming skills but more limited business and marketing skills. Further, small scale growers lacked the time and capacity to connect with institutional and commercial buyers, and generally lacked access to licensed, commercial kitchens that would allow creation of value-added product. Allen Neighborhood Center sought support in order to address these identified needs and to increase exposure, sales, and consumption of specialty crops in the region. There is great demand for locally sourced food, and our work was and is intended to increase small growers' capacity and make the supply side more visible and accessible to institutional, commercial and individual consumers.

***Objectives of the project:*** Our objectives were four-fold:

- 1) Increase visibility of regionally grown specialty crops (particularly those produced by very small, small, and medium-sized growers) to consumers and institutional procurers via a general

marketing campaign and the development of farm-specific materials. ANC proposed providing services of a graphic design professional to assist specialty crop growers involved in the Allen Market Place Exchange and the Allen Street Farmers Market to develop unique, farm-specific marketing materials. The materials were to include colorful profiles of the farms, farmers and their crops. Once these were developed, they would be provided in bulk to the growers for dissemination, as well as utilized in a broader promotional campaign that included billboards, print ads, and displays in food establishments (grocery stores, hospitals, restaurants.) Three billboards would be developed in partnership with Adams Outdoor Advertising and modeled on their successful “Artist in the Sky” campaign. Featuring specialty crops and their growers, the “Farmers in the Sky” billboards would travel to different sites around the region for a year. In addition, print ads in local newspapers would be developed to promote *seasonal* produce and note where it is available at local farmers markets every day of the week. Finally, buyers would be provided with high quality copies of marketing materials about the origin of the crops purchased, suitable for display in their food-related establishments to promote local sourcing.

2) To increase marketing and promotional skills, provide low or no-cost training opportunities to growers, including sessions addressing 1) use of web-based systems for marketing specialty crops, 2) development of an integrated marketing plan, 3) salesmanship and presentation skills, and 4) brand development. In addition to these formal trainings, we proposed providing guide-by-the-side, one-on-one marketing consultation to individual growers in our Exchange on an as-needed basis. Finally, we proposed creating a “community of practice” featuring bi-monthly gatherings. These gatherings would involve a shared meal, prepared by two or three participating food producers/growers (who would have an opportunity to describe growing practices or preparation techniques), and a brief presentation on some aspect of promoting the specialty crop industry. We proposed that much time be reserved for networking and sharing.

3) Increase specialty crop sales by increasing the number of mid-Michigan based institutional and commercial procurers purchasing regionally grown crops. We proposed increasing membership in the Exchange by reaching out to local restaurateurs, caterers, food service managers of hospitals and schools, group home managers, and other institutions. As part of our engagement of buyers, we would offer promotional materials suitable for use in displays. The displays would feature specialty crops, but would personalize the experience of eating local by also featuring growers and farms where the produce originated.

4) To assist specialty crop growers to determine feasibility of value-added product lines, we proposed providing affordable access to our newly opened licensed kitchen.

## PROJECT ACTIVITIES

**Activities Performed to Meet the Marketing Objective:** *Increase visibility of regionally grown specialty crops, particularly those produced by very small, small, and medium-sized growers, to consumers and institutional procurers via a general marketing campaign and the development of farm-specific materials.*

### The Work

- Since the start of the grant cycle, ANC staff, working with graphic artists and utilizing Canva Graphic Design Software, have created eighteen (18) specialty crop profiles that are posted on our website and are being given to growers to distribute at Farmers Markets and elsewhere. These colorful handouts include photos of farmers, their farms and produce & food products; text that captures the business story; and information pertinent to consumers, e.g., growing practices. These sheets co-promote both the producer and the Allen Market Place. We have completed vendor profiles for the following eighteen (18) farmers/food producers: Hillcrest Farms, Hillcrest Organics, Rust Belt Roastery, Craft & Mason Roasting Co, MSU Student Organic Farm, Peckham Farms, CBI Giving Tree Farm, The Country Mill, Wildflower EcoFarm, Calico Beans, Ten Hens Farm, Twin Sprouts,

Urbandale Farm, Smith Floral and Greenhouse, Lansing Roots, Cultured, Green Eagle Farm, and American Delicacy.

- In partnership with Adams Outdoor Advertising and working with our Lansing-based, graphic design company, Message Makers, we developed “Farmers in the Sky”-- three billboards featuring specialty crop growers. The three featured growers, along with their produce and food products, include: Hillcrest Farms, Green Eagle Farm, and American Delicacy. The billboards went up for the first time in spring 2015, and were then placed on a rotational basis in different locations for four weeks at a time, for thirteen different time periods.
- Thirteen (13) commercial buyers on our Exchange Food Hub were offered high quality materials that featured our specialty crop farmers, suitable for display. We are planning additional outreach in the future, and also creating a collaborative group to focus on a region-wide campaign to promote local sourcing to locally owned, mid-sized grocery stores.

**Activities Performed to meet the Training Objective:** *Provide low or no-cost training opportunities to growers, including sessions addressing 1) use of web-based systems for marketing specialty crops, 2) development of an integrated marketing plan, 3) salesmanship and presentation skills, and 4) brand development. In addition to these formal trainings, provide guide-by-the-side, one-on-one marketing consultation to individual growers in our Exchange on an as-needed basis. Finally, create a “community of practice” featuring bi-monthly gatherings.*

### **The Work**

The Associate Director of the Allen Market Place, working closely with the Exchange (food hub) Manager, collaborated with members of our instructional team --Michigan State University Product Center, Lansing Community College Small Business Development Center (SBDC), Learning Connection, Michigan State University Extension (MSUE), and others-- to develop a schedule of training opportunities and specialized services for growers. Topics focused on business and financial planning, marketing and branding, and food safety and were offered in a variety of formats (i.e., multi-session classes, half-day workshops, mini-workshops, one-on-one coaching) in order to accommodate growers’ seasonal availability and unique needs.

Over the grant cycle, staff promoted and hosted 26 training sessions, with a total of 245 (duplicated) participants. Fourteen (14) of these sessions focused on marketing skills. Nine (9) of the sessions focused exclusively on marketing while an additional five (5) addressed marketing issues to a more limited extent. Below are listed the marketing-related workshops, presenters, and number of attendees at each offering:

#### **Nine (9) Marketing Workshops; Attendance = 81**

- 10/24/2014 “People Skills for Food Entrepreneurs,” Led by Kristine Ranger, The Learning Connection, seven attendees
- 11/14/2014 “Marketing Your Business- Practical Applications of Marketing Concepts to Grow Your Small Business,” Led by Laurie Lonsdorf, SBDC, seven attendees
- 12/12/2014 “Analyzing the Competition- Where do you fit in the Marketplace?” Kristine Ranger, The Learning Connection, eight attendees
- 1/16/2015 “Growing Your Internet Presence,” Led by Sam Rose, Holocene Systems, and Veronica Gracia-Wing, Piper & Gold Public Relations, 19 attendees
- 2/20/15 “How to use Local Orbit,” Led by Egypt Krohn, Allen Market Place, three attendees
- 4/24/2015 “Breaking into Wholesale Markets”, Colleen Matts of MSU Center for Regional Food Systems, Erin Caudell of MSU and Flint Ingredient Farm, Kelly Lively of Cherry Capital Foods, four attendees

- 3/18/2016 "Breaking into Wholesale Markets" Colleen Matts of MSU Center for Regional Food Systems, 25 attendees
- 4/8/2016 "How to Use Local Orbit," John McCarthy of Allen Neighborhood Center, three attendees
- 4/22/2016 "Growing Your Internet Presence," Veronica Gracia-Wing of Piper & Gold Public relations, five attendees

**Five (5) Workshops Addressing a Broad Range of Topics, including Marketing; Total Attendees = 48**

- 10/17/2014 "Starting a (Food) Business" Led by Tom Donaldson, SBDC, one attendee
- 1/9/2015 "Boot Camp for Farmers" Led by Marty Garencer, Morse Marketing Connections, Phil Tocco, MSUE, and Larry Sheridan, Greenstone Farm Credit, 15 attendees
- 3/6/2015 "Diversify Your Revenue Streams," Led by Rebecca Titus, Titus Farms, and Anne Rauscher, Swallowtail Farm, seven attendees
- 4/10/2015 "How to Start a Food Business", Tom Donaldson, SBDC, ten attendees
- 01/29/2016 "How to Start a Food Business," TomDonaldson of LCC Small Business Development Center, 15 attendees

**Twelve (12) Non-Marketing Related Workshops; Attendance = 116**

- 11/18/2014 "What's Changing with FSMA?" Led by Lindsey Scalera, Michigan Voices for Good Food Policy & Tim Slawinski, MDARD, ten attendees
- 1/30/2015 "Effective Crop Planning," Led by Dan Fillius, MSU Student Organic Farm, 14 attendees
- 2/13/15 "Developing a Farm Safety Plan," Led by Phil Tocco, MSUE, six attendees
- 2/27/25 "Who Licenses Your Food Business?" Led by Rob Losee, Ingham County Health Department, and Ken Settimo, Michigan Dept. of Agriculture and Rural Development, 12 attendees
- 3/20/2015 "Crop Storage and Post-Harvest Handling," Ellen Moje, MSU Student Organic Farmer of MSU, 12 attendees
- 3/27/2015 "Choosing the Right Certification for Your Farm," Jen Silveri, Eaton Conservation District, 5 attendees
- 5/8/2015 "Cottage to Commercial", Pam Weaver of MDARD, 3 attendees
- 1/15/2016 "GroupGAP Informational Session," Phil Britton of Cherry Capital Foods, 17 attendees
- 2/26/2016 "Developing a Farm Safety Plan," Phil Tocco of MSU Extension, 16 attendees
- 3/25/2016 "GroupGAP Session 2," Phil Tocco of MSU Extension, 8 attendees
- 5/6/2016 "GroupGAP Session 3," Phil Britton of Cherry Capital Foods, 3 attendees
- 5/13/2016 "Who Licenses Your Food Business?" led by Pam Weaver of MDARD and Amy Weaver of Ingham County Health Department, 10 attendees

**One on One Consultation**

Ten (10) specialty crop growers have received one on one consultation from specialists in 1) business and financial planning, 2) food safety compliance, and/or 3) product development, nutritional analysis, and packaging guidance. The consultants along with their clients and months of service are listed below:

Kristine Ranger of the Learning Connection provided consultation serves for the following:

- Mark Kastner, Hillcrest Farm, Jan & Feb 2015
- Mike Rann of an as-yet-unnamed market garden, March 2015
- Teresa Nelson of Nelsfarm Produce, January 2015

Phil Tocco, Safety Compliance Authority of MI State University Extension Services worked with:

- Mark Kastner, Hillcrest Farm, November 2014
- Juke Putnam, of American Delicacy, November 2014
- Jessica Shelton, Twin Sprout Farm, January 2016

Diane Smith/MSU Product Center provided product development services to:

- Lisa Stuecher of Rooted Home Farm and Goods

Tom Donaldson, LCC Small Business Development Center has provided product development services to:

- Bradley Fierro, Cultured and Trillium Farms, January 2016
- Emily Nicholls, Rust Belt Roastery and Giving Tree Farm, January 2016
- Matthew & Melanie Romans of Harvest Day Farm, March 2016

**Activities Performed to meet the Sales Objective:** *Increase specialty crop sales by increasing the number of mid-Michigan based institutional and commercial procurers purchasing regionally grown specialty crops.*

### **The Work**

Over the last year, we have implemented several strategies to grow the Exchange and have experienced qualified success in this effort. Product diversity on the Exchange grew significantly. Currently, from 57-65 unique products are listed for sale each week, and over 175 unique products have been posted for sale over the past twelve months.

We initially focused intensively on recruiting more organizations to the Exchange. Exchange registrants doubled to a total of 250 organizations, with registered Buyers increasing from 72 to 149, and Sellers increasing from 67 to 101. This has not necessarily resulted in the increase in sales we had hoped for. Over the life of the grant, the Exchange has posted 157 transactions, involving 491 items, purchased from 38 unduplicated farmers/food producers by 23 unduplicated buyers and amounting to \$16,909 in sales. In the last twelve months, gross sales totaled \$13,620, largely due to the success of the Veggie Box pilot.

The largest buyers are Better Health Grocery, Cake Art, James Clift/Michigan Environmental Council Buying Group, Lansing Eastern High School, Moores Park Neighborhood, Okemos Public Schools, Finley's Grill and Smokehouse, Plant-based Nutrition Personal Chef and Educator, the Local Grocer, The Warren, and several individuals. In addition, our own Hunter Park GardenHouse buys from Exchange suppliers to provide add-ons (meat, eggs, bread) to our CSA subscribers and others.

In winter 2015, we examined survey results from both growers and buyers. We also weighed new information gathered from our participation in the Michigan Food Hub Network, the National Good Food Network webinars, the Food Hub Collaboration and/Discussion Group, and our Associate Director's participation in the first UVM Food Hub Management Certification Program. This resulted in our identifying several key areas within the Exchange program in need of improvement. We realized that:

- we lacked adequate infrastructure to successfully handle larger volume orders,
- we were missing clear Standard Operating Procedures to guarantee consistent, high quality service, and
- the existing Exchange delivery and pick-up schedule was inconvenient to many Buyers.

By early spring, our focus shifted to addressing these issues to ensure the long-term success of the Exchange. Funding was secured for the renovation of the attached garage space referred to as the "bubble," creating a new 600 square foot warehouse featuring a walk-in cooler, chest freezer, pallet shelving for dry storage, and a wash-pack/prep area. These improvements would allow us to

efficiently handle and store much larger volumes of product, which will prove critical in obtaining accounts with larger institutional buyers and ultimately reaching our sales goals. The new walk-in cooler, increased dry storage capacity, and wash-pack/prep area also provide valuable rental opportunities for our kitchen tenants and other area businesses looking for storage space. In fact, we have already had several inquiries from new businesses in the area regarding our dry storage and cold storage spaces.

Alongside these physical renovations, we also created more thorough SOPs outlining consistent internal processes for handling orders efficiently and safely as well as a Producer's Guide clearly outlining grower's responsibilities, product standards, payment terms, and available resources. These documents create clear procedures and standards for growers to follow, and allow us to guarantee the best quality product and service to our buyers. Several changes were made to our Local Orbit (the IT platform for the Exchange webstore) service plan, allowing us to offer purchase orders and credit terms to select buyers, and changes have been planned to our order and delivery schedule that went into effect on August 1, 2015.

Part of our evaluation entailed a sales analysis through which we identified end-consumers as our strongest customers (with our buying club and individuals purchasers comprising 42% of total 2014 Exchange sales). In order to fully utilize this market, we created our new Veggie Box program- a workplace delivery service where customers in participating workplaces pay in advance for a 10-week subscription to local produce, with the option to add on other locally produced grocery items, such as meat, eggs, bread, and locally roasted coffee. All food for this program is purchased through the Exchange from regional growers and/producers. We piloted this program in June 2015 with 16 subscribers from three Lansing-area worksites registering for the first session. The program was received with great enthusiasm, providing a significant, steady stream of Exchange purchases. Encouraged by the pilot, ANC staff spent considerable time during the first quarter of this year reaching out to other employers in the area. As a highly scalable program, Veggie Box has the potential to grow into a significant income stream for regional growers and food producers, and in fact, the 2016 Veggie Box program has expanded to include eight (8) worksites and 80 subscribers!

In addition to the Veggie Box program, an extensive Exchange sales and marketing plan has been created, identifying key area businesses to approach, creating sales cold-call scripts, best practices, marketing materials such as Exchange handbills and sample "Fresh Sheets" (weekly inventory lists and brief newsletters highlighting current Exchange products), and a record keeping system to track sales calls and buyers' responses. Sales and marketing has been an ongoing, constant activity as AMP staff work to network and make connections with area businesses and institutional partners, but this sales plan entails a highly focused, targeted approach to marketing that will take place in the foreseeable future.

Throughout these behind-the-scenes improvements and development work, we have maintained the weekly Exchange, populated with a diverse array of mid-Michigan specialty crop products, as well as baked goods, meat products, cheese, eggs, fermented foods, cider, and more. Recruitment of both buyers and sellers is ongoing, and the Exchange staff consistently provides support and coordination for the growers and buyers, helping growers post product, maintain inventory, set prices, and create strong profiles highlighting their products. Staff works with Buyers regularly to assess product demand and source desired products, and a twice-weekly Fresh Sheet is sent out detailing the current Exchange inventory and highlighting any new or exciting products. A weekly newsletter is also sent to growers and producers, sharing any upcoming workshops, trainings, or other community offerings, communicating policy changes and updates, and expressing any specific product requests from buyers.

**Activities Performed to meet the Value-Added Objective:** *Assist specialty crop growers to determine feasibility of value-added product lines by providing affordable access to our licensed kitchen.*

### **The Work**

The incubator kitchen in the Allen Market Place facility offers growers and food producers a fully equipped kitchen in which to create value added product at an affordable rate. Weekly newsletters to all members of the Exchange (65% of whom are specialty crop growers) and to the growers in our farmers market regularly remind them of the availability of the cooking kitchen, and, as of July 2015, a wash-pack kitchen as well.

Over the grant cycle, four (4) specialty crop growers have utilized the AMP Kitchen on a *regular* basis to create value added product. These include: Cultured (fermented food products such as sauerkraut with produce from Trillium Farm, Teff-rific (teff products), Tongue Huggers (hot sauce from peppers), and American Delicacy (mushrooms). Three of these are current weekly users while one utilized the kitchen for several months in the late fall of 2014. One other current food producer, Abood's Foods, purchases product from specialty crop growers (popcorn) and adds spice combinations (garlic and mint) in order to create value-added product. Five other producers have made intermittent use of the kitchen facilities. All regular users of the facilities were assisted by staff in obtaining necessary government approvals from Ingham County Health Department and the State of MI (Department of Agriculture and Rural Development).

One additional specialty crop farmer (FoodShed Farm) has utilized the cooking kitchen for wash and pack purposes, rather than to create value-added product. We anticipate that the Wash-Pack kitchen will continue to draw a number of additional users interested in prepping CSA boxes or packaging produce for commercial deliveries. The Wash-Pack kitchen also features cold storage (large walk-in cooler and a chest freezer) and dry storage (pallet shelving), which we are promoting to specialty crop farmers who vend at our farmers market and/or are members of the Exchange.

### **GOALS AND OUTCOMES ACHIEVED**

**Goals and Outcomes for Marketing Objective:** *Increase visibility of regionally grown specialty crops, particularly those produced by very small, small, and medium-sized growers, to consumers and institutional procurers via a general marketing campaign and the development of farm-specific materials.*

Target: Create farm-specific marketing pieces for 15 specialty crop growers.

Results: Target has been met and exceeded.

Eighteen (18) profiles of specialty crop growers have been completed and are posted on our website. Copies have been printed and distributed in batches of 100 to the featured specialty crop growers, with the expectation that they will utilize them in farmers markets in which they vend and with their wholesale and retail customers.

Target: 80% of growers receiving marketing pieces will report high levels of satisfaction.

Results: Target 75% completed

- In spring 2016, all participating farmers were surveyed to determine their satisfaction regarding the marketing materials and their perceptions of the impact of materials on sales and visibility. Of the 11 farmers who responded to the survey, eight indicated their level of satisfaction with the profiles. Within the latter group, six (75%) were very or somewhat satisfied, coming very close to the 80% target.
- Growers noted in the survey that they had used the business profile sheets in the following ways:

- Displayed sheets at farmer markets or similar site (n=4)
- Distributed sheets to potential buyers (n=2)
- Posted on their website (n=2)

Target: 3 high quality billboards featuring mid-Michigan specialty crop growers will be created and displayed at different sites in Greater Lansing.

Results: Target has been met.

- Working with Message Makers and Adams Outdoor Advertising, we designed and produced three billboards, each of which went on display in spring 2015. Adams provided thirteen four-week periods for our Farmers-in-the-Sky billboards. The three specialty crop farms featured were: Hillcrest Farms, Green Eagle Farm, and American Delicacy. Adams estimates that each of the three are viewed by a minimum of 20,000 – 36,000 viewers each day, and suggests a total of 522,659 views during the grant period.

Target: Ten procurers will display ANC-developed marketing pieces. Each procurer will utilize more than 1 piece, and each producer will be displayed in more than one location.

Results: Target 10% Completed (as originally conceived)

- Among survey respondents, three buyers had received farm/food business profile sheets, and one had displayed the profile sheets within their organization. The business profiles had helped them to learn more about the producers (2 yes, 1 somewhat). No buyers suggested any other marketing information was needed about the producers in the Exchange. (This should be considered a minimum; the extent to which ten other buyers who did not answer the survey had used the materials is unknown. Further, the eight businesses participating in the recently launched Veggie Box work-site delivery program will receive weekly inserts of profiles in each box.—See second bullet.)
- Companies participating in the 2016 Veggie Box Program have also received copies of the profile sheets during Informationals held at work-sites in February and March of this year. As of this writing, nine different organizations have hosted Informationals and eight will be participating in this work-site delivery program during Summer 2016. Total subscribers across the sites is 80. Each week, the 80 Veggie Boxes will contain the profile sheet of a different farmer whose produce is included in the Box. Participating organizations include: Ingham County Health Department, Michigan Environmental Council, CEDAM, Armory Center for Non-Profits, Dexsys Corporation, Public Sector Consultants, Sparrow Health System, and Ronald McDonald House.

**Goals and Outcomes for the Training Objective:** *Provide low or no-cost training opportunities to growers, including sessions addressing 1) use of web-based systems for marketing specialty crops, 2) development of an integrated marketing plan, 3) salesmanship and presentation skills, and 4) brand development. In addition to these formal trainings, provide guide-by-the-side, one-on-one marketing consultation to individual growers in our Exchange on an as-needed basis. Finally, create a “community of practice” featuring bi-monthly gatherings.*

Target: 4 organized, scheduled, formal training opportunities focusing on Marketing skills will be offered at Allen Market Place.

Result: Target has been met and exceeded. A total of 14 marketing training opportunities were offered, with nine of these focusing exclusively on marketing skills and five additional focusing at least in part on marketing skills. Twelve additional trainings focused on safe growing practices and other topics. A total of 26 trainings were offered.

Target: 35 growers will participate in at least two trainings.

Result: Target has been met.

- Twenty six training sessions (of which 14 focused on marketing) were offered to 245 duplicated individuals.
- Of the 245 duplicated attendees, 132 (54%) were specialty crop growers.
- 141 (unduplicated) people participated in trainings; of which 76 (54%) were specialty crop growers.
- Of the 76 unduplicated specialty crop growers, 35 participated in at least two trainings.

Target: 10 growers will receive one-on-one mentoring.

Result: Target has been met.

Ten (10) specialty crop growers have received one on one consultation from specialists in 1) business/financial planning, 2) food safety compliance, and/or 3) product development, nutritional analysis, and packaging guidance. A list of these growers and the consultants they worked with are included in Project Activities. (P. 6-7)

Target: 20 growers will participate in a Community of Practice.

Result: Target has been met and exceeded.

Our efforts to create a community of practice among specialty crop growers has resulted in multiple opportunities for well over the targeted 20 growers to come together for fellowship and learning. To date, we have:

- Partnered with local farmer Anne Rauscher of Swallowtail Farm in the creation of the *Mid-Mitten Farmer-to-Farmer Gatherings*. This group of greater Lansing area farmers is working to cultivate a community of practice, creating time in their busy schedules to meet, swap stories, share food, and learn from each other. Two gatherings have been held thus far, the first at the Allen Market Place and the second at Titus Farms in Leslie, Michigan. The group plans to continue meeting regularly, with gatherings being held at different farms in the region, allowing growers to see each other's set-up, equipment, and techniques, share experiences at various markets or with unique specialty crops, and help each other learn about other are resources. Attendees for the two events totaled 31, of which 27 are unduplicated.
- Hosted a CSA fair on February 22, 2016, involving 12 specialty crop farmers. Farmers had the opportunity to meet with approximately 299 potential CSA customers during a Sunday afternoon open house at Allen Market Place.
- "What's happening at the AMP/Greater Lansing Food Bank" was held in the first quarter of this year, bringing together 40 attendees, 23 of which are specialty crop farmers and food producers.
- Finally, a less anticipated impact of the trainings offered through the AMP has been the interchange of knowledge and experience between the workshop participants. Most workshops contained lively, involved discussions and input from attendees, which greatly complemented the training offered by instructors. More experienced growers often gave advice and input to those just beginning, and the significant diversity in background knowledge and experience lent itself to a valuable exchange of knowledge throughout the various trainings. As many participants attended multiple workshops, Exchange staff observed the formation of several relationships that seemed to be carried on outside of the AMP. This "community of practice" is a concept we have seen in other areas of the AMP as growers and producers become involved in multiple AMP programs and begin to forge deeper connections between businesses.

Target: 80% will report more effective marketing practices as a result of training, mentorship, and other offerings.

Results: While 80% of growers report high satisfaction with the workshops offered at the Allen Market Place, only 1/3 report that they have "created more effective marketing practices" as a result. Hence, this specific target has not been met.

On the other hand, we believe that our high quality trainings helped position individuals to improve the viability of their current, emerging or future businesses. For example, training participants reported an impact on their knowledge, growing practices, and preparation for certifications. In addition, of those attending trainings, at least five received ServSafe or other certifications, and six received food warehousing or processing licenses. In addition, many survey respondents said the training helped “some” or “a lot” their marketing strategies, business plans, product packaging or labeling, and helped increase volume of sales. More specific feedback in our 2016 survey of producers who attended trainings indicate that:

- Three out of four respondents (75 percent) indicated that the trainings had increased their knowledge.
- About two-thirds (65 percent) said the trainings had helped them prepare for certifications.
- About one-third (37 percent) indicated that AMP trainings had helped them create more effective marketing practices.
- 60% said that AMP Resources (Trainings, Kitchen, Farmers Market, Exchange) on Business provided them with another avenue for sales.
- Asked to reflect on the utility of the trainings, workshop attendees who answered the survey reported the following :
  - 78% said the trainings provided good information
  - 67% said the information helped them make decisions
  - 55% said they got insights into farm or food-related business issues
  - 44% said they gained insight as to their readiness for a next business
  - 80% reported being either very satisfied (50%) or satisfied (30%) with the workshop. None were dissatisfied.

**Goals and Outcomes for the Sales Objective:** *Increase specialty crop sales by increasing the number of mid-Michigan based institutional and commercial procurers purchasing regionally grown specialty crops.*

An online survey was conducted in the spring of 2016 of all registered exchange members who had completed one or more transactions. The instrument asked about their satisfaction with the online and physical systems for the transactions; satisfaction with exchange features; valued features; perceived benefits, challenges, and impacts of membership; ways to improve the Exchange; and interest in other AMP services. Completed responses were obtained from 12 producers and 14 buyers.

*Results:*

- In terms of the online process, at least six in ten buyers and producers found that communication and getting started with the online system were simple, and that the online system easy to use.
- The majority of buyers and producers found physical transactions satisfactory. Buyers were more likely than producers to note that the transactions are handled smoothly and efficiently and that the facility is well suited for the physical exchange. Few buyers or producers indicated that there was confusion on site or that more staff were needed to improve functionality.
- The majority of responding buyers (83%) had recommended the Exchange to others. However, only 40% of producers had recommended the exchange to other producers.
- When asked how likely they were to retain their membership, 10 of 12 buyers, and seven of 10 producers said that it was likely.

Buyer Feedback	Producer Feedback
<ul style="list-style-type: none"> <li>• Buyer satisfaction with their treatment as an Exchange member averaged 8.6 on a scale where 10=very satisfied.</li> <li>• Of buyers who responded to the survey, 83% said the quality of products met their needs, and made it easier to access local products.</li> <li>• 75% of responding buyers said the Exchange made it easier to access local products, product pricing was clear, and online information about producers was helpful.</li> <li>• 63% of responding buyers said they would buy a greater diversity of products if more diversity were available.</li> <li>• Relatively few buyers said the diversity of products met their needs or that they were getting a lot more regionally produced items because of the Exchange.</li> <li>• Buyers most valued the quality of products; ability to buy regional products; and price points of products. .</li> <li>• Top challenges reported by buyers were that the volume of product as packaged was too large, and that there was not enough variety of items. Other reported challenges included lack of information about farms, farmers, products, and growing methods.</li> </ul>	<ul style="list-style-type: none"> <li>• Producer satisfaction with their treatment as an Exchange member averaged 7.6 on a scale where 10=very satisfied.</li> <li>• About one-third of the 12 responding producers said they had less spoilage or waste of products.</li> <li>• Only two of the responding producers reported increased sales volume, and one reported increased profitability.</li> <li>• Three of the 12 responding producers considered the online marketing materials valuable. (The online materials are different from the profiles).</li> <li>• Very few producers had adjusted production plans or operations, or used the marketing materials elsewhere.</li> <li>• Producers most valued the price obtained for products; volume of products sold; ability to plan production; and ease of use of the system.</li> <li>• Low sales volume was the top challenge reported by producers, with 9 of the 12 respondents indicating that this was a problem. Three producers encountered challenges in getting a fair price and keeping up to date with posting online, and one reported logistical challenges with the online system.</li> </ul>

Buyers were asked what additional AMP services they would seriously consider using in the near future. Of these, buyers most often expressed interest in buying or selling at the farmers market. Several buyers also were interested in the cold storage rental, commercial kitchen, or workshops and consultation. Few of the responding buyers were interested in delivery of their orders or in participating as sellers in the aggregation and distribution exchange.

Target: 25 institutional procurers will purchase product through the Exchange at least once, while ten of these will purchase five times or more within the life of this grant.

Result: Target met 92%.

- 23 unduplicated buyers have purchased from the Exchange at least once, for a total of 157 transactions. Ten have purchased five times or more. As indicated earlier, we anticipate adding substantially to the number of buyers, given the popularity of the Veggie Box program and the recent enrollment of eight separate worksites to begin in June 2016.

Target: 10% increase in Exchange sales from benchmark (\$3,753.58).

Result: Target Met and Exceeded. Sales over the past 12 months have totaled \$13,620 or 3.5 times the benchmark (i.e., 350% increase)

- Though we have met our target, we believe that the bar was very low.

**Goals and Outcomes for the Value-Added Objective:** *Assist specialty crop growers to determine feasibility of value-added product lines by providing affordable access to our licensed kitchen.*

Target: Five growers will rent the AMP kitchen to create value-added product.

Result: Target 100% Met and Exceeded

- A total of ten producers have rented the cooking kitchen to create and sell value added product. Two have utilized the wash and pack kitchen, and five have rented dry or cold storage. Among survey respondents, two had rented the AMP kitchen, and one of these had used it to develop a new product line. The renters noted that the kitchen had helped their business by virtue of (1) being able to cool and sell produce, and (2) having a place to stay legal by producing in a commercial kitchen.

**Ensuring that Grant Funds are used solely to enhance the competitiveness of specialty crops.**

Nearly all of our services (trainings, participation in the Exchange, use of the incubator kitchen) are open to all growers, food producers and others. However, 65% of those involved in the Exchange and 54% of those involved in our trainings are specialty crop growers. Blended funding enables us to utilize Specialty Crop grant funds only for services to specialty crop growers, and our alternative funding sources for services to all others.

**BENEFICIARIES**

The most immediate beneficiaries of this project were Mid-Michigan's small urban, rural, and beginner specialty crop growers, who experienced increased visibility as a result of the integrated marketing activities, including billboards and print advertisements. In addition:

- All specialty crop growers on the Exchange benefit from the twice weekly order sheets sent to over 149 buyers.
- 132 (duplicated) specialty crop growers benefited from high quality, no cost trainings.
- 18 specialty crop growers benefited from personalized, farm-specific, full color spec sheets for on-line posting as well as hard copy distribution.
- 10 specialty crop growers received one on one mentorship.
- 25 (unduplicated) specialty crop growers benefitted from sales on the Exchange.
- 10 specialty crop growers benefited from access to a low cost, commercial kitchen to create value added product.

In addition, mid-Michigan institutional and commercial procurers (food service managers, restaurateurs, caterers, etc.) benefited from the increased ease of purchase of locally grown fruits and vegetables through the Exchange. 149 received twice-weekly order sheets detailing available-for-purchase specialty crops; 23 (unduplicated) purchased from the Exchange.

Finally, mid-Michigan residents learned about the rich array of specialty crops grown regionally via highly visible and broad marketing efforts of Allen Market Place.

**LESSONS LEARNED**

The food hub has been closely evaluated on an ongoing basis from its development, through its launch and ongoing operations. Our utilization-focused evaluation has generated data at many points

along the way, using administrative, primary, and secondary data. This has led to the identification of key lessons and informed leadership decision-making throughout the grant cycle:

- An example of using results to make improvements was the realization that our facility was not conducive to the volume of actual and desired physical transactions. With this, we expanded the aggregation and distribution capacity with creation of a wash-pack kitchen and storage center in summer 2015.
- After our trainings in late 2014 and into 2015, we identified several issues with multiple organizations in the area offering similar trainings to growers. The repetition and overlap seemed to create confusion amongst growers and hurt attendance, as well as creating unnecessary duplication of efforts across the organizations hosting these educational sessions. To help combat this, we brought together mid-Michigan groups hosting such trainings and proposed a collaboration. Staff from MSU's CRFS, Michigan Farmer's Market Association, Michigan Food and Farming Systems, the Greater Lansing Food Bank Garden Project, the MSU Student Organic Farm, the Wallace Center, and more have attended these meetings and created "Let's Farm Michigan," a website and Google calendar featuring grower trainings being offered across the state in one easy to navigate format. We expect that this calendar will help growers decide amongst the broad array of trainings being offered, and reduce redundancy and confusion.
- Upon finding a high number of registered Exchange members but a low number of sales transactions, we dug deeper to determine that buyers were more often individuals (and individuals buying on behalf of small groups of individuals) than institutions. These findings informed our decision to increase sales to individual buyers even further via the Veggie Box workplace delivery program. Piloted in summer 2015, and promoted in January and February of this year, the Veggie Box program will increase by 400% in summer of 2016 over its 2015 pilot.

Through the Veggie Box program, we have forged new relationships and begun to increase awareness and demand for high-quality local products in businesses throughout our region. Several of our Veggie Box host sites also work with the AMP in other ways: booking the AMP kitchen for staff cooking classes, receiving gardening consultation from GardenHouse staff to create on-site gardens for employees, and ordering additional food through the Exchange for work-related events. These relationships pave the way for future Exchange growth; as employees and patrons of these businesses become familiar with regional food and experience the quality of Mid-Michigan's fresh produce, demand for regional foods is increased, if only in a modest way. Veggie Box consumers are also familiarized with the seasonality of our local foods, a key understanding if consumers are to begin eating regionally. We hope that as more consumers want and demand local products, institutions will face growing pressure to carry locally grown produce on their store shelves and in their menus.

- Finally, in our efforts to increase use of the Exchange by hospitals, schools and local grocery stores, we have repeatedly bumped up against safety certification requirements. Inspired by the work of the Upper Peninsula Food Hub, we partnered early this year with Cherry Capital Foods, Prima Civitas, and MSU Extension in order to offer GroupGAP to six specialty crop growers on our Exchange. Two of our staff have only recently completed internal auditor training in order that we can continue to provide GroupGAP and other essential safety trainings to growers within our region.
- Development of thorough SOPs in 2015, as well as robust training offered throughout the grant cycle helped equip our growers for success in wholesale markets. This assistance helped growers to meet the necessary expectations regarding product quality, standard packaging requirements, typical case sizes or units of sale, and food safety practices. While helping to ensure the long-term success of the Exchange, these skills will be carried forward regardless of growers' future involvement in the AMP, and should prove valuable in their long-term financial growth and success.

## CONTACT PERSON

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## ADDITIONAL INFORMATION

- The complete Spring 2016 Survey Results
- Copies of the farm-specific, full-color marketing sheets
- Flyer promoting the Allen Market Place Exchange
- Information Sheet on One-on-One Consultation Services



**Providing Place-Sensitive Marketing and Other Services to Mid-Michigan  
Specialty Crop Growers to Increase Visibility, Capacity and Competitiveness**

### **Appendix**

1. Full report from the Spring 2016 Survey of Producers and Buyers, conducted by Nancy McCrohan, Public Policy Associates
2. Samples of Farm-Specific Marketing Sheets (18 growers)
3. Half-Sheet Flyer Promoting the Exchange
4. Flyer Distributed to Growers Describing Consultations Available

## Appendix: AMP Food Hub Survey Results 2016

Results from two surveys conducted in spring 2016 are summarized in the following pages. One survey was directed at registered *buyers* (procurers) in the AMP Exchange, and the survey tool was focused on the experience with the Exchange overall and the producer marketing materials. Of the 137 registered buyers, 24 individuals completed the survey—a response rate of 18 percent. Those who were registered but had not yet had a transaction were offered the option of being removed from the list.

The other survey's target audience was *producers* which is actually a wide variety of stakeholder types, including individuals who had taken part in one or more trainings at the Allen Market Place (AMP); individuals receiving one-on-one consultation; producers in the exchange; kitchen renters, farmer market vendors; and dry and cold storage renters. Participation in the producer survey included at minimum:

- 18 Growers
- 1 Value added producer
- 4 Ready to eat vendors
- 8 Other interested party

The producer survey instrument addressed experiences with *each* feature of the AMP, and where a section of the instrument was not relevant, the respondent was skipped to the next section of the tool. The producer survey instrument focused on the experience of the trainings and one-on-one consultation, and the impacts on business acumen and marketing. Not all workshop attendees were growers, and not all workshop aims were relevant to each attendee. Accordingly, respondents were given a "not applicable" option and the number of responses for each item varied. Of the 200 invitees, 38 individuals completed the survey—a response rate of 19 percent.

### Buyer and Producer Satisfaction with Exchange

#### Producer

Of the 38 producers who responded to the survey, 12 (32%) had had at least one transaction in the Exchange in the past year. These 12 respondents were asked to reflect on their experiences with the Exchange.

#### Buyer

The types of buyers who responded to the survey were as follows:

Individual	18
School	3
Grocer	2
Restaurant	1

Of the registered buyers responding to the survey, 10 had not had transactions in the past year. They were asked why they had not made any purchases from the Exchange. Their responses highlight the variety in the types of buyers in the exchange, as well as the large proportion of individual rather than institutional buyers.

The most common reason was that the volume of product as packaged is too large (4 mentions); however, one comment was that the volume of product is too small. Other common responses were the long distance to pick up product (3 mentions); not enough variety of items (2 mentions); and just have not gotten around to it (2 mentions). Other comments were:

- "I typically deal directly with farmers. Buying same produce through the exchange means smaller margins on sales for us."
- "Buying for family of 2, easier to shop at markets for quantity needed unless canning or putting food by."
- "I'm especially interested in soft cheeses."

Of the registered buyers responding to the survey, 14 indicated that they had made one or more transactions in the past year.

**Table 1: Exchange Member Feedback on Operations**

	Buyers Who Agree or Strongly Agree		Producers Who Agree or Strongly Agree	
	Number	Percent	Number	Percent
<i>Online System</i>				
Communication is simple	9	75%	6	60%
The system is easy to use	8	67%	7	70%
Getting started with the system was simple	9	75%	6	60%
<i>Physical Transactions</i>				
The transactions are handled smoothly and efficiently	8	80%	5	50%
The facility is well-suited for the physical exchange	8	80%	6	60%
There is a lot of confusion on site	3	30%	1	10%
More staff is needed to move things along	2	20%	2	20%
I am satisfied with the days and time for drop off of product	NA		6	60%
I am satisfied with the days and time for pick up or delivery of my order	6	60%	NA	

**Buyer: Thoughts regarding delivery**

Two of 13 respondents said they usually have product delivered to them. Both of these parties strongly agreed with the following ideas about delivery:

- I am satisfied with the days and time for pick up or delivery of my orders
- Delivery services are carried out in a professional and timely manner
- Delivery services are a good convenience relative to the fee
- Delivery service fee is fair

**Buyer: Comments regarding days and times for delivery or pick up**

- "It's a pretty narrow window which is sometimes hard for me."
- "I'm happy with present days and times."
- "They are on market days which are days we are least likely to be available to pick up."
- "John [exchange manager] and Yvonne [green trikes delivery] have been great to work with!!!!!! The best"
- "Now that I'm familiar with where orders are, I just look for my name on the box and take it. Works fine."

**Producer: Comments regarding days and times for drop off.**

- "All good."
- "Until business picks up, one weekly cycle would be more efficient use of farmers' time. Small orders and multiple trips to drop off actually cost farmers money."

**Table 2: Buyer and Producer Satisfaction with Exchange Features**

Rating, where 1=very dissatisfied and 10=very satisfied	Buyers Average Satisfaction Rating	Producers Average Satisfaction Rating
How satisfied are you with how you are treated as an Exchange member?	8.6	7.6
How satisfied are you with the Exchange manager?	9.0	7.8
How satisfied are you with communications and information?	8.1	7.4
How satisfied are you overall with the online system in the Exchange?	8.1	6.5
How satisfied are you overall with the physical transactions in the Exchange?	8.3	6.4

**Producers' Perceived Benefits and Value**

**Table 3: Producer Feedback on Benefits**

	<b>Number Agree or Strongly Agree</b>	<b>Percent Agree or Strongly Agree</b>
I have recommended the Exchange to other producers like me	4	40%
Due to the Exchange, I have less spoilage or waste of products	3	30%
Due to the Exchange, I have increased my volume of sales	2	20%
Due to the Exchange, I have increased profitability	1	10%
The online marketing materials about me are valuable	3	30%
Due to the Exchange, I have adjusted my production plans	1	10%
Due to the Exchange, I have changed some of my business operations	2	20%
I have used the marketing materials elsewhere	1	10%

**Table 4: Producer Ranking of Valued Features**

	<i><b>Rank Where 1=Most valued</b></i>
Price obtained for products	2.4
Volume of products sold	2.6
Ability to plan production	3.4
Ease of use of the system	3.5
Support from the Exchange manager, for tasks such as posting my products	4.1
Online marketing materials about me, my farm or business	5.0

	<b>Number Noting Challenge</b>	<b>Percent</b>
Low volume of sales	9	100%
Getting a fair price	3	33%
Staying up to date with posting in the online system	3	33%
Logistics with the online system	1	11%

#### **Buyers' Perceived Benefits and Value**

	<b>Number Agree or Strongly Agree</b>	<b>Percent Agree or Strongly Agree</b>
The quality of products available meets my needs	10	83%
I have recommended the Exchange to other procurers	10	83%
The Exchange makes it easier to access local products	10	83%
(Online) information about the farm, business, farmer or producer is helpful	9	75%
Product pricing is clear	9	75%
The Exchange makes it easy to buy from multiple vendors in one system	9	75%
I would buy a greater diversity of products if more diversity were available	8	67%
Information about products is complete	7	58%
The price point is acceptable on most products	6	50%
Due to the Exchange, I am getting a lot more regionally grown produce	6	50%
The quantity of products available meets my needs	6	50%
Due to the Exchange, I am getting a lot more regionally produced items	5	42%
The diversity of products available meets my needs	5	42%

	<i>Rank Where 1=Most valued</i>
Quality of products	2.1
Ability to buy regional products	2.5
Price points of products	3.3
Ease of use of the system	3.6
Customer service from the Exchange manager	4.0
Delivery of your order to your site	5.3

	<b>Number Noting Challenge</b>	<b>Percent</b>
Volume of product as packaged is too large	5	46%
Not enough variety of items	5	46%
Lack of information about the farms' growing methods	4	36%
Lack of information about the farms and farmers	3	27%
Lack of information about the products	2	18%
Volume of product available is too small	2	18%
Prices are not right	1	9%
Long distance to pick up	1	9%
Product availability has been inaccurate	0	0%
Product availability is not up to date	0	0%
Online ordering is too confusing	0	0%

***Likelihood of Future Membership Among Buyers and Producers***

When asked whether they were likely to still be Exchange members in the next six months, nearly all of the 12 responding buyers indicated in the affirmative. Of the 10 producers who responded to this question, most also responded in the affirmative, but the proportion was slightly smaller.



- Only 3 of the 10 registered buyers who had not made any transactions in the past year asked to be removed from the list. Buyers were asked to reflect on the reasons (i.e., why or why not) for their expectation of Exchange membership in the next 6 months. "Seasonal canning and freezing"
- "I don't need that much of anything as an individual"
- "Prefer buying in person at the Market."
- "I might find the products at the Allen Street farmers market."
- "If the quantities necessary to purchase change, I'd be likely to buy. Similarly, I would like to see more produce, chicken and eggs"
- "Volume of product as packaged is too large"

**Buyer: How could the Exchange better meet your needs?**

- "Smaller minimum orders"
- "More diversity of products both fresh produce and value added products, easier way to email Exchange manager from the site."
- "John M [exchange manager] has tremendous to work with as has the Yvonne L for delivery. They have been super with regards to meeting my schedule of distribution. A wider variety of product -frozen perhaps form fresh Students like the quality of the product. I would order different products if more were available. I can not always get the website."
- "More produce, pkg in variety of quantity, ability to reserve a future order, esp for preserving produce."
- "More info about the produce and how it's grown. Maybe some easy way to tell when produce is grown with organic vs conventional methods."

**Producer: How could the Exchange better meet your needs?**

- "When working with small and beginning farms, exchange employees need to work with buyers to agree to purchase the farm produce first. It's too big of risk for a farmer to get GAP certified to /possibly/ have a buyer lined up. You can't put the risk on the grower that has so much risk already relating to weather, pests and other variables. Push the buyers first to agree and put some risk on them."
- "We just need to get more buyers using it."
- "I think the Exchange could work on getting health care insurance providers to give cash towards local CSA memberships. There's a good success story of this very thing called Fair Share in Wisconsin. I think they have 3 or 4 local health care insurance providers in the program. In general, the margins are too slim for the Exchange to be sustainable in the long run. I think the Exchange focus could be on different ways of supporting the local food system. Some how more broadly..."

**Farmer-Specific Marketing Profiles**

**Buyer: Use of profiles**

Three buyers had received farm/food business profile sheets, and one had displayed the profile sheets within their organization. The business profiles had helped them to learn more about the producers (2 yes, 1 somewhat). No buyers suggested any other marketing information was needed about the producers in the Exchange.

**Buyer: How could the Exchange better market the farms and their products to you?**

- "The menus are long and cumbersome. I have to scroll through pages of things that aren't relevant to me to find the stuff I want."
- "Make it easier as an individual to purchase. Smaller minimum amounts."
- "The days that are available to pick up are inconvenient. The sizes available for pick up are inconvenient to our operation, need larger quantities. Prices are too high in many cases for us to make our margin/ or comparable to other produce"
- "I would like to see more individual packaged specials."
- "A wider variety of veggies/fruit. This could be frozen into bulk packages for use in February, March April"
- "Weekly news email works well."
- "It isn't always easy to find which produce has been grown with organic methods. That's important to me, and there seems to be less of it available than when I first started with the Exchange."

**Producer: Development of farmer/food producer profile sheets on your business**

AMP had worked with 15 producers to create profile sheets on their business. Of these producers, 11 described their experience in the survey. Producers had used the farmer/food producer profile sheets in the following ways:

- Displayed sheets at farmer markets or similar site (n=4)
- Distributed sheets to potential buyers (n=2)
- Posted on their website (n=2)
- One had not yet disseminated materials

A total of 8 indicated their level of satisfaction with the farmer/food producer profile sheets:

- One was very satisfied and five were satisfied
- Two were neither satisfied nor dissatisfied
- None were dissatisfied

**How have the farmer/food producer profile sheets benefited you?**

- "Don't know that they have"
- "Local community businesses became familiar with our veteran program"

**How could the Exchange better market the farms and their products? (n=12<sup>1</sup>)**

- "They could tell the public if any of the products are available to them to purchase. I don't hear much about it because I don't own a business that is a customer."
- "Feature a farm each week with email blast."
- "Deeper web and community demographic based marketing"
- "Going out in person and talking to the buyers at every restaurant and institution in the greater Lansing area."
- "Regional "food fair"/meet the grower type event"
- "The website page could be easier to maneuver, i.e. adding pictures"
- "Have a street team of volunteers that tell restaurants they want local food on the menu"
- "By not being in direct competition with the real farmers in the marketplace"
- "More information about what is needed and when."
- "A meet & greet with buyers? I miss interacting with buyers, knowing where the food is going, how it will be prepared, etc."

### Training

Only respondents who had attended at least one workshop since July 2015 at the AMP—20 of the 38 respondents—were asked about their experience with trainings.

80% of respondents reported being either very satisfied (50%) or satisfied (30%) with the workshop. None were dissatisfied and 20% were neither satisfied nor dissatisfied with the workshops.

**Table 9: Producer Feedback on How Trainings Were Useful**

	Number	Percent
Provided good information	14	77.8%
Provided information that helped me make decisions	12	66.7%
Got to hear from other workshop attendees	12	66.7%
Gave me insights into farm or food-related business issues	10	55.6%
Gained insight about my readiness for next business	8	44.4%

<sup>1</sup> This question was intended to be asked of all producers. Due to a skip pattern error, only 12 respondents were asked this question.

Among the 15 producers who received one-on-one consultation since July 2015 at the AMP, 5 also responded to the survey. Of these, 3 reported being very satisfied, one was satisfied, and one was neither satisfied nor dissatisfied with the consultation received.

**Impact of AMP Training on Participants' Business**

Participants were asked how much, if at all, participation in AMP trainings (workshops or one-on-one consultation) had impacted their business. A series of potential impacts were presented, along with a scale of 1=Not at all to 4=A Lot. Results are noted here with the "not applicable" cases removed from analysis.

- Three out of four respondents (75 percent) indicated that the trainings had increased their knowledge.
- About two-thirds (65 percent) said the trainings had helped them prepare for certifications.
- About one-third (37 percent) indicated that AMP trainings had helped them create more effective marketing practices.
- In terms of improving trainings, one suggestion was to just offer more training to business incubators. Another reflected uncertainty whether trainings were the best use of funding.

**Table 10: Impact of Training On Business**

	Number Responding	Percent Rating As Some or A Lot
AMP trainings have increased my knowledge	15	75%
AMP trainings helped me prepare for safety and other certifications	13	65%
AMP trainings have influenced my marketing strategy	8	40%
AMP trainings have influenced my growing practices	8	42%
AMP trainings helped me create more effective marketing practices	7	37%
AMP trainings helped me develop a new business plan	5	26%
AMP trainings have helped increase my volume of sales	5	29%
AMP trainings helped me change packaging or labeling of products	5	31%
AMP trainings helped me update a business plan	4	24%

*Producer: In what ways have AMP resources (trainings, kitchen, Farmers Market, Exchange) influenced your business?*

**Table 11: Producer Feedback:  
Influence of AMP Resources (Trainings, Kitchen, Farmers Market, Exchange) on Business**

	Number	Percent
AMP has not really impacted business operations	6	30%
It provides another avenue for sales	12	60%
It helps me better plan for volume of sales	2	10%

Among the 23 survey respondents who were growers, value-added producers, or ready to eat vendors, the certifications and licensing received in the past year included the following:<sup>2</sup>

- Certifications
  - MAEP certification (n=1)
  - GAP certification (n=1)
  - ServSafe certification (n=3)
- Licensing
  - MDARD Food Warehouse (n=1)
  - MDARD Wholesale Food Processor (n=1)
  - MDARD Limited Wholesale Food Processor (n=3)
  - Ingham County Health Department Ready to Eat (n=1)

#### **Kitchen Rental**

Two survey respondents had rented the AMP kitchen, and one of these had used it to develop a new product line. The renters noted that the kitchen had helped their business by virtue of (1) being able to cool and sell produce, and (2) having a place to stay legal by producing in a commercial kitchen.

<sup>2</sup>This is a minimum. It is unknown how many nonrespondents obtained certifications or licenses.

### Engagement in Other AMP Offerings

**Table 12: Producer Feedback:**  
Have you recommended any of the following AMP resources to producers?

	Number	Percent
Farmers Market	13	59.1%
Cold storage rental	6	27.3%
Dry storage rental	3	13.6%
Kitchen	15	68.2%
Workshops and consultation	13	59.1%
Exchange	4	33%

**Table 13: Producer Involvement in Other AMP Offerings\***

	Number of Producers
Exchange	17
Farmers' Market	29
Kitchen	11
Training (2015 and 2016 workshops)	98**
Dry or Cold Storage	5

\*The figures in this table were obtained from administrative data sources rather than the survey.

\*\* Duplicated

**Table 14: Buyers: What other AMP services would you seriously consider using in the near future?**

	Number of Respondents
Farmers Market (as a buyer or seller)	7
Cold storage rental	4
Commercial kitchen	4
Workshops and consultation	4
Delivery of your order to your site	2
Aggregation and distribution exchange (as a seller)	1

## Samples of Farm-Specific Marketing Sheets

1. Hillcrest Farms
2. Green Eagle Farm
3. Lansing Roots Farm
4. CBI's Giving Tree Farm
5. Calico Fields Farm
6. The Country Mill
7. MSU Student Organic Farm
8. Hillcrest Organics
9. Wildflower EcoFarm
10. American Delicacy
11. Peckham Farms
12. Ten Hen Farms
13. Twin Sprout Farm
14. Urbandale Farm
15. Smith Floral and Greenhouse
16. Cultured/Trillium Farm
17. Rust Belt Roastery
18. Craft and Mason



**Hillcrest Farms**

Mark Kastner of Hillcrest Farms works year-round to produce organic and farm-fresh food for the local area.

Hillcrest Farms is a four season farm in Eaton Rapids that offers an extensive selection of fresh produce. Owner, Mark Kastner, started farming in 2008 gaining inspiration from his grandmother, a fantastic chef and farmer with whom he spent summers with as a child. Now he is known around town for his deliciously unique spinach and salad mix, as well as for the impeccable quality of the rest of his produce. His sustainable farming practices assure customers that products are safely produced with regards to environment and human health.



**Mid-Michigan's Farm to Fork Connection**



For more information contact:  
Exchange Manager  
**ALLEN MARKET PLACE**  
Office | 517-894-3523

Allen Market Place is a project of Allen Neighborhood Center, a 501(c)3 non-profit organization.  
[AllenMarketPlace.org](http://AllenMarketPlace.org)



**Green Eagle Farm**

First generation farmers since 1887, Green Eagle Farm specializes in being earth-friendly and living off the land.

Steve and Chela of Green Eagle Farm are 20 year veteran farmers and stewards of the land. They take great joy in growing a wide variety of crops and experimenting with new and unique products, all while being earth friendly in their practices and their care for the environment. You know they care about what they do when you see the lemon and mature fig tree carefully protected from the Michigan winters in one of their hoop houses. Not long after Steve and Chela met, the two knew they were destined to be together as life partners and land stewards.



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**Lansing Roots Farm**

As a branch of the Greater Lansing Food Bank, Lansing Roots Farm serves as support for beginning farmers in the Greater Lansing area.

Being part of the Greater Lansing Food Bank, Lansing Roots exists to ultimately serve low-income and underserved populations. However with this farm the help is coming a self-help approach. Roots Farm aids those wanting to start their own farm businesses by lowering the barriers to success. This is done through an incubator farm program which enables to farmers to learn how to sustainably and ecologically grown their food, as well as how to market it. Since 2013 Lansing Roots has served as a non-profit organization with their main goal being to get local fresh produce to all people in every community.



**Mid-Michigan's Farm to Fork Connection**



**PRODUCTS:**

- Tomatoes
- Sweet Peppers
- Jalapenos
- Hot Peppers
- Collards
- Kale
- many more!

For more information contact:  
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**Calico Fields Farm**

In the spring Jim and his son Tech plant their fields using Jim's 1950s vintage tractor.

When you first meet Jim Winters of Calico Fields Farm don't be surprised if he greets you with a warm smile, a firm handshake, and a hearty bowl of "Jamaican Jerk Bean Soup." A specialty soup made from a special recipe Jim and his wife created highlighting their Black Turtle beans. Farming on two centennial farms, Jim and his family grow over five types of dry beans and corn. If you are interested in eating locally grown, delicious and sustainable foods from a family with a passion for what they do, you'll want to buy from Jim and his family of Calico Fields Farm.



**Mid-Michigan's Farm to Fork Connection**



**PRODUCTS:**

- Navy Beans
- Small Red
- Black Turtle Beans
- Pinto Beans
- Azuki Beans
- many more!

For more information contact:  
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**ALLEN MARKET PLACE**  
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The Tennes family has been farming their 120 acre orchard in Charlotte for 42 years, and are one of only a few certified organic apple growers in Michigan. Working closely with Michigan State University researchers has allowed the Tennes family to experiment with various all-natural, environmentally friendly growing methods to produce the highest quality blueberries, peaches, and sweet cherries in the area. Their hard work and continuous dedication has transformed the farm into one of the most popular fall attractions in Mid-Michigan.



**Mid-Michigan's Farm to Fork Connection**



For more information contact:  
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CBI's (Community Based Interventions) Giving Tree Farm is a seven acre, non-profit CSA farm just north of Lansing, MI, between Old Town and Dewitt. The farm originally began as a community garden for people with disabilities. As it's volunteer base grew, so did the available programs. The farm has established a heated greenhouse and eight hoop houses for year-round horticultural therapy programs. Monday through Friday, the farm provides vocational training for people who have suffered from traumatic brain injuries, allowing them to cultivate the produce provided to area restaurants, ELFCO, and CSA members.



**Mid-Michigan's Farm to Fork Connection**



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[AllenMarketPlace.org](http://AllenMarketPlace.org)



### MSU Student Organic Farm

The MSU Student Organic Farm supports the knowledge and research for farmers, and produces organic vegetables and herbs year-round.

The MSU Student Organic Farm is a 15-acre year-round, educational, organic farm located in Holt, Michigan, about 3 miles south of the Michigan State University campus. Started in 1999 by students who desired a more hands-on learning experience, the farm now offers a nearly year-long intensive program for those interested in learning everything they can about organic farming. Not only do the students tend to the fields, but the program also involves caring for the farm's livestock. MSU's multiple cafeterias source as much produce as they can from the MSUSOF, and they also offer a weekly farm stand in the middle of campus for anyone interested.



### Mid-Michigan's Farm to Fork Connection

#### PRODUCTS:

- Tomatoes
- Bell Peppers
- Herbs
- Raspberries
- Eggs
- many more!

For more information contact:  
Exchange Manager  
ALLEN MARKET PLACE  
Office: 517-969-3023

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AllenMarketPlace.org



### Hillcrest Organics

The Droscha family, of Hillcrest Organics, cultivates organic vegetables and herbs on their 140-acre farm in Charlotte, MI.

Hillcrest Organics is a MAEAP and USDA Certified Organic farm in Charlotte, Michigan. Owners, Jeremy and Jessica Droscha, started Hillcrest Organics in 2009 and now utilize 140 acres of land for growing vegetables and herbs. They have chosen to practice crop rotation in order to preserve the nutrients in their soil, rather than spraying their fields with harmful pesticides. Due to this decision, their produce selection may not be the same year-to-year, however, the quality of their products will always remain superb.



### Mid-Michigan's Farm to Fork Connection

#### PRODUCTS:

- Red and Gold Beets
- Assorted Herbs
- Green Beans
- Winter squash
- Onions
- many more!

For more information contact:  
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AllenMarketPlace.org



**Wildflower EcoFarm**

Phil Throop, of Wildflower Eco Farm, works his knowledge of being Mid-Michigan's local specialty green produce.

Drawn to farming due to the combination of physical and mental work, Phil Throop achieved his MS in Horticulture from Michigan State University and has continued farming ever since. He established his own 3.5 acre farm in Bath Township, MI, and named it for the wonderful array of wildflowers throughout the property. Wildflower Eco Farm specializes in organically farming over sixty types of fruits and vegetables. They offer their own CSA and are familiar faces at many of the area's Farmer's Markets.



**Mid-Michigan's Farm to Fork Connection**

**PRODUCTS:**

- Tomatoes
- Onions
- Garlic
- Potatoes
- Leafy Greens
- Radishes
- + many more!

For more information contact:  
Exchange Manager  
ALLEN MARKET PLACE  
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AllenMarketPlace.org



**American Delicacy**

American Delicacy provides unique or rare ingredients and gourmet food items to Mid-Michigan customers.

Michael McCann and company established their 3-acre farm north of Charlotte, MI in 2010. Here, they cultivate many unique varieties of produce that may not be regularly available to Mid-Michigan residents and restaurants. The team specializes in growing ramps, many varieties of mushrooms, and foraging for any products they do not grow. They are MAEAP certified and are currently in the process of becoming certified organic. A few of their homemade specialty products include wild mushroom butters, wild ramp seasonings, and wild ramp flakes. American Delicacy is quickly becoming known as the premier source for gourmet food products and ingredients. If they don't sell the product you're looking for, they will find someone that does!



**Mid-Michigan's Farm to Fork Connection**



**PRODUCTS:**

- Wild mushroom
- Ramps
- Butters
- Seasonings
- Wild produce

For more information contact:  
Exchange Manager  
ALLEN MARKET PLACE  
Office / 517-998-3923

Allen Market Place is a project of Allen Neighborhood Center, a 501(c)3 nonprofit organization.  
AllenMarketPlace.org



**Peckham Farms**

Peckham Farms provides agricultural training for individuals with disabilities and employment barriers while providing fresh produce for the local area.

Peckham Farms is a 10 acre farm located in Lansing, MI. It is a part of Peckham Inc., a non-profit organization that provides rehabilitation and vocational training to individuals with disabilities and who face other employment barriers. The farm uses eco-friendly farming techniques such as water reclamation and Integrated Pest Management. Peckham Farms specializes in small fruits and is a large raspberry producer in the Mid-Michigan area. Peckham is also known for the beautiful flowers grown annually on the fields and in baskets.



**Mid-Michigan's Farm to Fork Connection**



**PRODUCTS:**  
 Tomatoes  
 Peppers  
 Cucumbers  
 Raspberries  
 Dry Beans  
 - many more!

For more information contact:  
 Exchange Manager  
 ALLEN MARKET PLACE  
 09New | 517 953-3923

Allen Market Place is a project of Allen Neighborhood Center, a 501c3 non-profit organization.  
 AllenMarketPlace.org



**Twin Sprout Farm**

In only their third year as a farm, Twin Sprout Farms is thriving as they focus on growing sustainably with the changing seasons.

Starting as a gardener, Jessica Shelton has turned her hobby into a thriving business. Shelton started Twin Sprout Farm after training with Lansing's Urban Farm Project's apprentice program. Everything grown at Twin Sprout is grown using sustainable practices and is tended to by Shelton personally. "Growing food is important to me, and it gives me great joy to know I am helping to feed people and their families," said Shelton. In their three short years Twin Sprout is doing just that, and is making a great impact through food in the greater Lansing area.



**Mid-Michigan's Farm to Fork Connection**



**PRODUCTS:**  
 Parsley  
 Spinach  
 Spearmint  
 Collards  
 Kale  
 Carrots  
 - Many more!

For more information contact:  
 Exchange Manager  
 ALLEN MARKET PLACE  
 09New | 517 953-3923

Allen Market Place is a project of Allen Neighborhood Center, a 501c3 non-profit organization.  
 AllenMarketPlace.org



A non-profit urban farm that engages the community and produces delicious sustainable healthy fresh food.

Urbandale Farm a.k.a The Lansing Urban Farm Project (LUFF), is a rapidly growing non-profit farm. In 2010 Linda Anderson and Laura B. DeLind (co-directors) realized that there was a need for more intensive food production in Lansing. They began their work in Urbandale on Lansing's Eastside, a neighborhood that lies within the city's 100 year floodplain, has numerous vacant lots, and lacks (for many) easy access to a full service grocery store. Urbandale Farm continues to thrive and has quickly become a Lansing food staple.



Mid-Michigan's Farm to Fork Connection

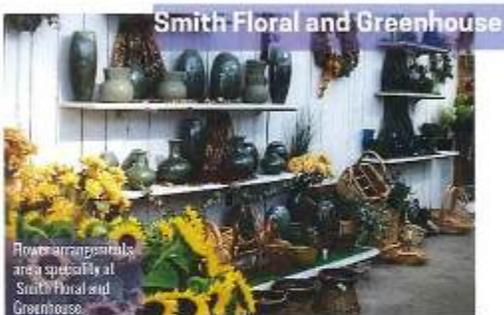
PRODUCTS:

- Asparagus
- Bok Choy
- Radishes
- Spinach
- Eggplant
- Yams
- many more!



For more information contact:  
Exchange Manager  
ALLEN MARKET PLACE  
Office 517-938-3023

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AllenMarketPlace.org



Flower arrangements are specialty at Smith Floral and Greenhouse.

Founded in 1903, Smith Floral and Greenhouse has been a Lansing staple for over 100 years. Starting out as just flowers, Smith Floral added their "Harvest Basket Produce" in 2013. Concerned about the availability for healthy produce to everyone in the community, Smith Floral owner Karen Smith, started touring local Michigan farms. These visits gave her a greater understanding of the magnitude of sustainable and organic farms. "Michigan has produced a vibrant local foods opportunity for us," said Smith. So she took advantage of that opportunity and is contributing greatly producing four seasons worth of farm fresh, local food.



Mid-Michigan's Farm to Fork Connection

PRODUCTS:

- Flowers
- Peppers
- Salad Mix
- Basil
- Tomatoes
- many more!



For more information contact:  
Exchange Manager  
ALLEN MARKET PLACE  
Office 517-938-3023

Allen Market Place is a project of Allen Neighborhood Center, a 501c3 non-profit organization.  
AllenMarketPlace.org



Friday firms are the Thorp, owners of Cultured, create uniquely delicious fermented foods using locally grown products.

After discovering the art of fermented food, Bradley Ferro and Elise Thorp decided to share their delicious, probiotic-packed, gut-loving combinations with the community. The duo chooses to exclusively use sustainably grown, local ingredients to ensure they are bringing customers excellent taste and quality. Cultured is a regular at many of the area's farmer's markets, as well as the local health-food and delicacy shops in Lansing. Fermented foods are a potent producer of B vitamins, play a large role in aiding the immune system, and encourage a healthy digestive system.



Mid-Michigan's Farm to Fork Connection



**PRODUCTS:**  
Kimchi,  
Sauerkraut,  
Pickled vegetables,  
Kvass  
and a variety of other  
fresh, fermented foods

For more information contact:  
Exchange Manager  
ALLEN MARKET PLACE  
Office 150 999-3923

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AllenMarketPlace.org



Rust Belt Roastery offers unique wood-fired coffee to the local area, while advocating social justice and environmental sustainability.

Rust Belt Roastery



After falling in love over a cup of coffee in Baja, Mexico, Paul and Emily Nichols began their search for their own coffee bean roaster. The couple eventually discovered their antique Italian roaster and immediately began making magic. They roast their coffee beans with hardwood, yielding a deeply rich, unique, and delicious coffee flavor. Paul and Emily also have a strict policy on only purchasing beans that have been grown in humane and environmentally sustainable conditions. They are regulars at many area Farmer's Markets, offering cold-brews, coffee beans, and even their own organic chocolate!



Mid-Michigan's Farm to Fork Connection

**PRODUCTS:**  
Assorted coffee



For more information contact:  
Exchange Manager  
ALLEN MARKET PLACE  
Office 150 999-3923

Allen Market Place is a project of Allen Neighborhood Center, a 501(c)3 non-profit organization.  
AllenMarketPlace.org



Craft & Mason Roasting Co.

Eric Craft and Jeremy Mason of Craft & Mason Roasting Co. located in Lansing, MI, have dedicated their work to providing their customers with the freshest, strictly single-origin, and uniquely flavorful coffee beans around town. They have immersed themselves into every facet of the coffee-roasting cycle by creating genuine relationships with each importer and farmer. As the customer, you will know exactly where your coffee was grown, processed, and roasted, along with the many aspects that have contributed to its memorable flavor.

Eric Craft and Jeremy Mason, of Craft & Mason Roasting Co. located in Lansing, MI, have dedicated their work to providing their customers with the freshest, strictly single-origin, and uniquely flavorful coffee beans around town. They have immersed themselves into every facet of the coffee-roasting cycle by creating genuine relationships with each importer and farmer. As the customer, you will know exactly where your coffee was grown, processed, and roasted, along with the many aspects that have contributed to its memorable flavor.



Mid-Michigan's Farm to Fork Connection

**PRODUCTS:**

Variety of coffees based on seasonality

For more information contact:  
Exchange Manager  
ALLEN MARKET PLACE  
(517) 399-3923

Allen Market Place is a part of Allen Neighborhood Center, a 501(c)(3) nonprofit organization.  
AllenMarketPlace.org



**EXCHANGE**

Buy Local. Eat Well.

Mid-Michigan's Local Food Hub

The Exchange operates to ease the gap & strengthen the relationship between farmers, food producers, and buyers such as schools, grocers, restaurants, buying clubs, & hospitals.

With multiple purchase & pick-up/delivery days available, we strive to make sourcing local easy.

Visit our online wholesale market to shop for local food from a wide selection of local farmers & food producers. Register for a free account and start shopping today!

**Visit:**

[www.allenmarketplace.org/exchange](http://www.allenmarketplace.org/exchange)

**Contact:**

[exchange@allenneighborhoodcenter.org](mailto:exchange@allenneighborhoodcenter.org)  
517-999-3923

**How It Works:**

Allen Neighborhood Center provides regular education, assistance & mentorship to growers & food producers to ensure the success of their business. Farming is hard work, & we're here to support our growers and local food economy by connecting them with new markets for their products.

Twice per week, farmers & food producers post inventory of products on the Exchange & deliver orders to the Allen Market Place where they are inspected for quality, food safety & labeling.

**We offer two order & delivery days per week:**

Order Monday by 8pm for

Thursday pick-up/delivery between 9am-2pm.

Order Friday by 8pm for

Tuesday pick-up/delivery between 9am-2pm.

Placing orders is quick, easy, & confirmed by email.



# ATTENTION

## MID-MICHIGAN FARMERS & FOOD PRODUCERS:

Allen Market Place is excited to offer you access to **free services** in the following topics:

**Business Planning**  
**Business Management**  
**Business Marketing**  
**Food Safety**  
**Product Innovation**

**Receive free services & consultations from the following experts:**

**Tom Donaldson**, Regional Director of Michigan Small Business Development Center at Lansing Community College. Tom is a seasoned business executive with broad knowledge of all aspects of small business management including marketing, operations, accounting, and finance.

**Phil Tocco**, food safety educator for MSU Extension in Jackson County. Phil is able to provide resources directly to farms developing food safety programs, especially hazard analysis, farm safety plans, pre-GAP consultation, post-harvest handling, and other topics.

**MSU Product Center.** Innovation Counselors connect entrepreneurs with MSU Product Center's wide range of offerings. A great opportunity for value-added producers with packaging/labeling, food safety, product development, nutrition analysis, or other needs. Many of these resources are free, and grant funds can be used to access the range of paid services offered.

Entrepreneurs or established businesses growing or processing food products for sale in Mid-Michigan (within 100 miles of Lansing) are invited to apply to take advantage of this offer!

There is a limited amount of funding for opportunities with each expert. Applications will be received and awarded on a rolling-basis until funding for that area of expertise has been depleted. Active suppliers on the Exchange are encouraged to apply!



### Contact:

Exchange Manager, John McCarthy  
517-999-3923, [exchange@allenneighborhoodcenter.org](mailto:exchange@allenneighborhoodcenter.org)

Funding for Allen Neighborhood Center's Food and Farm Business Development Series is made possible through funds awarded by the Michigan Department of Agriculture and Rural Development.

## **PROJECT TITLE: MICHIGAN MAPLE SYRUP ASSOCIATION – Improved Marketing of Michigan Maple Syrup – FINAL**

### **PARTNER ORGANIZATION**

Michigan Maple Syrup Association

### **PROJECT SUMMARY**

Through the efforts funded by this grant, Michigan's maple syrup producers were able to engage consumers and encourage demand for pure Michigan maple syrup. Through a coordinated campaign of public relations, earned media, social media and even cable television, we were able to widely publicize and promote the Michigan Maple Syrup Association's sponsored Michigan Maple Weekend events. This highly visible campaign helped to increase traffic to the MMSA website and Facebook pages, allowing us to engage with more consumers. This was followed by an outdoor billboard campaign to encourage additional engagement during the fall travel season. These outreach activities were supported by the redesigned MMSA website, a new association and product logo and a newly designed "rack card" that is being distributed at all Michigan Welcome Centers, as well as at a variety of other locations and events. The grant also funded two speakers at the MMSA winter meeting who are highly regarded among maple producers.

### **PROJECT PURPOSE**

Maple syrup has been traditionally produced and sold by many small, independent farms in Michigan. Because of their small size and limited marketing budgets, individual operators lack the resources to fully realize the potential for sales of Michigan maple syrup. Growing interest in purchasing local foods makes increased marketing efforts particularly timely. The Michigan Maple Syrup Association (MMSA) is the cohesive body of these producers.

The objective of this grant proposal is to promote a unified marketing program to increase public awareness of maple syrup made in Michigan and drive sales. Funds obtained developed outdoor advertising and print materials. It also directed funds toward growing the "Maple Weekend" activities that have been going on for two years now and help cost share advertisements purchased by individual producers participating in the industry building activity.

Maple weekend activities, held at sugar houses across the state, are of particular importance for several reasons. These visits to individual sugarhouses give maple syrup producers a chance to interact with potential customers. This type of "on farm" experience develops consumer appreciation for a product like pure maple syrup. Personal connection to the maple industry instills a loyalty to pure maple syrup when compared to maple-flavored syrups commonly consumed by the general public. This is the type of promotion that convinces the consumer with a choice, to buy the higher quality, but more expensive alternative, in this case pure Michigan maple syrup.

The passing of the Maple Tap Act in the 2014 Farm Bill combined with the fact that Michigan has more potential sugar maples for tapping than any other state in the US reinforces the need to develop solid consumer demand for this specialty crop. If Michigan maple syrup production is significantly increased and marketing efforts are not developed to insure adequate demand for the increased supply, low prices will ensue and maple syrup producers with long term investment in land, trees and equipment will be unable to operate profitably.

### **PROJECT ACTIVITIES**

The first task to be completed was securing a temporary executive director. A committee of the board made inquiries and followed leads for potential candidates. After receiving a number of resumes and interviewing three candidates, the board selected Marsha Gray to serve as the executive administrator. Her primary responsibilities involved overseeing the day to day execution of this grant

project; including oversight of website and logo redesign, regular postings on the MMSA Facebook page, coordinating public relations and media contacts for Michigan Maple Weekends, developing and distributing the new rack card and working with ad agency to design the billboards and select the locations for billboard placement. Having a dedicated staff member assigned to execute the activities of the grant ensured the timely completion of tasks, allowing volunteers to focus on other roles.

The redesign of the MMSA website was an important component of this grant, as it is the place where consumers can connect with maple syrup producers. Although functional, the association's website was not particularly attractive. Windstorm Marketing of Traverse City was selected as a design partner for nearly all of the grant projects, including the website redesign. In addition to creating a more attractive, easier to navigate website, Windstorm created a new logo for Michigan Maple Syrup and the Michigan Maple Syrup Association.

Michigan Maple Weekend was a primary focus for the grant, because it is highly visible and provides a direct connection between maple syrup producers and consumers. The grant called for the development of print advertising designs that could be used by participating maple syrup producers and were funded by a 50% match up to \$150 by the grant. Although a number of producers took advantage of this opportunity, much of the budgeted \$10,000 was not requested, so the MMSA chose to have Windstorm Marketing develop a television commercial that ran on a variety of cable channels including Food Network, Weather Channel, History, Discovery and Travel Channel. Windstorm Marketing also "boosted" Facebook posts to expand the reach of our message during the Michigan Maple Weekend dates. To further expand the promotional reach for Michigan Maple Weekend, Windstorm Marketing developed a website dedicated to the weekend that can be updated and used year after year.

The executive administrator supported these Michigan Maple Weekend activities with a series of general press releases regarding Michigan Maple Weekend, as well as customized press releases for each participant that were sent to their local newspapers and media outlets. The executive administrator also provided regular Facebook posts to increase interest among members and consumers.

The billboard campaign was chosen to increase visibility of pure Michigan maple syrup to the general population, rather than specifically to those looking for maple syrup products. In our original proposal, we earmarked \$38,000 to design and display billboards with Michigan Maple Syrup messaging in three key locations. By working through Windstorm Marketing and using group buying power, we were able to actually secure 16 billboard locations around the state starting in August and running through December of 2015, and most appearing on popular routes used by travelers headed to northern Michigan destinations. A number of these locations were digital billboards, while the others are traditional vinyl. Most of these locations displayed our message for four to seven months, while the two in Southeast Michigan were up for 30 days each.

In coordination with the billboard campaign, MMSA designed a new rack card that was distributed to all Michigan Welcome Centers and can be used at events and festivals, promoting pure Michigan maple syrup. The card was designed with a pure Michigan maple syrup message on one side and a Michigan Maple Weekend message on the reverse to promote both messages. The card was designed by MMSA's executive director and executed and printed by Foresight Group Printing. We were also able to print stickers with the new Michigan Maple Syrup logo for use by Michigan producers to identify their product as Michigan-made.

The final item funded by the grant was the participation by two guest speakers at the MMSA Annual Meeting in January of 2016. Discussing promotion was Eric Randall of New York, a seasoned maple syrup producer as well as an advocate for promoting maple syrup and the maple syrup industry. Brad

Gillian, a syrup producer from northern Vermont, focused his presentations on production methods and strategies. Both speakers brought a wealth of information from two top maple syrup producing regions.

## GOALS AND OUTCOMES ACHIEVED

The first goal achieved was the hiring of Marsha Gray to serve as MMSA Executive Director and to coordinate all grant activities. Marsha began a one-year contract with the association on January 1, 2015.

The MMSA website redesign was the second hurdle accomplished. This task took the website from dated to engaging; a more attractive place for potential customers to visit. The website redesign also included a redesign of the MMSA logo and Michigan maple syrup logo. Traffic on the website increased significantly after the redesign, with the majority of traffic during August, November and December, corresponding to the placement of the billboard advertisements. The revised MMSA website can be viewed at: [www.mi-maplesyrup.com](http://www.mi-maplesyrup.com) and a Google analytics report on website traffic is supplied as an addendum to this report. The new Michigan maple syrup product logo is shown below:



Michigan Maple Weekend was a focus of efforts during March of 2015. All Michigan Maple Weekend participants were notified regarding the availability of co-operative advertising funds. The executive administrator provided materials for all participants as well as instructions on how to apply for co-op ad dollars. Unfortunately, only 15 participants placed ads and requested funding reimbursement. Seeing that the requests would be significantly below what was estimated by the promotions committee and wanting to make a greater impact with Michigan consumers, Windstorm Marketing was engaged to develop a television ad that ran on a number of cable networks, including Food Network, Weather Channel, History, Discovery and Travel Channel. Windstorm Marketing also “boosted” Facebook posts to expand the reach of our message. This outreach garnered significant traffic on the brand new Michigan Maple Weekend website with 11,228 sessions and more than 22,000 page views – an exceptional amount of traffic. Google analytics for the Michigan Maple Weekend website are attached to this report, as well as links to the television advertisement and sample co-op ads.

The executive administrator supported these activities with a series of general press releases regarding Michigan Maple Weekend, as well as customized press releases for each participant that were sent to their local newspapers and media outlets. The executive administrator also provided regular Facebook posts to increase interest among members and consumers.

Attached to this report are some sample co-op ads as well as the new Michigan Maple Syrup logo. Below are links that may be of interest:

- MMSA Facebook page - <https://www.facebook.com/MichiganMapleSyrupAssociation>
- Michigan Maple Weekend Website - <http://michiganmapleweekend.com/>
- Michigan Maple Weekend Cable Ad - [https://www.youtube.com/watch?v=\\_t5GV0PV8HY](https://www.youtube.com/watch?v=_t5GV0PV8HY)

The billboard campaign got a later than planned start, however was an important part of the campaign to promote Michigan maple syrup. As previously mentioned, though our partner Windstorm Marketing, we were able to expand the campaign to include 16 billboard placements rather than the originally planned three. A map of the 16 locations is attached to this report along with a Google analytics report demonstrating strong MMSA website traffic during the time period when the billboards

were on display (August – December 2015). There were no other promotions taking place during that time and we would credit the billboards with driving that website traffic.



The new rack card and coordinating product stickers allow Michigan maple syrup producers to utilize the new logo and more contemporary design that is carried through the website, billboards, rack cards and stickers. We produced 50,000 rack cards for distribution as well as 50,000 Michigan Maple Syrup logo

stickers that producers can apply to maple syrup bottles or promotional flyers. Approximately 15,000 rack cards were distributed to Michigan Welcome Centers through the Michigan Department of Transportation warehouse. More cards are stored to replenish that supply in the future as well as to be used at other events and festivals. A copy of the rack card and product sticker is attached to this report.

Finally, the two speakers that were engaged to speak at the MMSA Annual Meeting in January of 2016 were well received by the 240 attendees at this meeting; the largest gathering of maple syrup producers in Michigan. Brad Gillian and Eric Randall provided practical production instruction as well as inspirational promotional suggestions that really rounded out this effort to improve marketing of Michigan-produced maple syrup.

## BENEFICIARIES

Clearly the beneficiaries of these promotional activities were the maple syrup producers in Michigan. All producers benefitted from the efforts of the association to improve the look of marketing and communications materials. The 25 maple syrup producers who actively engaged in Michigan Maple Weekend events benefitted from professionally written press releases and matching funds for advertising. Many participants reported having many more participants than earlier years, including one southeast Michigan producer who had more than 600 guests to his sugar bush on maple weekend. Also, the 71 maple producers who promote their business and products through a listing on the MMSA website benefit from increased exposure to potential customer seeking their products. Producers who engaged in the Facebook campaign reported more connections with potential customers and the 240 producers who attended the Annual Meeting each benefitted from the information provided by industry experts. All in all, the campaign was a success and benefits all maple syrup producers in Michigan, but most certainly those who took advantage of the opportunities presented.

## LESSONS LEARNED

As reported previously, the committee did face a bit of a timing challenge. With all members being small business owners, it was sometimes difficult to get everyone together to move forward on projects. Both the executive administrator and website/advertising designer were hired a bit later than

originally planned, however both were on board and able to meet MMSA members at the Annual Meeting in January and were able to fully execute the Michigan Maple Weekend activities and promotions as planned.

The billboard campaign got delayed with the focus on the Michigan Maple Weekend, however, we were able to take advantage of many more billboard locations than originally planned and tapped into the fall travel and pre-holiday baking timeframe.

It was apparent that contracting with an individual to coordinate and execute grant activities was a good decision and would be recommended for future grant projects. Also, there may be a value in narrowing the focus of future grant projects. Overall, the process was positive and MMSA was very pleased with the results.

#### CONTACT PERSON

Cyndi Alexander

989-965-1912

[alexandersenterprizes@outlook.com](mailto:alexandersenterprizes@outlook.com)

#### ADDITIONAL INFORMATION

##### **Changes in Retail Sales of Maple Syrup in Michigan**

Retail sales of Michigan maple syrup increased 14.8% from 54% in 2014 to 62% in 2015. Wholesale maple syrup sales in Michigan decreased 16% from 18% in 2014 to 15% in 2015. Bulk maple syrup sales also decreased by 18% from 28% in 2014 to 23% in 2015.

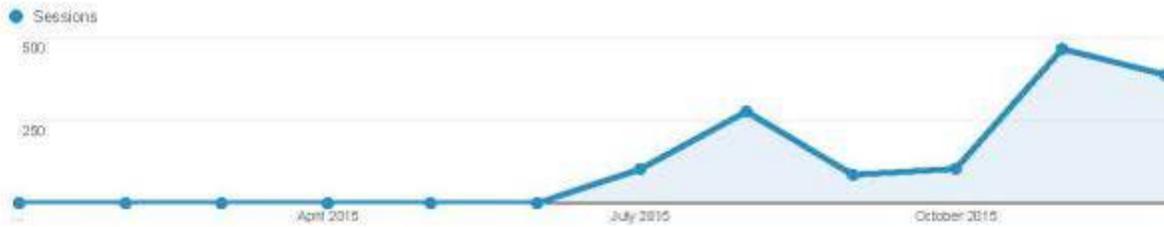
Retail prices increased for several sizes of retail containers from 2014 to 2015 including ½ gallon increased from \$28.00 to \$28.30, quart increased from \$15.30 to \$15.50, and pint increased from \$9.50 to \$9.80. Both the gallon price (from \$50 to \$47.30) and ½ pint price (from \$6.90 to \$6.30) decreased.

## Audience Overview

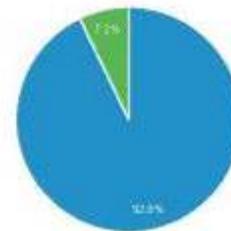
Jan 1, 2015 - Dec 31, 2015

All Sessions  
100.00%

### Overview



■ New Visitor ■ Returning Visitor



Language	Sessions	% Sessions
1. (not set)	1,205	84.62%
2. en-us	120	8.43%
3. en	53	3.72%
4. es	32	2.25%
5. ru	14	0.98%

**Location**

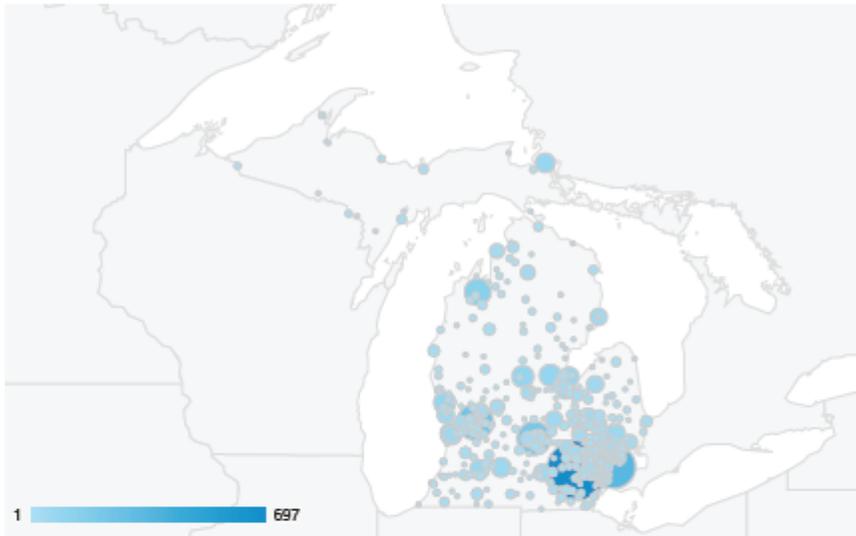
Jan 1, 2015 - Dec 31, 2015

ALL » COUNTRY: United States » REGION: Michigan

All Sessions  
52.51%

Map Overlay

Summary



City	Sessions	Sessions
	5,896 % of Total: 52.51% (11,228)	5,896 % of Total: 52.51% (11,228)
1. Ann Arbor	697	11.82%
2. Detroit	342	5.80%
3. Grand Rapids	235	3.99%
4. Lansing	213	3.61%
5. (not set)	182	3.09%
6. Traverse City	139	2.36%
7. Midland	90	1.53%
8. Muskegon	90	1.53%
9. Mount Pleasant	89	1.51%
10. Beechwood	85	1.44%

Rows 1 - 10 of 362

## Channels

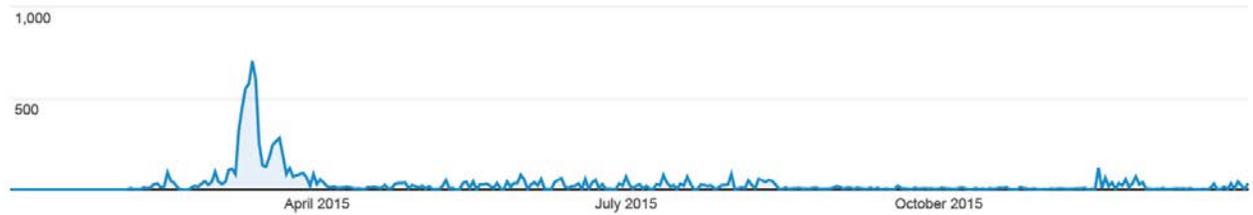
Jan 1, 2015 - Dec 31, 2015

All Sessions  
100.00%

### Explorer

Summary

### Sessions



Default Channel Grouping

Sessions

Sessions

## Audience Overview

Jan 1, 2015 - Dec 31, 2015

Email Export Add to Dashboard Shortcut

All Sessions  
100.00%

+ Add Segment

### Overview

Sessions vs. Select a metric

Hourly Day Week Month

### Sessions



Sessions

11,228

Users

9,767

Pageviews

22,128

Pages / Session

1.97

Avg. Session Duration

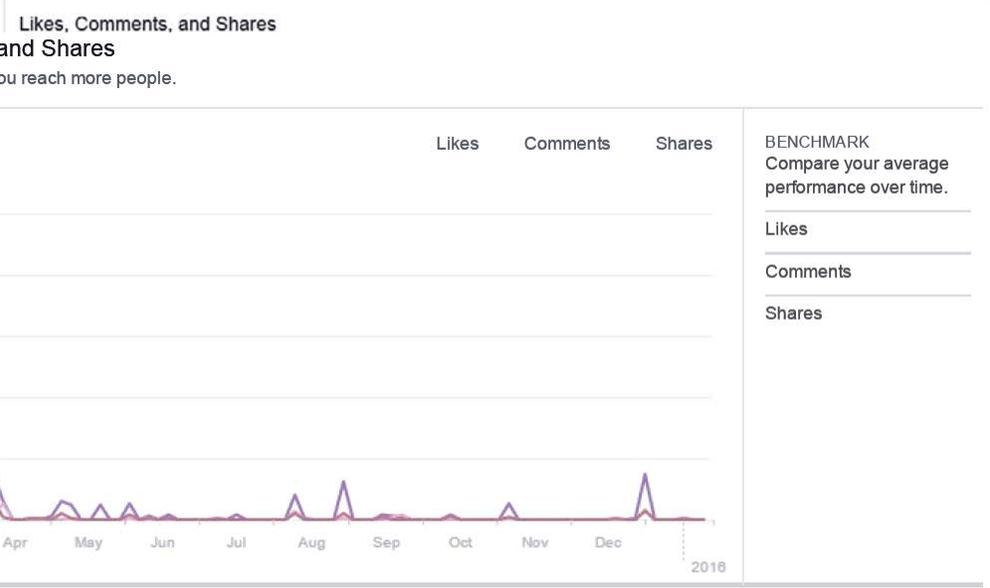
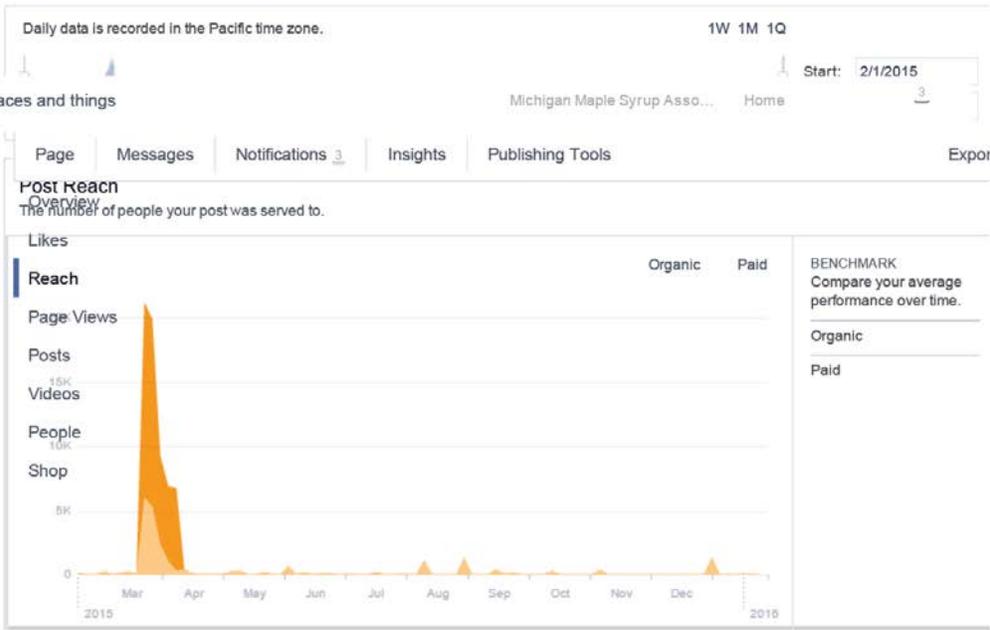
00:01:06

Bounce Rate

60.28%

New Visitor Returning Visitor





### Hide, Report as Spam, and Unlikes

These actions will decrease the number of people you reach.



2015

2016

### Total Reach

The number of people who were served any activity from your Page including your posts, posts to your Page by other people, Page like ads, mentions and checkins.



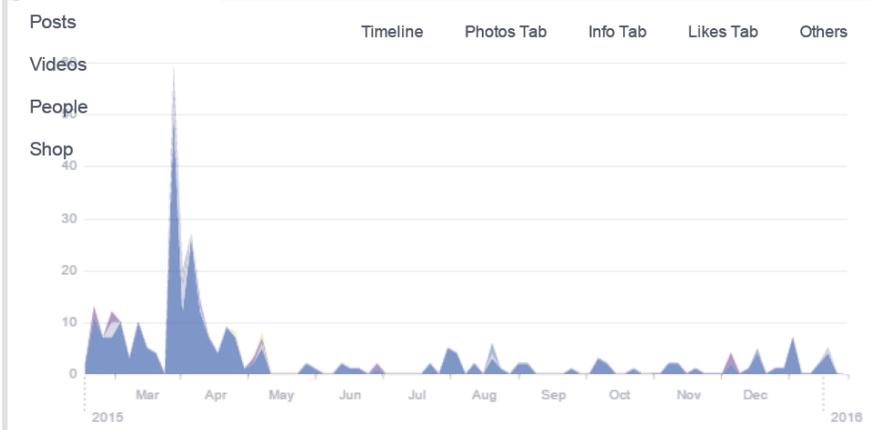
Page Messages Notifications 3 Insights Publishing Tools Export



### Page and Tab Visits

#### Page Views

f your Page tabs was viewed.

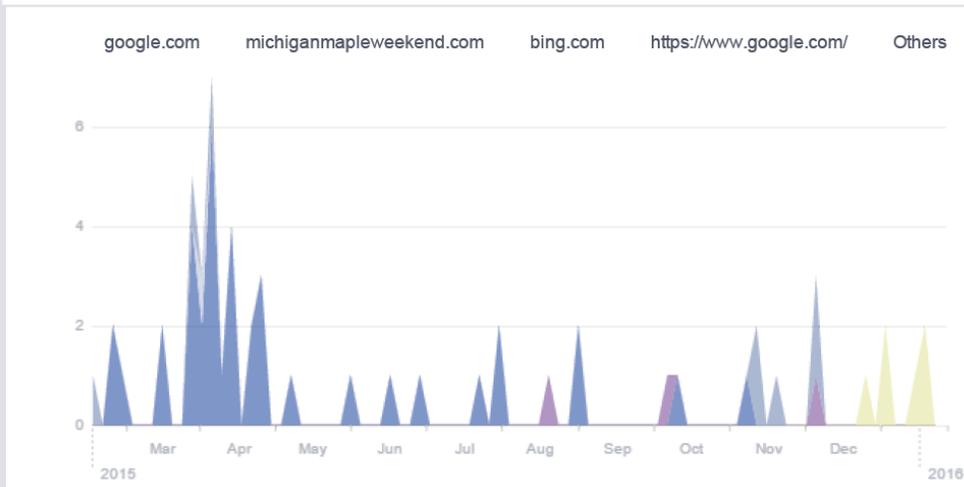


**BENCHMARK**  
Compare your average performance over time.

- Timeline
- Photos Tab
- Info Tab
- Likes Tab
- Others

### External Referrers

The number of times people came to your Page from a website off of Facebook.



**BENCHMARK**  
Compare your average performance over time.

- google.com
- michiganmapleweeken...
- bing.com
- https://www.google.com/
- Others

## SE Michigan

Inventory #	Location Description	Copy Size	IMP 18+ Weekly	Current Copy	When Run	Cost per 4 weeks	Total Cost
93933AO	I-275 Fwy .4 mi S/O Ecorse W/S F/S	14'X48" - Trivision	232,234	Schoolcraft College Marketing	September	\$3,080.00	\$3,080.00
95665A	I-96 Fwy & Wixom S/S F/E	Digital Unit 14'x48'	194,401	Biggby Coffee	October	\$4,480.00	\$4,480.00

Total Cost	\$7,560.00	
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## Upper Peninsula

Inventory #	Location Description	Copy Size	IMP 18+ Weekly	Current Copy	When Run	Cost per 4 weeks	Total Cost
1081	US-2 2 MI W/O I-75 N/S F/E TOP	10' 6" x 22' 9"	14,235	Northcare Network	9/21 - year end	\$500.00	\$1,500.00
2336	I-75 @ KINROSS W/S F/N	12' 0" x 40' 0"	15,216	none	Sept - Year end	\$1,250.00	\$3,750.00

One time Production cost \$150 and \$600		
Total Cost	\$6,000.00	

## Lower Peninsula

Inventory #	Location Description	Copy Size	IMP 18+ Weekly	Current Copy	When Run	Cost per 4 weeks	Total Cost
283	Old 131 1000' N/O 19 Mile Rd. - Big Rapids	8x24			ASAP - Dec. 31st	\$667.20	\$2,001.60
223a	S/S Boon Road .25 mi w/o US-131 Cadillac	12x24		DIGITAL	ASAP - Dec. 31st	\$667.20	\$2,001.60
729	W/S US-127 .5 mi s/o US-10E Clare	14x48			ASAP - Dec. 31st	\$667.20	\$2,001.60
823	E/S M-99 472' n/o Smith Road Eaton Rapids	12x24		DIGITAL	ASAP - Dec. 31st	\$667.20	\$2,001.60
201	E/S US-131 533' S/O M-32 Elmira	12x49			ASAP - Dec. 31st	\$667.20	\$2,001.60
64a	E/S US-31 450' N/O Stanton Road Grand Haven	12x24		DIGITAL	ASAP - Dec. 31st	\$667.20	\$2,001.60
860	N/S M-57 1000' W/O Lincoln Lake Rd Greenville	10x24		DIGITAL	ASAP - Dec. 31st	\$667.20	\$2,001.60
970	E/S US-127 1.7 mi n/o E. Dover Road Harrison	12x40			ASAP - Dec. 31st	\$667.20	\$2,001.60
572	S/S I-96 3166' W/O M-66 Ionia	14x48			ASAP - Dec. 31st	\$667.20	\$2,001.60
842	N/S M-20 100' e/o Loomis Rd Mt Pleasant	12x24		DIGITAL	ASAP - Dec. 31st	\$667.20	\$2,001.60
48	E/S US-31 .2 miles S/O Russell Road Muskegon	15.6x20			ASAP - Dec. 31st	\$667.20	\$2,001.60
989	W/S M-37 200' N/O Hamlin Road Traverse City	12x24		DIGITAL	ASAP - Dec. 31st	\$667.20	\$2,001.60

Total Cost	\$24,019.20	
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Total Cost	\$37,579.20	
Less paid Windstorm	(\$8,840.00)	
Total due	\$28,739.20	



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# Michigan Maple Syrup

## WEEKEND!

Saturday March 14th - Sunday March 15th 10am - 4pm

### H & H Sugarbush

Tour the sugarbush & sugar shack to see how Pure Michigan Maple Syrup is made! Taste pure maple syrup & other great maple confections.

4 Miles South of Chelsea on M-52  
[www.hhsugarbush.com](http://www.hhsugarbush.com)



For map visit [MichiganMapleWeekend.com](http://MichiganMapleWeekend.com)

Member of The Michigan Maple Syrup Association. For more information visit [Mi-Maplesyrup.com](http://Mi-Maplesyrup.com)

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# Michigan Maple Syrup WEEKEND!

Join Michigan's maple syrup producers for the annual Michigan Maple Weekend! The celebration is over a three weekend period, typically in March, starting in the southern half of the state and wrapping up in the UP. Guests can visit dozens of maple syrup producers' "sugarbushes" around the state and can expect to see maple trees being tapped and the process of collecting the maple sap. Once collected, the time consuming process of "boiling down" the sap begins. Visitors will experience the entire process, culminating with the opportunity to sample the final, sweet maple syrup, maple cream, maple sugar and maple candy.



Michigan is the 7th largest producer of maple syrup in the U.S. producing approximately 100,000 gallons of the sweet confection each year. To plan your Michigan Maple Weekend, please visit our website:

[www.michiganmapleweekend.com](http://www.michiganmapleweekend.com)

[www.mi-maplesyrup.com](http://www.mi-maplesyrup.com)

# Michigan Maple Syrup

## *Taste the Difference*



Pure maple syrup produced right here in Michigan is an all-natural and nutritious sweetener and the perfect choice for everything from your morning pancakes to baking, cooking and grilling.

Pure maple syrup is a great source of minerals and vitamins. Researchers have shown that pure maple syrup has a higher nutritional value than all other common sweeteners.

Made by reducing or "boiling" the water out of maple sap collected in the late winter or early spring, maple syrup was first used by Native North Americans as a source of nutrition and energy.

To find a Michigan Maple Syrup Producer and experience the sweet pleasure of pure maple syrup, visit [www.mi-maplesyrup.com](http://www.mi-maplesyrup.com) and click on "Find a Sugarbush."



[www.mi-maplesyrup.com](http://www.mi-maplesyrup.com)

## **PROJECT TITLE: MICHIGAN POTATO INDUSTRY COMMISSION – Michigan Potato Impetus and Education - FINAL**

### **PARTNER ORGANIZATION**

Michigan Potato Industry Commission

### **PROJECT SUMMARY**

The problem the potato industry faces is one of public opinion. Potatoes are seen as a comfort food that is predictable and labor intensive. Few know the nutrients found in potatoes and even less know that Michigan grows nearly 50,000 acres of potatoes annually. This project set out to capitalize on previous marketing programs set for by the Michigan Potato Industry Commission (MPIC). By partnering with SpartanNash MPIC would be able to promote in store demos, in store radio ads. By partnering with Michigan Farm Bureau MPIC would be able to develop a public school lesson plan that teaches students not only the science behind plant growth but Michigan agriculture and the nutritious benefits to Michigan potatoes. This formed a multi-faceted plan to present to the current and future consumer the innovative ways to prepare a potato based dish, and inform the public about the health benefits to potatoes grown in Michigan.

### **PROJECT PURPOSE**

Michigan's fresh potato market makes up 20% of the total crop. While Michigan ranks #1 in the country for growing potatoes for potato chips, the fresh market continues to go unnoticed. This project was aimed at promoting Michigan's fresh market. It was well suited for this specific project to happen at this specific time as MPIC just finished a successful in-store radio promotion with SpartanNash the previous holiday season. In order to follow up and elevate that campaign, this grant project was created.

Michigan's fresh potato growers see this situation as an opportunity to educate the public. The second purpose of this project was to develop a lesson plan. Aimed at middle school/Jr. High aged students the lesson plan discusses Michigan agriculture, the health benefits of potatoes, all through the lens of Earth science.

### **PROJECT ACTIVITIES**

Partnering with the Michigan Restaurant Association, MPIC held a statewide recipe competition in November of 2015. Four finalists were chosen and those recipes were made the platform for the SpartanNash in store cooking demos. In the same month MPIC made contact with Michigan Farm Bureau to begin the construction of the lesson plan.

The partnership with SpartanNash became an issue almost immediately. The winter holiday season is the main purchasing season for Michigan potatoes. MPIC was eager to being the in-store radio ads and planning out the cooking demonstrations. Due to the continued merger of Spartan Stores with Nash Finch, our grant project was moved to several different contact points. Several of these contact points were let go from the company before contact could even be established. Thus the first round of in-store radio ads and cooking demonstrations where not conducted.

Regardless of setbacks, MPIC and Michigan Farm Bureau met several times to fine tune the educational lesson plan. After development and testing the lesson plan was completed ahead of schedule. MPIC pushed forward and continued with the grant project working with culinary programs and schools teaching about nutritional benefits of potatoes and "buy local" facts about Michigan's agriculture along with a complete plant science lesson for educators to go through.

The goal being to teach the next generation of chefs about what Michigan has to offer the food service industry, along with all Michigan students to learn more about agriculture in general by using a commodity specific lesson guide.

Unfortunately, the second winter season was as effective as the first. Despite a constant effort from MPIC, SpartanNash was unable to complete the work assigned to them and the in-store ads and cooking demonstrations were not done.

#### GOALS AND OUTCOMES ACHIEVED

The finalization of the lesson plan was achieved. Significant testing was done to ensure the content was at the appropriate level for the target audience. The entire lesson was compiled and put on potato shaped usb drives. They were distributed throughout Michigan by the Michigan Farm Bureau Foundation at the Michigan Science Teachers Association Annual Conference for free. Every attendee received one.

In February a demonstration was given by Michigan Farm Bureau Foundation at the Michigan Winter Potato Conference so that all interested growers/ industry partners could see the work that was done. The lesson plan received high praise. Growers specifically appreciated the direction and content.

#### BENEFICIARIES

Michigan Potatoes was the primary beneficiary of this grant project. All commodities had their nutritional content laid out in the lesson plan and Michigan agriculture discussed at length. While potatoes were the main focus, the lesson plan was aimed at informing students about the entire industry.

#### LESSONS LEARNED

The main lesson learned was to be cautious about partnering with other organizations when entering a grant. The lack of cooperation between MPIC and SpartanNash came as a massive disappointment. Despite being continually promised that the in store radio spots and cooking demonstrations, no action manifested from the partnership.

MPIC has reviewed the communication with SpartanNash in hopes to prevent this outcome from reoccurring. Signed agreements will also be utilized in the future. MPIC believes that this will give grant partners a sense of buy-in and cement the expectations for all parties involved. The biggest culprit was the lack of organizational structure as SpartanNash was formed. Despite moving from one point of contact to a team, as discussed in the previous report, the noise of the merger downed out many other projects and this was unfortunately one of them.

The lesson plan side was a complete success. Michigan Farm Bureau Foundation stayed on task and utilized their resources well. In a comparison of both partnerships we see that the Foundation bought into the vision of this project and wanted to help achieve the goal. In the future this will be a vital criterion for partnerships on other projects.

#### CONTACT PERSON

Mike Wenkel (517) 253-7370  
Mike@mipotato.com

#### ADDITIONAL INFORMATION

For the complete lessons below and more, please contact the Michigan Potato Industry Commission at <https://www.mipotato.com/>

Tuber Plant Parts Lesson and Not all Potatoes are the same link [Learn  
http://www.mipotato.com/MPIC/Learn/MPIC/Navigation\\_Items/Learn.aspx?hkey=4c1960ae-0170-492a-a405-8397a027ee6b](http://www.mipotato.com/MPIC/Learn/MPIC/Navigation_Items/Learn.aspx?hkey=4c1960ae-0170-492a-a405-8397a027ee6b)

# WHAT'S GOING ON UNDER THE GROUND?

Click on the links below to access each section of this lesson bundle. Digital posters are perfect for use on a smart board or projector. Print individual charts and worksheets for student use.

## Lesson Materials

[Potato Introduction Full Lesson Packet](#)

[Not all Potatoes are the Same Lesson](#)  
[Not all Potatoes are the Same Worksheet](#)

[How do Potatoes Grow? Lesson](#)  
[Tuber Plant Parts Poster](#)  
[Characteristics of a Potato Plant Worksheet](#)

[Potato Nutrition Lesson](#)  
[Dig This! Nutrition Diagram](#)  
[Potato Nutrition Chart](#)  
[Potato Nutrition Questions](#)

## Lesson Extension Activities

[Michigan Potato Facts Poster](#)  
[Potato books and Additional Resources](#)  
[Michigan Better Made Potato Chip Video](#)  
[How it's Made: Potato Chips](#)

BROUGHT TO YOU BY:



Name \_\_\_\_\_

## Characteristics of a Potato Plant

Directions: After you listen to the description of the parts of the potato plant, fill in the labels on the diagram below. After you have labeled each part, answer the following questions.



INTERNATIONAL POTATO CENTER (IPC)

- Why do potato plants have flowers?  
\_\_\_\_\_
- What are the two different methods of propagating (growing) potatoes?  
\_\_\_\_\_
- What are three other foods which the edible part grows under ground?  
\_\_\_\_\_



# DIG THIS!

Watch out! Some packaged foods and beverages pack more servings than you need.



## Nutrition Facts

Serving Size 1 potato (148g/5.3oz)

Amount Per Serving

Calories 110 Calories from Fat 0

% Daily Value\*

Total Fat 0g 0%

Saturated Fat 0g 0%

Trans Fat 0g

Cholesterol 0mg 0%

Sodium 0mg 0%

Potassium 620mg 18%

Total Carbohydrate 26g 9%

Dietary Fiber 2g 8%

Sugars 1g

Protein 3g

Vitamin A 0% Vitamin C 43%

Calcium 2% Iron 6%

Thiamin 8% Riboflavin 2%

Niacin 8% Vitamin B<sub>6</sub> 10%

Folate 6% Phosphorus 6%

Zinc 2% Magnesium 6%

\*Percent Daily Values are based on a 2,000 calorie diet.

Do the math; % Daily Value adds up to a balanced diet.



Potassium is a superhero for healthy blood pressure.



Too much fat, sodium and cholesterol can bully your body.

For health, vitamin C gets an A+.

There's more to fiber than a good crunch.



## READ THE LABEL.

### IT'S GOOD FOR YOUR BODY.

[www.healthypotato.com](http://www.healthypotato.com)





## Objectives

### Students will

1. Understand how potatoes are grown.
2. Learn the purpose of each part of a potato plant.

### Time:

15 minutes

### Grade Level:

7-9

### Curriculum Standards Next Generation Science

#### Standards:

MS-LS1-4

MS-LS1-5

MS-LS2-4

### Plant Classification

#### Potato:

Family: Solanaceae

Genus: Solanum

Species: Solanum tuberosum

#### Tomato:

Family: Solanaceae

Genus: Lycopersicon

Family: Lycopersicon lycopersicum

#### Sweet Potato:

Family: Convolvulaceae

Genus: Ipomoea

Family: Ipomoea batatas

### Extension Activity

Plant Science Comparison:

Compare and contrast how different plants grow. What is the difference between fruits and vegetables?

### Additional Resources

[http://msue.anr.msu.edu/news/what\\_are\\_those\\_fruit\\_growing\\_on\\_my\\_potato\\_plants](http://msue.anr.msu.edu/news/what_are_those_fruit_growing_on_my_potato_plants)

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## How do Potatoes Grow?

### Materials Needed

- A potato plant diagram on pg. 9 with blank labels
- Potato with sprouts
- Photo of a sprouted potato

### Background

As stated earlier, potatoes are grown under the surface of the soil as a tuber on a stolon. This activity will go into more depth about what the plant looks like under and above ground.

### Directions/Discussion Guide

1. Prompting a discussion.
  - **Q: Where on the plant I would find the potato or the part that we consume?**  
**A:** The potatoes grow under the surface of the soil as a tuber on a stolon which is an underground stem. The rest of the plant above the surface looks pretty much like any other flowering plant.
2. Pass out the diagram of a potato plant on pg. 9 with blanks to fill in. Using the visual, work with the class to fill in the correct labels.
3. Discuss the function of the various parts.
  - The **leaves** are important for photosynthesis.
  - The **flowers** facilitate pollination by insects/honeybees but are not necessary for tuber production. These flowers may produce a fruit with seed. These seeds could be used to grow another potato that is genetically different from the parent plants.
  - The **stolons** are stems that grow at or beneath the soil surface. While many other plants have stolons, potatoes are unique because tubers form at the end of the stolons. Stolons are not the same as roots.
  - Thickened stolons are called **stem tubers**. These storage organs contain the same parts as normal stems, such as nodes, but also store starches for the plant. The stem tubers are the potatoes we eat.
  - The **stem and roots** provide support for production of tubers.
  - The **mother tuber** is the original seed potato planted with the intent to reproduce more potatoes.
4. So why haven't we mentioned sweet potatoes at all? Although they seem similar in several ways and are also a healthy food choice, they are not the same as a traditional potato. The edible part of a sweet potato is actually the plant's root, whereas the edible part of a traditional potato is the thickened stolon, called a tuber. In fact, potatoes are more closely related to tomatoes. See the left side bar for the plant classifications.





## Objective

### Students will

1. Learn about the different varieties of potatoes.
2. Understand how potatoes are grown.
3. Learn of the many uses of potato products.
4. Understand the ways that potatoes can be a part of our daily diet.

### Full Lesson Time

Approx. 45 minutes to 1 hour

### Grade Level

7-9

## Lesson Outline

### Introduction

#### 1. Not all potatoes are the same

- Activity- Students will be given 3 different varieties of potatoes (i.e. Michigan russet, yellow, red skin, fingerling, purple, etc.), they will list the characteristics of each variety and complete a Venn diagram or chart comparing and contrasting the varieties. Discussion on how different potatoes are good for different purposes.

#### 2. How do potatoes grow?

- Activity- After showing students a seed potato, they will look at a diagram of a potato plant and label the parts. Discussion on how food can come from all different parts of a plant, how all plants need the same nutrients and growing conditions, similarities between potato plants and other plants.

#### 3. What makes potatoes good for you?

- Activity- Students are given several different foods' nutrition information. As a group they should identify the good characteristics of the potato. Discussion on benefits on potatoes as a food source (no fat or cholesterol, good source of fiber, niacin, Vitamin C), and on how method of preparation can change the health value of a food.

#### 4. Extension Suggestions:

- How are potatoes like other vegetables that grow under the ground?
- Potato Facts- Number grown in MI, how they are harvested, first vegetable grown in space, amount eaten annually, etc.
- How potatoes have impacted history- Ireland and Russia, Native Americans
- Taste testing the different varieties or a simple recipe
- Weighing or measuring circumference of different varieties
- Processing Potatoes Video
- How the body uses nutrients from potatoes

#### 5. Conclusion

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[www.miacclassroom.org](http://www.miacclassroom.org)





## Objectives

### *Students will*

1. Understand the nutritional benefits of potatoes
2. Compare and contrast nutritional values of common foods.

### **Time:**

15 minutes

### **Grade Level:**

7-9

### *Curriculum Standards:*

#### **Common Core:**

RST.6-8.1, RST.6-8.9, 7.RP.A.2, MP.2, 6.SP.B.4, RST.6-8.7

### *Additional Terms:*

**Gram (g):** A metric measurement of mass and is the base of the International Standard of Units (SI).

**Miligram (mg):** A metric measurement of mass and is a thousandth (0.001) of the International Standard of Units (SI). 1g= 1000mg or  $10^{-3}$  of a gram.

**Mircogram (ug):** A metric measurement of mass and is a millionth (0.000001) of the International Standard of Units (SI). 1mg= 1000ug or  $10^{-6}$  of a gram.

**Kilojoule (kJ):** A measurement of energy that is 1000 of the base measure of a Joule. 1 kJ= 1000 J

**International Unit (IU):** A measurement of drugs and vitamins. The mass or volume varies based on which substance is being measured based on it's biological activity or effect.

### *Extension Activity*

Pair this lesson with further study of macromolecules including what role each nutrient plays in bodily functions.

# Potato Nutrition

## Materials Needed

- The potato nutritional info-graph on pg. 12
- The potato nutrition handout on pg. 13

## Background

Potatoes can be an excellent part of our diet, but how they are prepared has a lot to do with how healthy they are. One of the major reasons that potatoes are a healthy choice is the amount of water they contain. A 100 gram portion of potatoes contains 79 grams of water.

Potatoes are also important to our economy in Michigan and around the world. Potatoes are the world's fourth largest food crop behind corn, wheat and rice.

## Directions/Discussion Guide

1. Prompting discussion
  - **Q: Who thinks potatoes are good for you?**  
A: Potatoes can be an excellent part of our diet with the healthiness based on how they are prepared.
  - **Q: What cooking methods are likely the healthiest?**  
A: Baked, roasted, grilled, steamed.
  - **Q: What choices might be okay occasionally but not all the time?**  
A: French fries, chips, cheese-based.
  - One of the major reasons that potatoes are a healthy choice is the amount of water they contain. A 100 gram portion of potatoes contains 79 grams of water.
2. Pass out the info-graph with nutrition information about various staple crops to see how potatoes measure up.
3. Review the meanings of the abbreviations g, mg, ug, kJ, IU. See left side bar for the definitions.
4. Direct students in finding the first answer - The amount of vitamin C in potatoes as compared to sweet potatoes.
  - Depending on the academic level of students, answers can be ratios or simple subtraction.
  - Have students independently work through finding additional data responses.
5. When students are finished go over the answers.

**PROJECT TITLE: INSTITUTE FOR SUSTAINABLE LIVING, ART & NATURAL DESIGN (ISLAND) – Specialty Crop Education in Hops, Soil Fertility for Fruit and Vegetable Crops, and Agroforestry Systems at the 2015 Northern Michigan Small Farm Conference and Pre-Conference - FINAL**

**PARTNER ORGANIZATION**

Institute for Sustainable Living, Art & Natural Design (ISLAND)

**PROJECT SUMMARY**

To enhance the competitiveness of specialty crops grown by small and medium farmers in Michigan, the Institute for Sustainable Living, Art and Natural Design, (ISLAND) conducted a specialty crop educational ‘school’ in conjunction with the 2015 Northern Michigan Small Farm Conference (NMSFC). Based on 2014 post-conference evaluations and key stakeholder needs assessments, three specialty crop sessions focused on: 1) hops production, 2) soil fertility for fruit and vegetable crops, and 3) crops in agroforestry systems. These three events included national and regional experts. These day-long trainings exclusively focused on specialty crops.

While the soil fertility and agroforestry intensives were held the day prior to the NMSFC, the hops intensive took the form of the Great Lakes Hop and Barley Conference on April 10 and 11, 2015 in Grand Rapids. The conference featured separate basic and advanced sessions for hop growers as well as a barley session and malting tour. Several prominent speakers from around the country were on hand to discuss: market outlook, horticultural practices, pest and disease control, harvest and post-harvest practices, nutrient management, and much more. The conference featured three tracks: Hop Introductory Track, Hop Advanced Track, and Barley and Malt Track.

**PROJECT PURPOSE**

Specialty crop growers in Michigan are recognizing market opportunities for niche crops that are desired by specialty markets and food and beverage entrepreneurs. These crops include hops, mushrooms, culinary and medicinal herbs, diversified vegetables, and small fruits that are often highly specialized (but also can be very profitable). Intensive grower education is often difficult to find and sometimes cost prohibitive. By bringing national and regionally recognized expertise to the NMSFC, we impact the profitability of these Michigan farmers.

A worldwide shortage of hops increased prices 400% between 2007 and 2010, which has led to varietal scarcity. As a result, emerging interest in hop production in the greater Great Lakes region has increased dramatically over the last few years. With support from a thriving craft brewing industry, many growers across the region are beginning to recognize the potential financial benefits of increasing farm diversity and/or expanding their current agricultural operations to include hops. MSU Extension survey results suggest there were over 200 acres of hops and 8 processing operations in Michigan in 2013.

Despite the enthusiastic growth of hops production, there are significant challenges to hops production in the greater Great Lakes region. First, there is a continuing and urgent need for appropriate regional-specific cultivar selection and development of best management practices (BMP) to enhance yield, quality, and profit. Management of pests, diseases, and fertility has a direct impact on hop quality and yields. The vast majority of hops-related research has taken place in the Pacific Northwest, where over 75% of U.S. hop production occurs. Many of the BMP’s developed in the Pacific Northwest provide a basis of knowledge, but Midwest and Eastern North American growing and climatic conditions, and pest and disease complexes differ, which justifies the need for more region-specific hops related research and outreach.

Second, while brewers have purchased hops from the region's growers, many are concerned that growers have not yet reached the capacity to provide a consistent quantity of high-quality product that they require. However, based on MSUE survey results of Michigan craft brewers, 98% are interested in contracting with local, small-acreage Michigan hop producers, and 50% suggested they would pay a price premium to purchase locally grown hops, provided local production and processing resulted in sufficient quantity of high-quality hops.

Given Michigan's optimal growing conditions and the demands for this specialty crop, it is an ideal time for Michigan growers to produce more hops. Providing the education requested by Michigan growers will allow for increased production of hops, as well as increased knowledge of post-harvest considerations, leading to enhanced hop quality.

In June 2011, the USDA released the *Agroforestry Strategic Framework*, which outlines three main goals to increase agroforestry throughout the United States, the first of which is to "increase use of agroforestry by landowners, managers, tribes and communities."

Agroforestry is more complex than forestry or agriculture on its own, and can seem daunting for small farmers who are uncertain of the benefits of this system. Educational programs (like the Northern Michigan Small Farm Conference and Preconference) help small farmers overcome barriers to entry into agroforestry, and give them the tools they need to strategically incorporate tree crops, bush crops, mushrooms, and perennial plants.

Many specialty crop producers in Michigan grow vegetables and fruits for fresh market and are appealing to a clientele concerned about growing practices. For that reason and for concerns about soil health, plant health and environmental sustainability, these growers are trying more biological approaches to soil quality management. Heightened awareness of food safety has raised concerns about the safe use of natural fertilizers in crops grown for the fresh market. Compost, another source of soil fertility, requires a level of knowledge and technical training that many specialty crop growers do not yet have. With increasing awareness of the importance of soil biology for soil fertility and plant nutrition, a number of laboratories are now offering tests to measure soil biology. Specialty crop growers would like to better understand how to manage the fertility of their cropping systems. An overall soil quality program would lay the foundation for plant health and food safety for specialty crops.

## PROJECT ACTIVITIES

ISLAND held the first ever pre-conference in conjunction with the 2015 Northern Michigan Small Farm Conference, including two tracks: Soil School and Agroforestry School (together, we called this Farm School). Speakers from this program stayed overnight to then present breakout sessions for the Northern Michigan Small Farm Conference. Attendance at Farm School was 178; attendance at NMSFC was over 1,000.

Speakers and topics included:

- Holistic Disease Management, Michael Phillips
- Orchard Health, Michael Phillips
- Intercropping Specialty Crops, Peter Bane
- Growing Specialty Mushrooms, Bernie Ware
- Polyculture Building, Peter Bane
- Creating an Agroforestry Colloquium, panel with Michael Phillips, Peter Bane and Bernie Ware
- Bringing Back Abandoned Fruit Trees, Michael Phillips

- Soil Fertility for Fruit and Vegetable Crop Growers with Food Safety Modernization Act Update, Brad Morgan and RJ Rant
- Introduction to Agroforestry Systems, Peter Bane
- Organic Toolbox, Michael Phillips
- Preparing Soil for Long-term Plantings of Vineyards, Fruit and Nut Trees, Gary Zimmer
- Getting Started with Organic Hops, Rob Serrine and Brian Tennis

Additionally, we partnered with Michigan State University Extension on the Great Lakes Hop and Barley Conference on April 10 and 11, 2015 in Grand Rapids. The conference featured separate basic and advanced sessions for hop growers, as well as a barley session and malting tour. Several prominent speakers from around the country were on hand to discuss: market outlook, horticultural practices, pest and disease control, harvest and post-harvest practices, nutrient management, and much more. The conference featured three tracks: Hop Introductory Track, Hop Advanced Track, and Barley and Malt Track.

Evaluations, outreach materials and images from these events may be found under Additional Information, below.

#### GOALS AND OUTCOMES ACHIEVED

**Goal 1:** Increase small farmers' knowledge about hops production.

**Performance Measure:** Participant scoring on pre-surveys vs. post-surveys.

**Benchmark:** This is a new activity; this information does not exist.

**Target:** At least 15 farmers will report an increase in specific technical knowledge in growing and marketing hops. At least eight farmers queried in pre/post conference will report that they intend to change their farm operation base on the knowledge gained.

**Outcome:** As a result of attendance to the Great Lakes Hop and Barley Conference, participants indicated that they would: begin cultivating hops (introductory—80%); expand an existing hopyard (advanced—52%); establish new business partnerships with brewers/maltsters/growers (advanced—70%); and utilize MSU Extension IPM online resources (introductory—90%, advance—84%). Additionally, attendees indicated they would utilize, expand or improve (introductory/advanced): soil and tissue testing to make nutrient management decisions (85%/74%); scouting for insects and diseases (85%/48%); management for downy mildew (80%/82%); harvest timing (75%/60%); and processing and storage practices (50%/56%). In the NMSFC session on Getting Started in Organic Hops, 83% indicated that they would make changes to their farm business.

**Goal 2:** Increase small farmers' knowledge about agroforestry.

**Performance Measure:** Participant scoring on pre-surveys vs. post-surveys.

**Benchmark:** This is a new activity; this information does not exist.

**Target:** At least 15 farmers will report an increase in specific technical knowledge in growing and marketing agroforestry products. At least eight farmers queried in pre/post preconference intensive will report that they intend to change their farm operation base on the knowledge gained.

**Outcome:** As a result of attendance to Agroforestry School, 71% of participants indicated that they would make changes in their farm operation based on the knowledge gained at the conference. In the NMSFC sessions:

- on Soil Fertility for Fruit and Vegetable Growers, 80% indicated that they would make changes to their farm business as a result of attending the session.
- on Preparing Soil for Long Term Vineyards, Fruit and Nut Trees, 65% indicated that they would make changes to their farm business as a result of attending the session.

**Goal 3:** Increase small farmers' knowledge about soil fertility for fruit and vegetable production.

**Performance Measure:** Participant scoring on pre-surveys vs. post-surveys.

**Benchmark:** This is a new activity; this information does not exist.

**Target:** At least 15 farmers will report an increase in specific technical knowledge in soil fertility for fruit and vegetable production. At least eight farmers queried in pre/post preconference intensive will report that they intend to change their farm operation base on the knowledge gained.

**Outcome:** As a result of attendance to Soil School, 67% of participants indicated that they would make changes in their farm operation based on the knowledge gained at the conference. In the NMSFC sessions:

- on Bringing Back Abandoned Fruit Trees, 43% indicated that they would make changes to their farm business as a result of attending the session.
- on Introduction to Agroforestry Systems, 62% indicated that they would make changes to their farm business as a result of attending the session.
- on Organic Toolbox for Fruit Trees, 92% indicated that they would make changes to their farm business as a result of attending the session.

## BENEFICIARIES

The Great Lakes Hop and Barley Conference drew 330 registrants and over 350 total participants. Attendance was evening distributed across sessions with 32% attending the Hop Introductory Track, 35% attending the Hop Advanced Track and 24% attending the Malting Barley Track. Attendees hailed from 44 Michigan Counties, eleven states (Alabama, Iowa, Illinois, Indiana, Maryland, Michigan, Nebraska, New York, Ohio, Washington, Wisconsin), and Ontario. Attendees increased their knowledge of hop production and MSU Extension hop resources; the majority of participants indicated they would establish or expand hopyards and improve production practices.

The 2015 Farm School consisted of an Agroforestry School with three presenters and six sessions, and a Soil School with two speakers and two sessions. The Agroforestry School had 86 participants and the Soil School had 83 participants, for a total of 169 total participants. In reality, many participants attended selected workshops from both schools.

Participants in sessions at the NMSFC included farmers, homesteaders and gardeners. The session on Soil Fertility for Fruit and Vegetable Growers attracted 44 participants; Preparing the Soil for Long Term Vineyards, Fruit and Nut Trees saw 33 participants; Introduction to Agroforestry Systems had 66 participants; Bringing back Abandoned Fruit Trees had 40 participants; Organic Hops had 35 participants.

## LESSONS LEARNED

Our original plan was to have three tracks for Farm School: Soil School, Agroforestry School and Hops School. As we began our planning process, however, we learned that there was a big hops conference in San Diego taking place at the same time as Farm School. All of the top speakers would be there. Instead, we partnered with MSUE on the Great Lakes Hop and Barley Conference. In the end, their conference was much more comprehensive than our planned Hops School, and we are grateful that we found a solution that worked for everyone and to the benefit of producers.

Because we were incorporating three separate events (Great Lakes Hop and Barley Conference, Farm School, and Northern Michigan Small Farm Conference), the evaluations were not as cohesive as we would have liked. While the data we gathered is still very helpful, planning evaluations earlier in the process could have produced better results.

Additionally, while Farm School was well-attended by any measure, there was room for more. Outreach included print ads and information included with Northern Michigan Small Farm Conference materials, but we could have benefitted from a targeted direct mailing. In the future, we will test that approach.

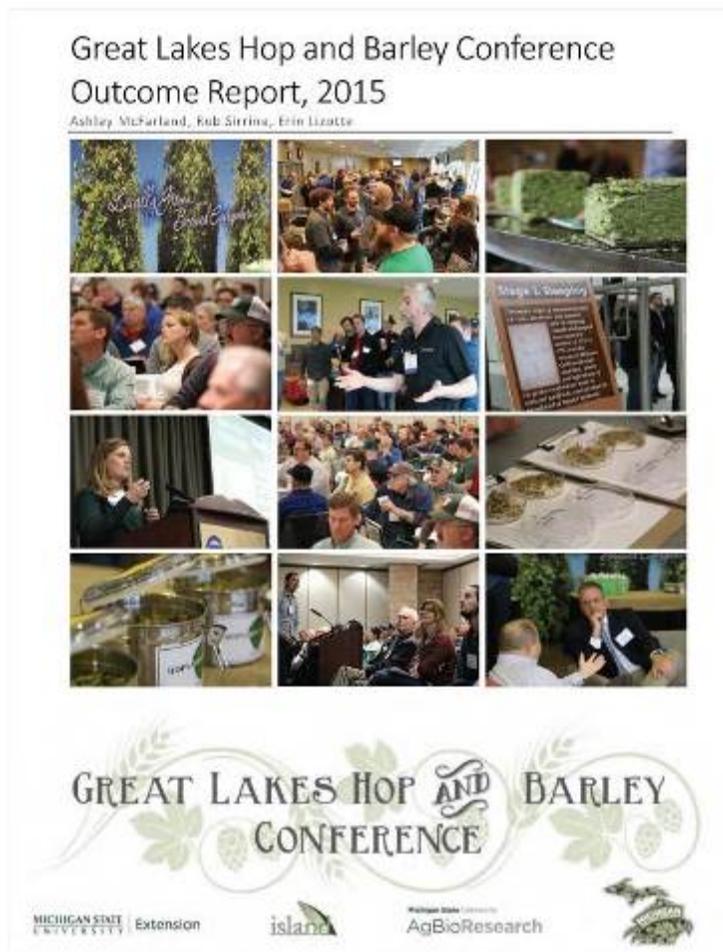
#### CONTACT PERSON

Amanda Kik, Co-director, ISLAND  
(231) 622-5252  
[amanda@artmeetsearth.org](mailto:amanda@artmeetsearth.org)

#### ADDITIONAL INFORMATION

Included are highlights from below:

- Great Lakes Hop and Barley Conference Outcome Report
- Farm School evaluations
- Northern Michigan Small Farm Conference Evaluations
- Outreach materials
- Photos





**Impact**

Attendance at the 2015 Great Lakes Hop and Barley Conference (GLHBC) resulted in increased knowledge of hop production and MSU Extension hop resources; the majority of participants indicated they would establish or expand hopyards and improve production practices.

**Event Description and Role**

On April 10-11, 2015 the inaugural Great Lakes Hop and Barley Conference (GLHBC) was held in Grand Rapids Michigan. The GLHBC consisted of three concurrent sessions: the Hop Introductory Track, the Hop Advanced Track, and the Barley and Malt Track. The conference was coordinated by Michigan State University Extension, Michigan State University AgBioResearch, and the Michigan Brewers Guild. Conference sponsors contributed over \$18,000.

**Audience Description**

The conference drew 330 registrants and over 350 total participants. Attendance was evenly distributed across sessions with 32% attending the Hop Introductory Track, 35% attending the Hop Advanced Track and 24% attending the Malting Barley Track. Attendees hailed from 44 Michigan Counties, eleven states (Alabama, Iowa, Illinois, Indiana, Maryland, Michigan, Nebraska, New York, Ohio, Washington, Wisconsin), and Ontario. Male attendees represented 82% of the audience, females represented 18%. Participants (n=99) self-identified as: 97% White, 2% Hispanic and 0.5% Multiracial; 46% current or future hop producer, 17% other, 13% current or future barley producer, 5% maltster, 4% brewer, 4% consultant, etc.

**Outcome Highlights**

As a result of attendance at the GLHBC, participants indicated they would:

- Begin cultivating hops (Introductory-80%)
- Expand an existing hopyard (Advanced-52%)
- Establish new business partnerships with brewers/maltsters/growers (Advanced-70%)
- Utilize MSU Extension IPM online resources (Introductory-91%, Advanced-84%)

As a result of attendance at GLHBC, participants indicated they would utilize, expand, or improve (Introductory/Advanced):

- Soil and tissue testing to make nutrient management decisions (85%, 74%)
- Scouting for insects and diseases (85%, 48%)
- Management for downy mildew (80%, 82%)
- Harvest timing (75%, 60%)
- Processing and storage practices (50%, 56%)

## Outcomes

To better evaluate the program, survey respondents were evaluated based on their role or program track selection with the following categories: Introductory Hop Track attendees, Advanced Hop Track attendees, Hop and Barley Track attendees, Brewer attendees, and Program sponsors.

### Introductory and Advanced Hop Track Evaluation Questions and Responses

Do you plan to utilize the following resources based on the GLHBC (select all that apply)?				
Answer Options	Introductory Hop Track		Advanced Hop Track	
	Response %	Respondents	Response %	Respondents
MSU IPM resources online (MSUE News, hops.msu.edu, Facebook page etc.)	91.3%	21	83.3%	26
MSUE Hop Cost of Production Bulletin	82.6%	19	54.8%	17
The Enviroweather network of weather stations and historical data	43.5%	10	54.8%	17
		n=23		n=31
Do you plan to do any of the following based on the resources and opportunities presented at the GLHBC?				
Answer Options	Introductory Hop Track		Advanced Hop Track	
	Response %	Respondents	Response %	Respondents
Begin cultivating hops due to an increased understanding of the opportunities & resources	80.0%	16		
Not cultivate hops due to an increased understanding of the costs & risks	5.0%	1		
Expand an existing hopyard	15.0%	3		
Leverage new business partnerships (brewers, maltsters, or growers)	10.0%	2		
		n=20		
Expand an existing hopyard (If yes, by how much in 2015?)			52.2%	12
Improve your standing at a current job or apply for a new job			21.7%	5
Establish new business partnerships (brewers, maltsters, or growers)			69.6%	16
				n=23
Do you plan to utilize, expand, or improve your use of any of the following practices on the acreage you manage/impact based on the GLHBC?				
Answer Options	Introductory Hop Track		Advanced Hop Track	
	Response %	Respondents	Response %	Respondents
Soil or tissue testing to make nutrient management decisions	65.0%	17	74.1%	20
Improve nitrogen use on farm	65.0%	13	63.0%	17
Scout for insects and diseases	65.0%	17	46.1%	13
Better manage for downy mildew on hop	80.0%	16	81.5%	22
Support beneficial insect habitat to promote pest control via natural enemies	65.0%	13	37.0%	10
Use alternative weed control or ground cover strategies (e.g. cultivation, cover cropping)	75.0%	15	59.3%	16
Protect native pollinators (mowing before spraying, spraying at night, etc.)	60.0%	12	25.9%	7
Optimize harvest time	75.0%	15	59.3%	16
Improve processing and storage practices	50.0%	10	55.6%	15
		n=20		n=27

**Great Lakes Hop and Barley Conference**  
**April 10-11, 2015, Grand Rapids, Mich.**



<b>Friday, April 10</b>		
8:00-9:00 Onsite Registration and Continental Breakfast		
9:00-9:05 Welcome, Debbie Stabenow, U.S. Senator		
9:05-9:45 Emerging Drink Trends Impacting the Brewing Industry Lester Jones, Chief Economist, National Beer Wholesalers Association		
9:45-9:50 Conference Announcements, Ashley McFarland, MSU		
9:50-10:35 Craft Brewing and Hop Usage Dr. Bart Watson, Chief Economist, Brewers Association		<b>Barley and Malt Track Room 201</b>
<b>Hop: Introductory Track Room 215BCDEFG</b>	<b>Hop: Advanced Track Room 215AH</b>	9:50-10:35 North American Barley Market Update Derek Prell, Malteurop
10:35-10:45 BREAK	10:35-10:45 BREAK	10:35-10:45 BREAK
10:45-11:30 Basic Physiology & Stages of Production Sarah Del Moro, John I. Haas Inc.	10:45-11:15 Optimal Nitrogen Management Jill O'Donnell, MSU	10:45-11:30 Malting Barley Opportunities in Michigan Ashley McFarland, MSU
11:30-12:15 Hop Cost of Production & Considerations Dr. Rob Serrine, MSU	11:15-11:40 Fertigation and Nutrient Management Dr. Ron Goldy, MSU	11:30-12:15 Quality Malting Barley Production Christian Kapp, MSU
12:15-1:15 LUNCH	11:40-12:15 Downy Mildew Management Dr. Dave Gent, USDA ARS	12:15-1:15 LUNCH
1:15-1:50 Soils & Fertility Diane Brown, MSU	12:15-1:15 LUNCH	1:15-2:15 Importance of High Quality Barley Grain and Barley Malt Ed Ruble, Bell's Brewery
1:50-2:25 Fertigation and Nutrient Management Dr. Ron Goldy, MSU	1:15-2:15 Advanced Physiology & Stages of Production Sarah Del Moro, John I. Haas Inc.	2:15-3:15 Outlook for Barley in Michigan Panel Steve Berthel, New Holland Brewing Company; Jacob Brenner, Grand Rapids Brewing Company; Ryan Hamilton and Erik May, Pilot Malt House; Jeff Sheehan, Rockford Brewing Company; and Carl Wagner, CS Seeds and Farms.
2:25-3:15 Intro to Integrated Pest Management Erin Lizotte, MSU	2:15-3:15 Powdery Mildew Management Dr. Dave Gent, USDA ARS	3:15-3:30 BREAK
3:15-3:30 BREAK	3:15-3:30 BREAK	
3:30-4:30 p.m. Joint Session Financing Panel Sandra Bloem, Economic Development Foundation; Tyson Lemon, Greenstone Farm Credit Services; Chris Cook, Michigan Economic Development Corporation		
5:30-7:00 p.m. Brewers Cut Demo and Meet the Buyer Mixer <i>You must have pre-registered for the Mixer.</i> Sponsored by the Michigan Brewers Guild, Location-Fifth Third Ballpark		

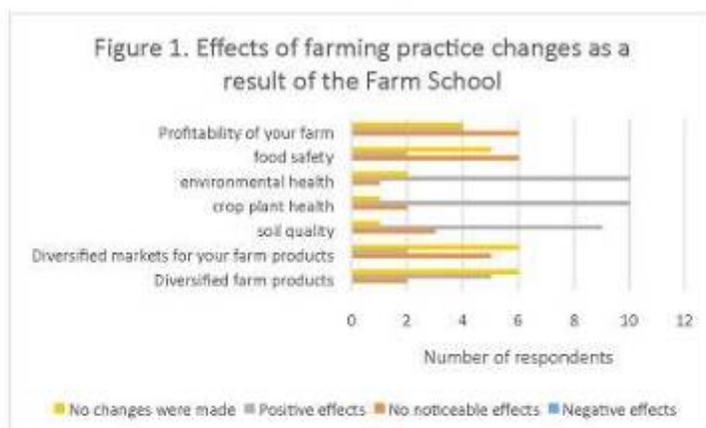
### Farm School 2015 follow-up survey

The 2015 Farm School consisted of an Agroforestry School with three presenters and six sessions, and a Soil School with two speakers and two sessions. The Agroforestry School had 86 participants and the Soil School had 83 participants, for a total of 169 total participants. In reality, many participants attended selected workshops from both schools.

We sent a follow-up survey to participants on October 16, 2015, nine months after the Farm School. We sent the survey to the 157 participants (92.9% of the total) for whom we had email addresses. By the due date of October 25, 2015, 28 people had responded to the survey for a return rate of 17.8%.

In our proposal we anticipated that the Farm School would teach agroforestry practices that would help farmers to diversify farm products, diversify markets, improve soil and water quality and reduce erosion. We expected the Soil School to help farmers develop a comprehensive soil quality management plan that would lay the foundation for plant health, plant disease management and food safety for specialty crop farmers. We also expected that practices implemented as a result of the farm school would help improve farm profitability.

Of the 28 survey respondents 14 indicated they were farmers. Five of them have been farming for 20 or more years, six of them for 6-10 years and three of them for three years or less.



Our primary interest was in changes people made in farming practices, so the following analysis is for only those 14 individuals who indicated they were farmers. In the survey we asked the farmers to assess the effects of any changes they had made as a result of the Farm School (Figure 1). None of the farmers indicated negative effects resulting from changes. In many cases no changes were made. Especially in the cases of diversified farm products and diversified

markets, those changes were predicted from Agroforestry School participants. Of our survey respondents only 1-4 attended the agroforestry sessions, so reports of no changes are not surprising. The greatest number of perceived positive effects are in environmental health, crop plant health and soil quality. When asked to describe the changes they had made in farming practices three reported changes in tillage operations and two said they had included cover crops in their crop rotations. Only two of the 14 farmers said they had made no changes in any areas.

Six farmers made no estimate of changes in farm profitability and four farmers said there was zero change. But three farmers indicated changes of \$1000 - \$2000, and one reported a \$10,000 increase in profitability.

In addition to 14 farmers, six individuals indicated they hoped to begin farming soon. One of those said he/she intended to transition from conventional to organic farming. Another said "[My] Overall approach to business plan has changed. [I] Have considered smaller scale/acreage production but increased diversity of function". And another said "I don't currently own a farm, but this has given me great knowledge to go forward."

Several other respondents described themselves as homesteaders or gardeners. Others included an incubator farm manager and a garden writer.

## NMSFC 2015 SOIL FERTILITY FOR FRUIT & VEGIE GROWERS-44 surveys

Overall impression				Effectiveness of Presenter-knowledge			
Excellent	Good	Fair	Poor	Excellent	Good	Fair	Poor
25	11	1	0	39	3	0	0

Effectiveness of Presenter-Quality				Would you sign up for another workshop from this presenter?		
Excellent	Good	Fair	Poor	Yes	NO	Not Sure
30	11	1	0	38	1	2

Do you plan to make changes to your farm or business as a result of this session?			My knowledge of topic	
Yes	NO	N/A	Before	After
35	1	8	3	3.6

Do you plan to make changes as a result of this session?  
DESCRIBE

Increase microbe invertebrate through more mulching . Improving habitats.  
 Have not been doing enough for my soil.  
 I'll grow more plants.  
 Will be adding soil amendments.  
 More in season soil feeding. More knowledge to provide for organic producers whom I service.  
 Compost to correct plant disease.  
 Begin using a different carbon input management plan.  
 Manage inputs more strategically.  
 higher focus on carbon types.  
 I'll be taking more soil samples and using more compost.  
 soil diversity  
 RJ Rant drew the connection between quality & biology.  
 More testing of water ,soil, microbes.  
 Concentrate on our soil more- composting.  
 amendments.  
 Test/Sample of produce for nutrient content.  
 Add compost % make it on farm-fish entrails.  
 More testing to find out what to feed.  
 Apply manure in fall.

INSTITUTE for SUSTAINABLE LIVING, ART of NATURAL DESIGN PRESENTS:

# FARM SCHOOL

PRE-CONFERENCE for the NORTHERN MICHIGAN SMALL FARM CONFERENCE

**AGROFORESTRY SCHOOL** with Michael Phillips, author of *The Holistic Orchard: Growing Tree Fruits and Berries the Biological Way*, Peter Bane, editor of *Permaculture Activist*, and Bernie Ware, Ware Farm

**SOIL SCHOOL** with Brad Morgan, Morgan Composting, and Gary Zimmer, Midwestern BioAg

FRIDAY  
JANUARY 23  
HAGERTY CENTER  
TRAVERSE CITY

[WWW.ARTmeetsEARTH.org](http://WWW.ARTmeetsEARTH.org)



## WINONA LADUKE

JANUARY 23<sup>RD</sup> 7<sup>PM</sup>  
HAGERTY CENTER



Winona Laduke is an internationally renowned activist working on issues of sustainable development and food systems. She lives and works on the White Earth reservation in northern Minnesota.

\$15 in advance \$30 at the door (excludes tax) with cash bar following the presentation

For more information and to register:  
[www.smallfarmconf.com](http://www.smallfarmconf.com)

INSTITUTE for SUSTAINABLE LIVING, ART of NATURAL DESIGN PRESENTS:

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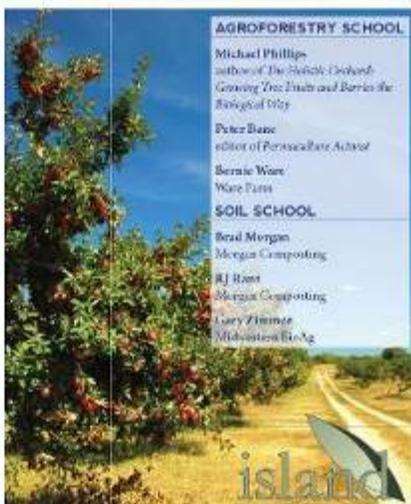
Bernie Ware  
Ware Farm

### SOIL SCHOOL

Brad Morgan  
Morgan Composting

RJ Bant  
Morgan Composting

Gary Zimmer  
Midwestern BioAg



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March 20, 2015  
Traverse City, MI

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- Presentation of our first State of the Agricultural Region report
- Rapid-fire updates on progress of the 2008-2010 goals
- Legislative updates
- Casual conversation
- Opportunities to take action
- A hint to cup of the night



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## AGENDA AT A GLANCE

6:30 to 8:30am	Vendor Registration
7:30 to 8:30am	Regular Registration
8:30 to 8:50am	Welcome & Introductions
9:00 to 10:15am	Concurrent Session I
10:15 to 10:30am	Refreshment & Trade Show Break
10:30 to 11:30am	Keynote: Gary Zimmer
11:45am to 1:30pm	Lunch
1:30 to 2:45pm	Concurrent Session II
2:45 to 3:30pm	Refreshment & Trade Show Break
3:30 to 4:45pm	Concurrent Session III
4:45 to 5:30pm	Trade Show & Networking
5:30pm	Trade Show Closes, Conference Concludes

**TRADE SHOW OPEN 8:30AM TO 5:30PM**  
 FOR CONFERENCE UPDATES AND DETAILED SCHEDULE,  
 VISIT [WWW.SMALLFARMCONFERENCE.COM](http://WWW.SMALLFARMCONFERENCE.COM)

**REGISTRATION DEADLINE IS JANUARY 19, 2015**  
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 OR (231) 838-8093.

VETERAN FARMERS AND TRIBAL PRODUCERS:  
 PLEASE CONTACT US FOR POSSIBLE SCHOLARSHIPS.

3



Gary Zimmer, speaker on soil fertility, at the Northern Michigan Small Farm Conference



Gary Zimmer, speaker on soil fertility, at the Northern Michigan Small Farm Conference



Attendees listening to Gary Zimmer, at the Northern Michigan Small Farm Conference



Graphic illustration for the agroforestry sessions at Farm School

**PROJECT TITLE: CHERRY MARKETING INSTITUTE (CMI) ON BEHALF OF MICHIGAN TREE FRUIT COMMISSION – Strategic Modernization of the Enviro-Weather IPM Information System for Fruit Production in Michigan - FINAL**

**PARTNER ORGANIZATION**

CMI worked directly with Dr. Jeff Andresen, Dept. of Geography, Michigan State University and the Michigan Tree Fruit Commission to execute this project.

**PROJECT SUMMARY**

The overarching mission of the Michigan State University-based Enviro-weather Project is the provision of relevant, detailed, and accurate weather-based information to support agricultural pest, production, and natural resource management decision-making in Michigan. Such information allows for more efficient and profitable farming operations and for the state's agricultural and green industries to remain competitive in global markets and economies. While continuing budgetary support of the system's weather monitoring network does include the costs for basic maintenance and service, it does not consider the needs for systematic replacement of weather stations or related technology, and portions of the network, especially those located in fruit production areas, are in serious need of replacement due to age and long term continuous use. The primary objective of this project is to replace existing weather station hardware to help ensure long term dependability and reliability of management information for fruit specialty crop producers, the system's largest user by group. This 1.5-year project to modernize 16 network station sites in fruit-producing areas of the state will provide useful and relevant data for more than 75% of Michigan's fruit-producing acreage. This upgrade will improve IPM programs and help growers better time pest control tools and eliminate them when possible.

**PROJECT PURPOSE**

Fruit production is an important component of Michigan's agricultural economy, with over \$750 million in annual sales (USDA/NASS, 2012). Michigan ranks among the top producing U.S. states for apples, blueberries, peaches, juice grapes, and tart cherries. Production of such specialty crops typically requires large amounts of detailed weather-related information for Integrated Pest Management (IPM), irrigation, and other management-related decisions. The Enviro-weather Project began in 2006, the result of a joint effort of the Michigan Climatological Resources Program and the Michigan State University IPM Program to help address growers needs for timely weather and model information. The major elements and functions of the system are environmental monitoring, model application, and integrated delivery of products and education in their usage. The primary source of environmental information for the system is an automated weather mesonetwork (formerly the Michigan Automated Weather Network), which has grown considerably from six sites at its formation in 1997 to 79 in 2014. The system also integrates a substantial amount of weather forecast data from the National Weather Service via a dedicated Internet Data Distribution link.

Continuing support for Enviro-weather is provided by Michigan AgBioResearch, Michigan State University Extension, the Generating Research and Extension to meet Economic and Environmental Needs (GREEN) Project, external grants, the state's various commodity and industry groups, and from individual growers. While this continuing support does include the costs of basic maintenance and service of the system and information dissemination and quality control, it does not consider the needs for systematic replacement of older and failing weather stations. Of particular concern is the age of our weather station hardware, especially the sites that were established more than ten years ago as these stations must operate 24 hours/day, seven days a week with little or no human interaction. We have benefited greatly by purchasing

high-quality, industrial supplies from Campbell Scientific, Inc. of Logan UT; this company has a long solid history in the collection of research-grade environmental data and its telemetry. Although Campbell Scientific's products are more expensive than most hobby- or similar grade instrumentation is has proven to be significantly more durable and reliable, and has a greater expected lifetime than less expensive options. However, even quality products have a finite lifetime (the expected life span of most technical parts is 5-10 years or less), and the costs of replacing parts of our aging network are critical. The primary objective of this project was to replace existing weather station hardware within Enviro-weather's observing network in fruit production areas (generally among the oldest of the system's monitoring network) to help ensure the long term dependability and reliability of the monitoring system. This effort targeted station sites on the basis of greatest replacement need and on past station data demand and usage. These efforts will help maintain provision of useful and relevant data for weather-related decision making, improve IPM programs, and help growers to better time pest control tools and eliminate them when possible on more than 75% of Michigan's fruit-producing acreage.

### PROJECT ACTIVITIES

The project time frame was 1 October 2014 through 31 March 2016. Station modernization at the 16 sites began during the spring of 2015 (March) and continued through March of 2016. Replacement supplies at each site included a new datalogger, datalogger enclosure, solar



panel, charging regulator, sensors for air temperature, relative humidity, rainfall, wind speed and direction, solar radiation, soil temperatures and volumetric soil moisture (at two depths), two leaf wetness grids, and where needed, directional antennae and cellular-IP modems. Modernization sites are displayed geographically in Figure 1. Overall, all of the sites are located in lower Michigan, with five in southwestern production areas, four in the west central region, six in the northwestern region, and one at the MSU campus in East Lansing. Site priority for modernization was based on two factors: 1) Station age (particularly the age of the existing

equipment at the site) and 2) Basic usage of data and information in the Enviro-weather system (Table 1). Service time at each site was approximately four hours plus transportation time needed to and from each site. All modernization work was carried out by the Enviro-weather Network Field Manager, Steve Marquie, and his staff.

*Figure 1. Geographical locations of the 16 proposed site modernizations in the Enviro-weather network. Locations are highlighted with red stars.*

<u>Station Site</u>	<u>1st Year of Operation/Usage Rate</u>
Bainbridge Center	2001/4
Belding	2000/7
Benton Harbor, SWMREC	1999/6
Benzonia	2001/9
East Lansing, Hort. Res. Teaching Center	1996/1
East Leland	2003/11
Fennville	2000/16
Grand Junction	2000/11
Hart	1996/3
Kewadin	2003/18
Lawton	2003/17
Ludington	2002/13
Old Mission	2000/17
Sparta	1996/5
Northport	2003/32
Traverse City, NWMHRS	2000/2

*Table 1. Enviro-weather network modernized observing sites targeted for modernization, initial year of site operation, and the overall ranking of the site in terms of user demand (a '1' denotes highest usage, 78 is lowest) follow each site name in parentheses.*

## GOALS AND OUTCOMES ACHIEVED

The project time frame is 1 October 2014 through 31 March 2016. Replacement supplies at each site include a new datalogger, datalogger enclosure, solar panel, and sensors for air temperature, relative humidity, rainfall, wind speed and direction, solar radiation, soil temperatures and volumetric soil moisture (both at two depths), two leaf wetness grids, and wireless cell modem and directional antenna for operational communications. Station modernization at the individual sites began in early May 2015 in southwestern sections of the state and proceeded northward with time. New cellular-IP wireless modems were installed at 10 sites (Bainbridge, Belding, Benton Harbor, Benzonia, East Lansing, East Leland, Grand Junction, Hart, Ludington, and Old Mission) and directional antennas at eight sites ((Bainbridge, Belding, Benton Harbor, Benzonia, East Lansing, East Leland, Grand Junction, and Hart) in March 2016. All modernization work was carried out by the Enviro-weather Network Field Manager Steve Marquie and his staff. The actual service time at each site so far has averaged approximately four hours. Combined with the time necessary to reprogram the new dataloggers and reintegrate the data stream into the operational Enviroweather dataset, actual outage time (no web access to recent station site data) for each of the sites generally ranged from 24-48 hours. Notices and warnings of scheduled modernization at individual sites were distributed via email and by phone to MSU Extension personnel. As of March 31st, 2016, modernization has been completed at all 16 sites. The on schedule completion of the fieldwork was due to: 1) the (unanticipated) availability of a skilled technician who could work on the project; 2) availability of some replacement supplies from existing Enviro-Weather inventory (for early stages of the

project); 3) favorable weather conditions; and 4) a more rapid than expected delivery of some of the replacement supplies needed for the project. A photo of a modernized weather station (Belding, MI) is given in Figure 2.

Only a few minor problems and delays were encountered during the project, allowing an earlier than expected completion of field-based activities. Specific problems/delays included poor weather conditions at Benton Harbor on the 5th of May and Grand Junction on May 25/26, as well as a wasp nest at the Bainbridge station site which delayed work on May 18/19.

The total budget for this project was applied toward the purchase of replacement weather monitoring supplies conformant with Enviro-weather quality standards at 16 network sites. All labor and travel costs necessary for the work at the sites was provided by Enviro-weather operational funds.

## BENEFICIARIES

The specialty crop beneficiary of the proposed project is Michigan's entire fruit industry. Modernization of the network stations sites will proactively reduce the risk of network failure and help ensure provision of reliable, high quality weather information to specialty crop growers, scouts and consultants during the growing season, which will in turn lead to improved management skills, increases in production efficiency, and economic gains to producers. The demand for detailed weather information to support agricultural pest, production, and natural resource management decision-making is increasing, and usage of the Enviro-weather system through its website has grown rapidly over time, increasing from an average of 96 individual product accesses per day (a metric more discriminating and selective than the more commonly used 'hits') in the first full year of operation to 606 per day in 2015, an overall increase of 629% and an average yearly growth of 29.1% per year. Peak usage rates during recent growing seasons have reached 2000 accesses per day (the average number of the commonly-used 'hits' metric was approximately 10 times this value). Similarly, use of the fruit-specific applications has grown an average of 18.9% per year since 2006 and as of 2013 still constitutes 73.1% of all commodity-oriented application usage. At a fruit industry conference in early 2013, more than 80% of the growers and consultants in attendance (primarily from NW Lower Michigan) identified Enviro-weather as their primary source of weather data. There is also increasing evidence of the value of detailed weather information. Based on a survey of cherry and apple growers across Michigan in 2011, Enviro-weather users reported significant reductions in their use of pesticides as a result of the information provided by the system (relative to non-users), including approximately 0.5 fewer total applications per grower per insect pest and approximately 0.3 to 0.5 fewer total applications per grower per disease. They also reported increases of more than 5% in both crop yield and quality. Collectively, the yearly economic impact associated with the use of Enviro-weather-based information for Michigan apple and cherry production including reduction in pesticide applications, increased yield and labor savings, was estimated to be more than \$1.7 million dollars. These data illustrate the potentially large overall economic value of the system as it only considers two crops, does not include the economic impact of the increase in crop quality, and only considers the impacts of only nine currently available disease and insect applications.

## LESSONS LEARNED

The most important overall lesson learned was the need for careful and detailed planning in carrying out the project. The timing of deliveries of necessary replacement parts and the suitable weather conditions necessary for fieldwork were out of the project personnel's control. We regularly modified/changed our schedule in order to take advantage of favorable weather conditions whenever possible, and as individual Enviro-weather field crew schedules allowed.

#### CONTACT PERSON

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#### ADDITIONAL INFORMATION



Figure 2. Newly-modernized Enviro-weather automated station site at Belding, MI, July 2015.

**PROJECT TITLE: Lakeshore Environmental, Inc. – A Study of Water Repurpose and/or Water Use Reduction at Michigan Fruit and Vegetable Processors - FINAL**

#### PARTNER ORGANIZATION

Lakeshore Environmental, Inc.

#### PROJECT SUMMARY

This grant was issued to Lakeshore Environmental, Inc. (LEI) in October 2014 and project work commenced in 2015. As outlined in the grant proposal, this project was to be completed at

Peterson Farms, Inc. (PFI) Main Campus, located in Shelby, Michigan. The PFI Main Campus was broken down into three processing facilities; Main Plant, Fresh Plant, and Juice Plant. Each operated independently and therefore maintained different uses for fresh water. This allowed LEI to review various processes and commodities at a single campus. Main Plant and Fresh Plant were the most similar in their water use. Both utilized open flumes and dump tanks that offer water reduction opportunities. Juice Plant had significantly less overflow and a more consistent, reduced water use on per product basis. With the final analysis of water and production data, LEI updated water use ratio goals for each facility to reflect the following:

- 2.0 gallons per pound: Main Plant
- 2.0 gallons per pound: Fresh Plant
- 1.0 gallons per pound: Juice Plant

Focus areas for analyzation and quantification included:

- Water quality
- Processing (by Facility)
- Sanitation
- Employee awareness/engagement
- Hoses
- Facility support equipment
- Controlled Atmosphere (CA) Rooms
- Cost of Water
- Treatment Technology options

Checklists and worksheets were developed in order to summarize water reduction strategies and findings.

## PROJECT PURPOSE

Food processing facilities use large amounts of fresh water daily, ranging anywhere from 10,000 gallons per day (GPD) to 6.0 million gallons per day (MGD). While water is an important and essential part of food processing, there is potential for more efficient use of that water. Water is becoming a scarce commodity worldwide, and Michigan is beginning to feel the pressure to reduce water use. It is important for the Michigan food processing industry to preemptively plan for more restrictive water regulation and shortages. By analyzing water use practices within various processing facilities, LEI plans to provide the entire industry with a better understanding of water use best practices, as well as reduction and/or repurposing options.

The first indication of efficient water use at any processing facility is the ratio between gallons of water used (or gallons of wastewater produced) per pound of finished product sold or shipped. This is referred to as the water use ratio. While this ratio has generally decreased over the past decade (i.e. less water used for each pound of finished product), there is still a lot that can be done to improve efficiency and reduce water use at these facilities.

There are also several water and wastewater treatment technologies available that could provide sufficient treatment so that water may be repurposed within the facility, thereby reducing the overall water footprint of a facility. These methods need to be analyzed and tested in real world situations to ensure consistency in practice. Peterson Farms Inc. (PFI) served as a “test case” for these real world analyses.

## PROJECT ACTIVITIES

The grant was issued to LEI in October 2014 and project work commenced in 2015. Site tours were conducted at each facility, during various production shifts/seasons (i.e. various

commodities). This allowed LEI to gain a general understanding of various processes and water usage in fruit processing. During these site visits water use was quantified and samples were collected for analytical testing. These allowed for a baseline estimate of water quality and usage from typical food processing practices. In March 2016, LEI received a no-cost project extension based on several unexpected hindrances throughout the study.

### **Water Quality**

In food processing, water quality is extremely important in ensuring that the end product is safe for consumption. This called for rigorous quality testing of product and incoming water. In order to approve any potential water reduction strategies proposed in this report, significant water quality testing and analysis will be performed to ensure that quality standards are met. The quality testing performed within this study was for initial feasibility only. Additional quality testing should be completed and verified internally by quality personnel.

LEI corresponded with quality personnel regarding water reduction strategies and determined that water reuse within product lines would require significant water treatment and continual quality testing. As a result, this was not seen as the most economically feasible option and LEI focused water reduction strategies on sanitation, general clean-up, facility support equipment, and other areas that do not come into direct contact with food product. These focus areas also required additional treatment and analysis, but have been approved for use in the past and were more likely to provide cost effective options for PFI.

#### **Main Plant**

Main Plant (MP) accounted for the majority of production from PFI and had the widest range of commodities and processes.

Year Round commodities:

- Apples

Peak Season commodities (typically May through September, dependent on crop yield):

- Blueberries
- Sweet and Tart Cherries
- Peaches

Each commodity was processed into:

- Puree
- Blanched
- Frozen: IQF (Individual Quick Freeze)

Table 1 provides a description of the water use for each product line and the percentage of overall production that the product makes up, based on 2015 and 2016 data (through October). (next page)

**Table 1: Summary of Main Plant Production Areas**

Description/ D	General Description of Water Use	Estimated % of Total MP Pounds of Production	
		2015	2016 <sub>1</sub>
<b>Apple Line</b>	Dump and accumulation tanks, flumes, spray bars, food pumps, and general clean-up	47%	46%
<b>Blueberry Line</b>	Lug dumper and washer, flumes, spray bars, food pumps, and general clean-up	15%	15%
<b>Tart Cherry Line</b>	Dump tanks, flumes, spray bars, food pumps, and general clean-up	19%	22%
<b>Sweet Cherry Line</b>	Dump tanks, flumes, spray bars, and general clean-up	7%	9%
<b>Peach Line</b>	flumes, spray bars, caustic unit, food pumps, and general clean-up	6%	5%
<b>Puree</b>	Chiller, pumps, and bucket washers	6%	4%
<b>Blancher</b>	Accumulation tank, blancher unit, spray bars, flumes, food pumps, and general clean-up	NA	NA
<b>IQF</b>	Individual Quick Freeze: shakers, spray bars, and general clean-up	NA	NA

1 – Breakdown accounts for January through October 2016, primarily apples are processed the remaining months.

Figure 1, attached, provides the completed Water Balance Diagram for Main Plant. This was used for analyzing water discharge sources at the facility. It was necessary to have an understanding of what present water sources were in order to determine where minimization could occur. SQF Code (Safe Quality Food), Edition 7.2 – Module 11.5.2 (provided by PFI quality department for review) notes that water used for blanching, fluming, and/or washing can be recycled to an earlier stage of the same process. As seen on Figure 1, a majority of these flumes were already collected and recycled. However, many of these collection systems were undersized or used improperly and overflowed to the floor drain throughout the majority of a production shift/day.

Locations for reroute and/or reuse in Main Plant include the following areas:

- Sieve overflows (16.3 GPM on Cherry Sweet Line, 9 total sieves at Main Plant, size varied)
- Dump tank overflows (vary by operator, 4 at Main Plant)
- Unbalanced flume/tank configuration (i.e. more continuously going in than out; 44.4 GPM on Sweet Cherry Line, all tanks had overflow)
- Blancher discharge; reroute/reuse (19.7 GPM)

While influent flow meters were installed at each of the PFI Main Campus production facilities, data was not available from the meters at Main Plant during the study period. Water enters Main Plant at two locations: Inlet 1 located in the freezer/packaging area and Inlet 2 located near the cherry pitters. Portable flow meters were installed at PFI in June 2016 for additional analysis during peak season. From these flow meters LEI was able to pull the following estimates:

- Inlet 1 was used consistently each day with reductions during low production and on weekends. (June to October).
  - Average daily use was estimated at 360,000 GPD.
- Inlet 2 was used less frequently but increased significantly coming into peak season. It is believed that this pump primarily serves the Cherry Processing lines.

- Increased flow at the start of Cherry Processing season peaked at 520,000 GPD (July 9, 2016). Again LEI recommends more consistent tracking of this line during additional peak seasons for verification.
- It was noted at the start of the study that Main Plant was the primary onsite water use location. Based on the estimates described above, Main Plant used approximately 40% of overall incoming water during average production.
- The significant overall water use increase during peak season can be primarily attributed to Cherry Processing. In early July of 2016 there was a 124% increase in water use at Main Plant compared to the average in June 2016.
- Note that all these estimates are based on limited data from a single production season. All food processing facilities should install meters for year round, consistent tracking of water use.

**Fresh Plant**

Fresh Plant processed apples into ready to eat form, which added another level of quality assurance and hygiene.

Fresh Plant divides into four rooms to separate raw product from finished product, as follows:

1. Raw
2. Ready to Eat
3. High Hygiene
4. Packaging

A summary of general water use in each room is provided in **Table 2**.

**Table 2. Summary of Fresh Plant Production Areas**

Room ID	General Description of Water Use
Raw	Dump tanks and general clean-up
Ready to Eat	Dump tanks, flumes, UV treatment, spray bars, and general clean-up
High Hygiene	Flumes, general clean-up
Packaging	Minimal daily water use

Figure 2, attached, is the water balance diagram for Fresh Plant. As shown, a majority of the dump tanks and flumes were recirculated via pumps. At the end of each shift (8 hours +/-) these were discharged to the drain. The initial dump tanks in the Raw Room (2 total) overflowed often and offered the most potential for water reuse. The amount of overflow varied based on the operator. A combination of employee engagement, treatment, and reuse water for filling/makeup water would provide significant water reduction at Fresh Plant. Other sources of continuous water discharge include spray bars and UV treatment pumps.

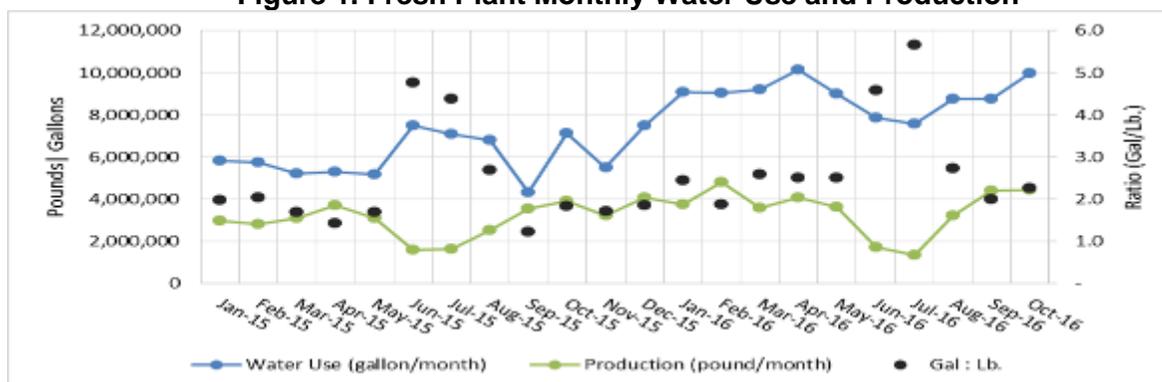
Compared to production at Main Plant, which was over seven times higher in peak season than average production; Fresh Plant production was relatively consistent throughout the year with slight decreases during Main Plant peak to account for the increased demand on employees and resources at that facility.

Influent water at Fresh Plant was tracked using existing influent water meters installed that facility. The data was retrieved by PFI periodically and delivered to LEI for review and interpretation.

This study set a goal of 2.0 gallons of water to be used for every pound of product produced. As seen in Figure 1 below this was determined to be feasible for Fresh Plant processing and was maintained for a majority of 2015. Since production is consistent year round, there is no reason that a 2.0 gallon per pound ratio cannot be maintained. June and July showed a consistently higher water use ratio, which indicates a decrease in efficiency and could be partly

attributed to a decrease in production. Scheduling at Fresh Plant should be optimized during this time of the year to minimize tank fillings and sanitation when they can be avoided (i.e. run two shifts in one day versus one shift each day).

**Figure 1. Fresh Plant Monthly Water Use and Production**



Daily water use was steady during production hours and then increased significantly over the sanitation shift. Further discussion of sanitation water use is provided below.

**Juice Plant**

Juice Plant processed a variety of products throughout a year, but the production process was nearly the same for each. The primary products processed were:

- Apples
- Blueberries
- Tart and Sweet Cherries

Each commodity was processed into juice, cider and/or concentrate.

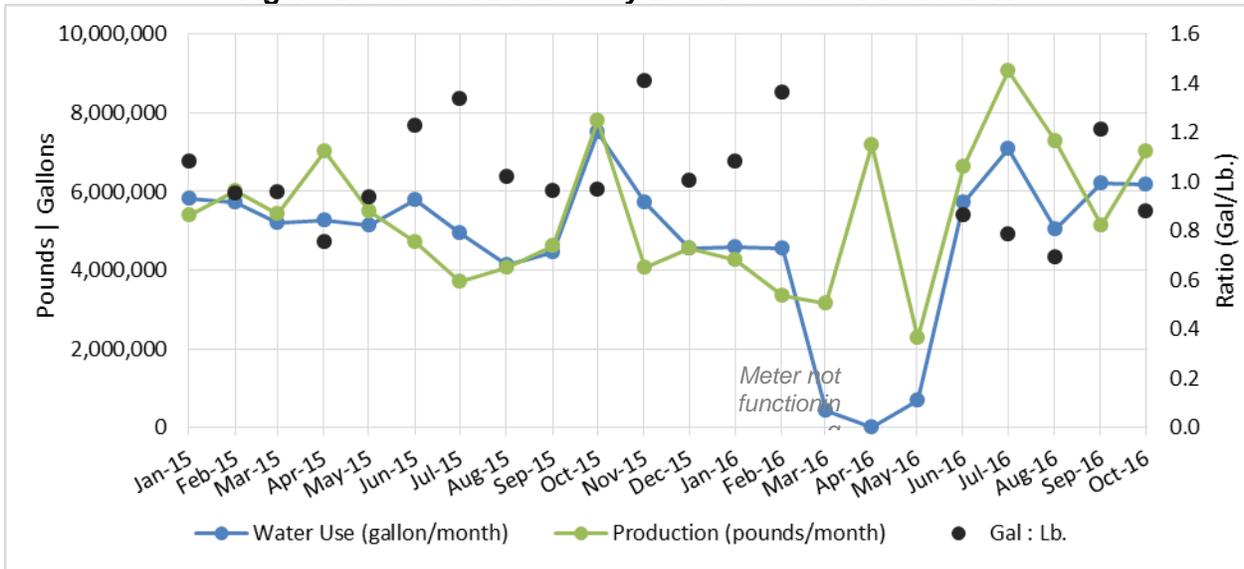
**Table 3. Summary of Juice Plant Production Areas**

Description	General Description of Water Use
<b>Product Receiving</b>	Whole apple rinsing, flume
<b>Processing</b>	Evaporator condensate (58.8 GPM), product transportation
<b>Sanitation</b>	Clean-in-place (CIP) system, hoses

Influent water at Juice Plant was tracked using existing influent water meters installed at that facility. The data was retrieved by PFI periodically and delivered to LEI for review and interpretation.

Juice Plant production and water use are relatively consistent throughout a year. As should be expected, water use followed production very closely. Figure 2, below, displays water use and production totals on a monthly basis.

**Figure 2. Juice Plant Monthly Water Use and Production**



As noted with Fresh Plant data, LEI set an overall goal of 2.0 gallons per pound. However, these goals need to be adjusted depending on baseline facility data. Based on the information displayed above a more appropriate goal ratio should be 1.0 gallon per pound at Juice Plant. Juice Plant does not maintain a separate sanitation shift, meaning that sanitation was integrated with production throughout a 24 hour day. This type of operation made it difficult to quantify water use specific to production.

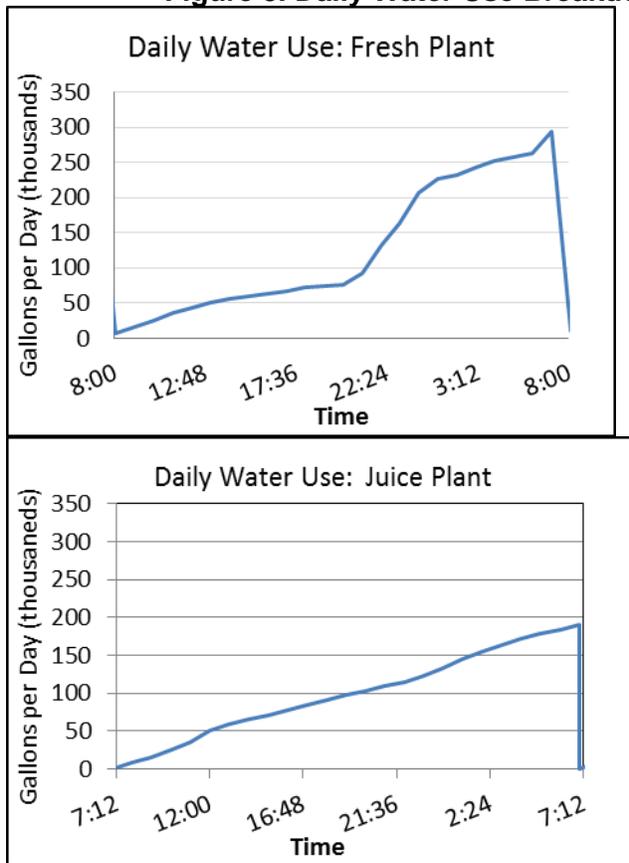
**Sanitation**

Sanitation efforts at PFI Main Campus were broken down into three different types:

- Manual Sanitation Practices
  - The operator has complete control of water use and cleaning practices (i.e. hoses). Manual sanitation consisted of general clean-up, rinsing, caustic washing and sanitizing of floors, outside of equipment, walls, and other areas.
  - From correspondence with PFI representatives, as well sanitation site visits, it was noted that hoses often get left on. Hose nozzles were regularly removed and/or used improperly.
  - Used at Main, Fresh, and Juice Plant.
- Semi-Manual Sanitation Practices
  - The operator controls water and chemical amounts but pumps move water and provide cleaning. Semi-manual sanitation cycles involved at a minimum four complete filling and dumping cycles.
  - For high hygiene areas additional cleaning and rinsing cycles were necessary.
  - Typically used on flumes and dump tanks in series.
  - Used at Main and Fresh Plant.
- Automatic Sanitation Practices
  - Used to clean inside of fully enclosed pipes and tanks.
  - Water use and cleaning are based on set pipe sizes and run times (i.e. CIP).
  - Used at Juice Plant; difficult to quantify water use because sanitation took place at same time as production elsewhere in the facility.

Figure 3, below, illustrates daily water use and displays the difference in sanitation practices for Juice and Fresh Plant. The meters reset to zero each day at 8:00 AM at Fresh Plant and 7:00 AM at Juice Plant and collected hourly, totalized readouts. The graphs below depict a typical production day at each plant.

**Figure 3. Daily Water Use Breakdown (Fresh Plant and Juice Plant)**



At Fresh Plant (left), all sanitation took place during the third shift (i.e. approximately 8:00 PM to 2:00 AM,). Approximately 70% of daily water use was attributed to the sanitation shift. Meanwhile, sanitation at Juice Plant (right) takes place throughout the 24 hour day. Without specific metering during sanitation activities it was impossible to quantify sanitation specific water use with the existing meters.

Typical areas of sanitation water reuse include:

- Later steps for initial rinse water.
- Final rinse water to earlier steps.
- Caustic wash from previous cycles.

LEI researched industry guidelines and regulations to determine which types of sanitation reduction opportunities were feasible for fruit and vegetable processing facilities. While sanitation water reuse regulations did not exist, it was determined sanitation practices were based on two operating principles:

1. Procedures needed to be repeatable, followed, and properly documented through the use of Sanitation Standard Operating Procedures (SSOP).
2. Final equipment and buildings needed to pass necessary quality testing.

Reduction and water reuse opportunities were feasible if a facility's quality department was able to provide necessary testing and documentation for food safety needs at the facility.

PFI implemented a few strategies for water reduction in sanitation, to date:

1. Chemical use was being reviewed at the start of this study. A reduction in chemical use leads to a reduction in water use.
  - a. This led to a single filling of each tank versus continuous overflow to for each step in the sanitation cycle. This took place before the commencement of the project and therefore reduction quantification was not possible.

- b. This was completed at an overall cost savings to PFI.
- 2. PFI conducted a second thorough self-investigation of their current processes with regard to water reduction.
  - a. It was determined that a majority of the circulation pumps were able to be reversed. If pumps are reversed, the system only needs to be filled halfway to flow. This will cut CIP water use in half for lines that are able to do this.
  - b. Based on tank sizes this operation provided a water savings of 2,593 gallons per sanitation shift per line. Assuming 250 working days per year and two process lines that equates to an annual savings of 1,296,533 gallons at Fresh Plant.
  - c. Using the same process at Main Plant would create an annual water savings of 669,211 gallons on Apple Line only.
  - d. This was completed at no cost to PFI.

**Employee Awareness and Tracking**

Employee awareness at all levels (floor worker, managers, etc.) was deemed essential to the success of any water reduction project. PFI used meetings and site visits by LEI to inform sanitation management of the effort which led to:

- Increased attentiveness on hose use.
- Further analysis of chemical use with water reduction in mind.
- An adjustment to semi-manual practices cutting water use in half for this step (as previously described).

Similar awareness should be provided to each facility operator during all production shifts as well to hold each employee accountable. An employee awareness template is attached. It is meant to increase tracking of water use in a manner than is repeatable and distributable to managers and employees for more attentiveness on water use.

**Hoses**

Hoses were a primary contributor to water use within the food processing facilities. Two strategies were explored for water reduction. The first was to communicate with operators to relay and understand the importance of proper hose use relative to the company’s big picture goals (i.e. employee engagement).

- a. Keep nozzles on hoses.
- b. Turn off hoses when not in use.
- c. Use squeegees, shovels, and brooms where possible instead of hoses.

Table 4 provides quantification results for hoses at PFI. The results are provided in equivalent hours of run time per day.

**Table 4. Hose Use, PFI Main Campus**

	<b>Peak Season (hrs.)</b>	<b>Off-Peak Season (hrs.)</b>
<b>Main Plant</b>	38-62	38
<b>Fresh Plant</b>	34.5	34.5
<b>Juice Plant</b>	11.75	11.75

The hose use assumptions were based on conversations with each of the facility’s operational managers.

Peak season water use at Main Plant was directly dependent on which lines were operating. Hose use varied throughout the year from the 38 hours per day (apple lines only) to almost double that depending on how many shifts and products were running.

The second strategy was to reduce the flow rate of hoses wherever applicable.

- a. Determine where high volume flow is required. Limit high volume hoses as much as possible.
- b. Determine where a high pressure/low volume hose can be substituted for high volume hoses. A high pressure hose at Juice Plant measured 1.4 GPM.

- c. Ensure that the high volume/standard hoses operate at no more than 5 GPM. A standard hose at Juice Plant was measured at 4.4 GPM.

Based on facility run times and hose flow rate measurements, LEI estimates that if it was applicable for Fresh Plant to switch all standard hoses to high pressure hoses, PFI could achieve a water reduction of 6,210 GPD at a low capital cost.

**Facility Support Equipment**

All boilers and cooling towers at PFI were equipped with treatment and reuse systems. The cooling tower for Freezer 1 is operated off pH and conductivity to determine how much blow down is necessary. From April to July of 2015 blow down volumes averaged 203 gallons per day. Assuming the cooling tower runs approximately eight months out of the year this equates to an annual use of approximately 50,000 gallons or 0.01% of total water discharge.

PFI Main Campus operates six cooling towers at Main Plant, three at Juice Plant, and three at Fresh Plant. Assuming each of these units run similarly to that outlined above, the cooling towers blow down approximately 600,000 gallons per year. Blowdowns occur when water is of poor quality, however, if the makeup water could be supplied by a source of water of adequate quality or run through simple treatment (i.e. water softening) 600,000 gallons of water could be saved each year.

Although water use information was not available for the boilers there are four boilers onsite and it was indicated that they blow down similar to the condensers. If makeup water is able to be reused from another discharge source this could be an additional water savings of 200,000 gallons per year.

All of the boilers and cooling towers at PFI were equipped with recirculation and condensate return streams. This is essential for water minimization. Single pass units use a significant amount of water and internal recirculation of facility support equipment is a required step for water reduction at any facility.

**Controlled Atmosphere Rooms**

The defrost system for the Controlled Atmosphere (CA) rooms is a significant water use onsite and has therefore been separated from the general facility support equipment category. The CA rooms were split into two different types (CA1 and CA2) and had different cooling systems:

1. CA1 was split into small and large rooms and used water for cooling.
2. CA2 utilized a hot gas defrost system. This system did not use or discharge any water.

Table 5 below displays the amount of water typically used by the CA rooms.  
(next page)

**Table 5: CA Room Water Usage**

Building, Room Type	Number of Rooms	Water Use (gallons)		
		Per Cycle	Per Day	Per Year
CA1, Large	18	2,500	20,000	5,280,000
CA1, Small	16	2,500	15,000	3,960,000
CA2	15	0	0	0
<b>Total</b>	<b>49</b>	<b>5,000</b>	<b>35,000</b>	<b>9,240,000</b>

“per year” based on running defrost 22 days/month

By converting all CA rooms to a hot gas defrost system, PFI could reduce annual water use by over nine million gallons.

### **Cost Analysis**

Cost savings are a major driver for water reduction in most facilities. Similar to other rural food processors, PFI is not tied into a municipal system, therefore they are not charged for municipal water or sewer on a per gallon basis. However that does not mean that water at PFI is free. Cost of water was calculated based on infrastructure, maintenance, electricity use, and costs of quality testing.

Based on available information, LEI estimates the total cost of water use at PFI is \$1.76 per one hundred cubic feet (CCF). For comparison, water/sewer from a municipal system can cost over \$5.00 per CCF.

The total cost of water use at PFI was calculated to be \$0.002 per gallon. At 512,000,000 gallons per year (permitted maximum discharge), this equated to \$1,024,000 per year. Daily costs were estimated to range from \$2,000 to \$8,000 per day (based on 1 MGD to 4 MGD discharge rates, typical).

Table 6 estimates supply and wastewater costs broken down into the cost of electricity, compliance testing, and maintenance.

**Table 6: Estimated Annual Cost of Water Summary**

	Cost/Gallon			Cost/CCF		
	Supply	Wastewater	Total	Supply	Wastewater	Total
<b>Electricity</b>	\$0.001217	\$0.000822	<b>\$0.002039</b>	\$0.91	\$0.61	<b>\$1.52</b>
<b>Compliance</b>	\$0.000004	\$0.000268	<b>\$0.000272</b>	\$0.00	\$0.20	<b>\$0.20</b>
<b>Maintenance</b>	\$0.000031	\$0.000008	<b>\$0.000038</b>	\$0.02	\$0.01	<b>\$0.03</b>
<b>Total</b>	<b>\$0.001251</b>	<b>\$0.001098</b>	<b>\$0.002349</b>	<b>\$0.94</b>	<b>\$0.82</b>	<b>\$1.76</b>

Electricity costs are most directly impacted by reductions in water use. Cost reduction in maintenance and compliance testing are also expected with water reduction, but more consistent reduction is necessary before impact is observed.

Infrastructure must be included in cost estimates for rural water systems, however, it is difficult to quantify on a per gallon basis. Improving facility operations, water tracking, and reducing water use and discharge will have a major impact on infrastructure costs. A facility that continues to increase water use each year will continue to require more wells, pumps, and additional maintenance. This in turn causes the need for more fields, piping, and treatment for the onsite wastewater treatment system. Reducing water use within each of the production areas will allow existing equipment to get proper rest and rotations for routine maintenance and decrease the need for new wells and pumps.

Groundwater supply and discharge at a facility made it difficult to base water reduction efforts on costs alone. Careful consideration of infrastructure costs and requirements quickly demonstrated that although there is no monthly water bill at PFI there were significant costs associated with using millions of gallons of water each day.

### **Treatment Technology Testing**

In the beginning phases of this study, LEI expended significant efforts into research and contact with water treatment/water reuse vendors to determine if these systems would be applicable, cost effective, and testable for food processing facilities. Previous reports have summarized some of these initial findings. In the final phase of this study LEI used in house testing of known treatment options to determine a combination of options that would be more cost effective than “off the shelf” systems.

Table 7 was compiled to summarize the critical components analyzed for this study.

**Table 7: Critical Design Components**

Critical Components	Notes (Reasoning, factors, etc.)
Bacteria Removal	Food safety concern, internal quality departments, industry standards
Total Solids Reduction/ Removal	Equipment concerns, food safety, public perception, general cleanliness/sanitation
Aesthetics (e.g. color, odor, smell)	General cleanliness/sanitation, internal quality, public perception
Cost	Return on investment, no direct water costs, indirect cost analysis
Infrastructure Feasibility	Ease of implementation, connected with costs, facility downtime for construction
Specific Facility Concerns	TBD

**Filtration Testing – Round 1**

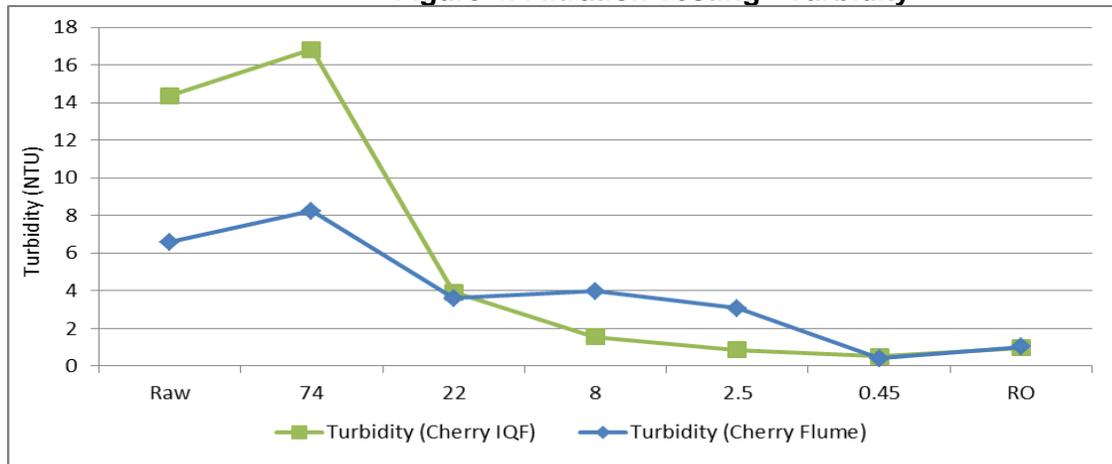
The following samples were collected from PFI for initial filtration analysis:

- IQF – Blueberry
- IQF – Cherry
- Flume – Cherry

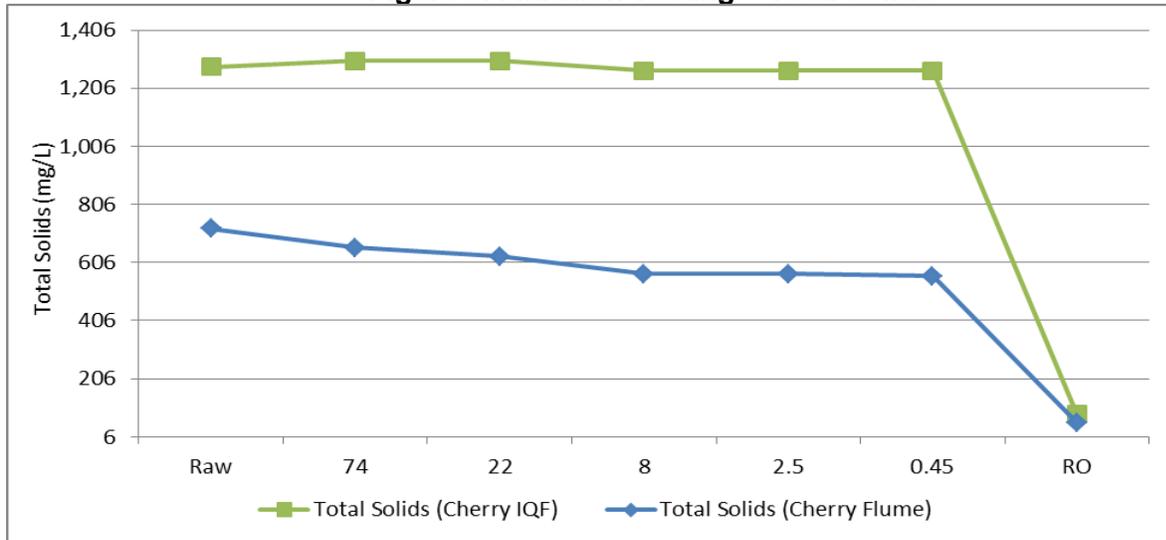
Each sample was filtered through a 74 (sieve), 22, 8, 2.5 (paper) and 0.45 (cartridge) micron filters and a DuPont QT series Reverse Osmosis (RO) membrane filter. LEI used each filter step to observe and analyze reductions and/or removal of total solids and bacteria.

Solids removal and aesthetics were tracked using field turbidity readings and sample collection for laboratory analysis of total solids (dissolved and suspended). Figure 4 and 5, below, display testing results.

**Figure 4. Filtration Testing - Turbidity**



**Figure 5. Filtration Testing – Total Solids**



Turbidity showed an increase after the first filter series (74 micron). This was not interpreted as an actual increase, but was more likely attributed to changes that took place in the water with regards to settling and the span of time over which the samples were tested. There was no notable reduction in total solids until the sample was filtered through the RO system.

Bacteria was also analyzed during initial filtration testing. No appreciable removal of bacteria was found from any level of filtration. LEI carefully decontaminated all equipment before sampling, but due to the nature of bacteria it is likely that samples were introduced to external bacteria before laboratory analysis. LEI determined that bacteria counts (not just presence/absence) would be analyzed with each sample moving forward to quantify bacterial reductions.

LEI observed changes in other field parameters (pH, conductivity, ORP) which were not included in analysis because fluctuations were due to the significant amount of time it took to filter each sample volume.

No change in visual observations occurred until process water was pumped through the RO system. Furthermore, these samples were extremely difficult to efficiently filter. This indicated that a range of particulate sizes were present in the water (greater than 20 micron and less than 0.45 micron). LEI determined that filtration alone would not be adequate to efficiently and cost effectively treat this type of wastewater.

**Disinfection Testing**

The following samples were collected for disinfection testing:

- Peach flume
- Initial apple dump tank
- Further processed apple line

The following table (Table 8) summarizes each of the tests that were completed and number of in house bacteria plates that were analyzed.

**Table 8: Summary of Disinfection Tests**

Wastewater Sample I.D.	Treatment	Number of test plates
<i>Disinfection 1, September 28, 2016</i>		
Raw apple	None	3

Raw peach	None	3
Raw peach UV	Ultraviolet (UV)	3
Raw peach Cl	Chlorine (CL)	3
Filtered peach	Filtration	3
Filtered peach UV	Filtration then UV	3
Filtered peach Cl	Filtration then CL	3
Control	No samples used	2
<i>Disinfection 2, October 18, 2016</i>		
Raw apple (A-R)	None	3
A-R-CL	Chlorine (CL)	3
A-R-UV	Ultraviolet (UV)	3
Filtered Apple (A-F)	Filtration	3
A-F-CL	Filtration then Chlorine	3
A-F-UV	Filtration then UV	3
Control (C)	No samples used	2

The peach wastewater sample was treated using ultraviolet (UV) disinfection or chlorine addition. The apple wastewater was collected to determine raw sample qualities only. To further aid the UV and chlorine treatment, one set of tests of the peach wastewater sample was pretreated through a series of filters to reduce their turbidity below 5.0 NTU. Only cartridge filters were used to allow for more head from pumping and therefore more efficient filtration. Nonetheless, the flow rate through these filters would decrease dramatically as more wastewater was fed through them. This was mainly due to the high amount of particulate present in these samples that would gradually plug the membrane surface of the filters. The second apple sample filtered the most efficiently and none of the filters had to be replaced throughout filtration.

The turbidity of the peach and apple wastewater throughout filtration is shown in the following table below.

**Table 9: Turbidity for Peach and Apple Wastewater after Filtration**

Filter Size ( $\mu\text{m}$ )	Turbidity (NTU)	
	Peach	Apple
None (Raw)	183	120
5.00	80.8	9.3
1.00	12.2	3.1
0.45	1.6	0.4

Raw and filtered wastewater samples were tested in order to determine the difference in colony forming units (CFU) concentration before and after filtration.

The samples that were UV treated were pumped through sterilized tubing into an OPP625 UV Sterilization Filter at a flow rate of about 0.07 GPM. This UV model has a rated output of 17.7  $\mu\text{W}/\text{cm}^2$ .

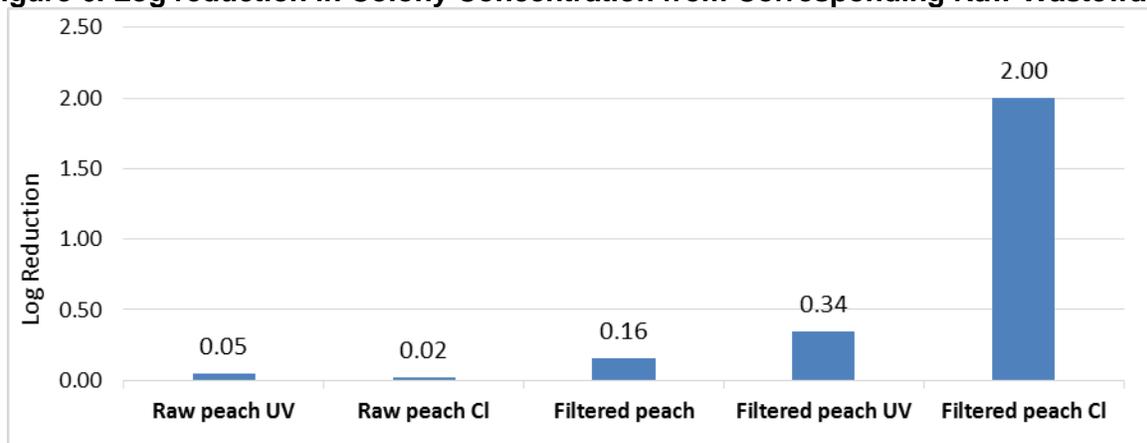
The chlorine treatment applied to the wastewater samples was done utilizing Meijer Low Splash Bleach, which has a sodium hypochlorite weight percent between one and five. The bleach was added to the wastewater to yield a hypochlorite concentration of 10 ppm. This was done by

adding two drops of bleach to 100 mL of wastewater. The bleach was given a contact time of 30 minutes and then 0.5 mL of a sample was placed onto the nutrient agar of a prepared plate. To determine the concentration of colony forming units (CFU) in the wastewater, a heterotrophic plate count was conducted by placing a sample onto a nutrient agar growth media and incubated for 24 hours at 35 °C. The samples were periodically checked on to record quantity and quality of new colonies.

Additionally, six of the wastewater samples above were sent to Trace Analytical Laboratories for a HACH m-ColiBlue24 analysis. This test is virtually the same to what was conducted at LEI, as the results are given in concentrations of total coliform after incubating over 24 hours at 35 °C. The final results of the numerous analyses performed are shown below.

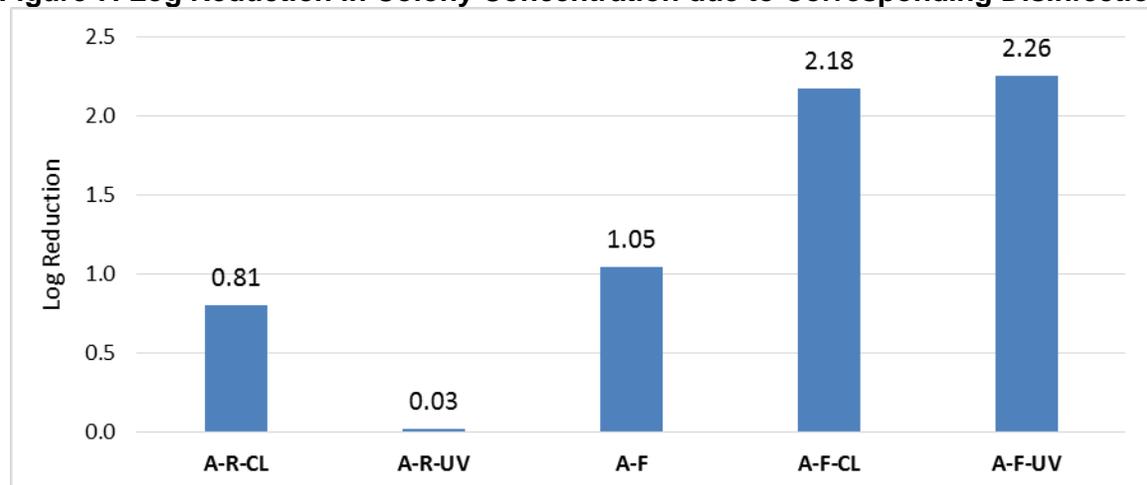
The log reduction on colony concentrations from disinfection of the peach wastewater sample is shown in Figure 6, below.

**Figure 6. Log reduction in Colony Concentration from Corresponding Raw Wastewater**



The log reduction on colony concentrations from disinfection of the second apple wastewater sample is shown in Figure 7 below. The data includes in house results and results from samples analyzed at New Age/Landmark laboratory.

**Figure 7. Log Reduction in Colony Concentration due to Corresponding Disinfection**



Chlorine treatment on the filtered samples showed the most consistent results. UV treatment did not appear effective on the peach sample. A new UV bulb was installed for the second session of testing conducted on the raw apple wastewater. The results from the heterotrophic plate counts show that UV disinfection was the most effective for the filtered apple wastewater which is likely due to the new bulb and low amount of particulate from the sample source.

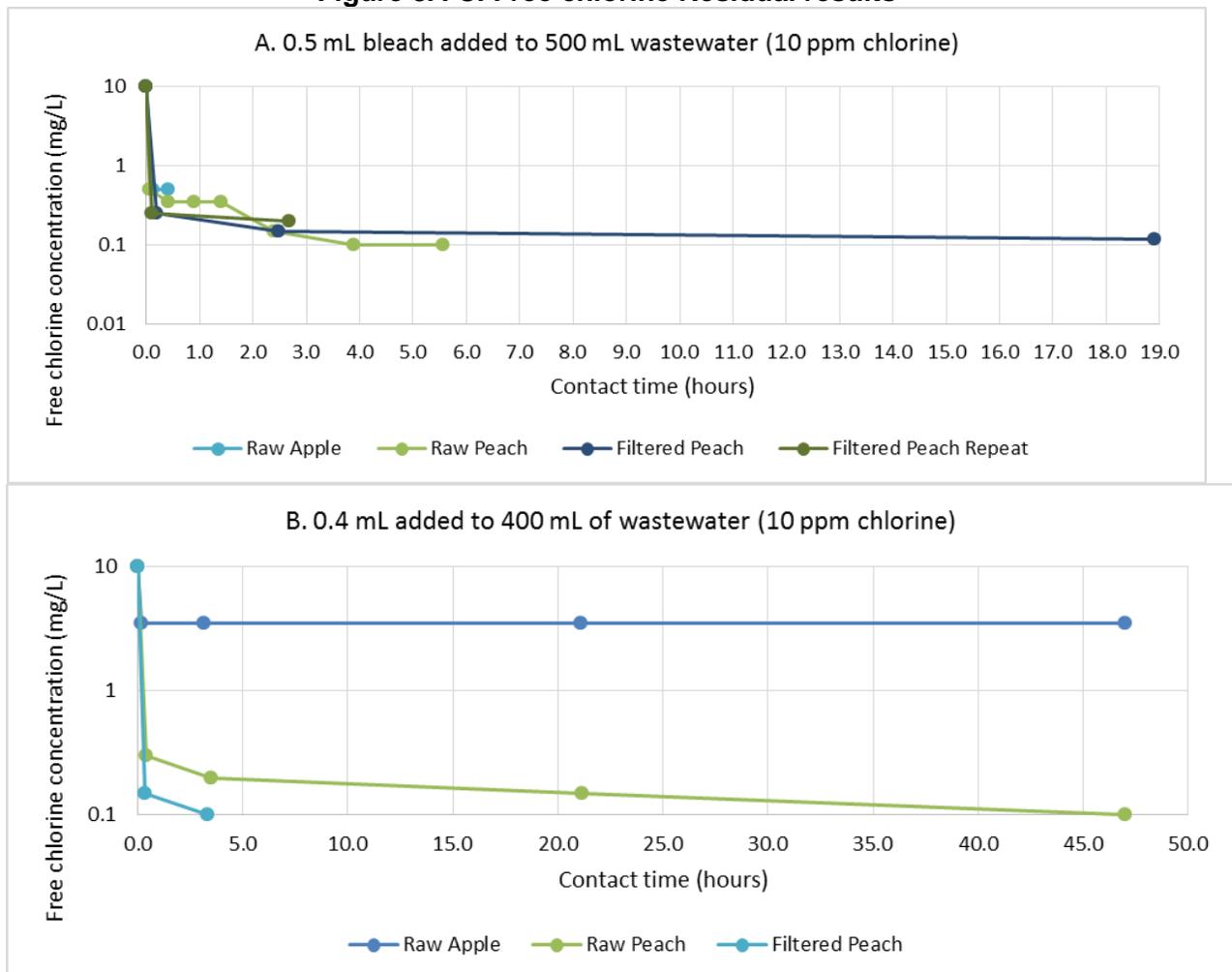
From the limited data collected, LEI concludes that while some filtration is still required, disinfection was the more efficient and reliable way to treat bacterial concerns. Chlorine disinfection appeared to be the best option and additional chlorine residual testing was completed (below). UV disinfection will be analyzed further in the continuation of this study under a separate grant project (due 2017) to determine what processes and/or products it would be better suited for.

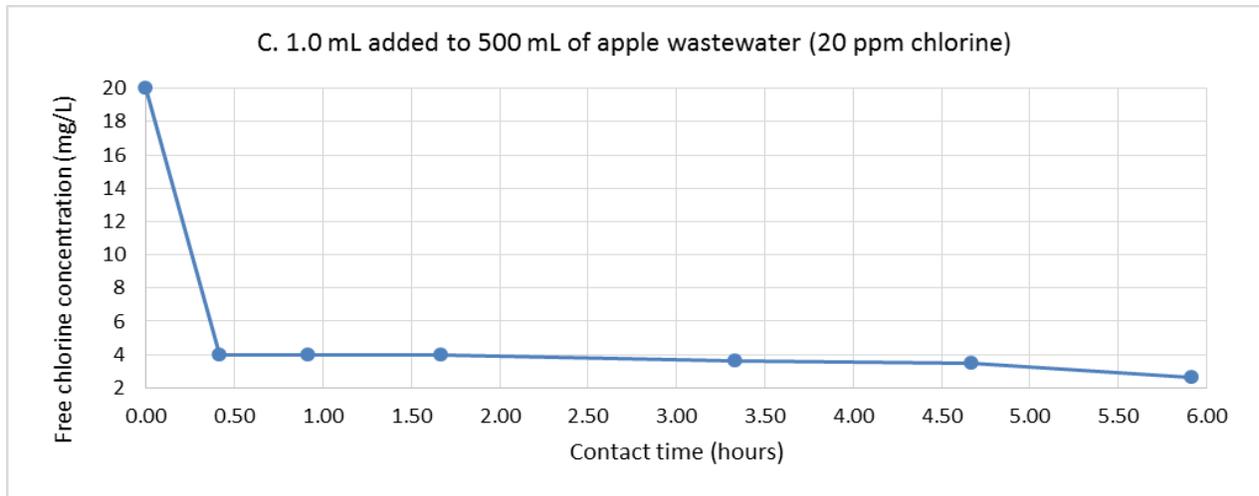
### Disinfection - Residual

A separate chlorine residual test was completed to determine the amount of chlorine dosing necessary and how long it would be expected to remain in a given sample. Meijer Low-Splash Bleach was added to wastewater samples to yield a chlorine residual. This brand of bleach contained a sodium hypochlorite concentration of at least 1%. The chlorine residual of the samples were then tested periodically to determine if any free chlorine remained. This was done through the use of a HACH Free Chlorine Test Kit, which uses DPD Free Chlorine Reagents and a viewing tubes to determine free chlorine concentrations between zero and 3.5 mg/L.

The wastewater samples used for the chlorine residual testing were the raw apple (initial and further processed), raw peach, and filtered peach. The results of the testing are shown below.

**Figure 8A-C. Free chlorine Residual results**

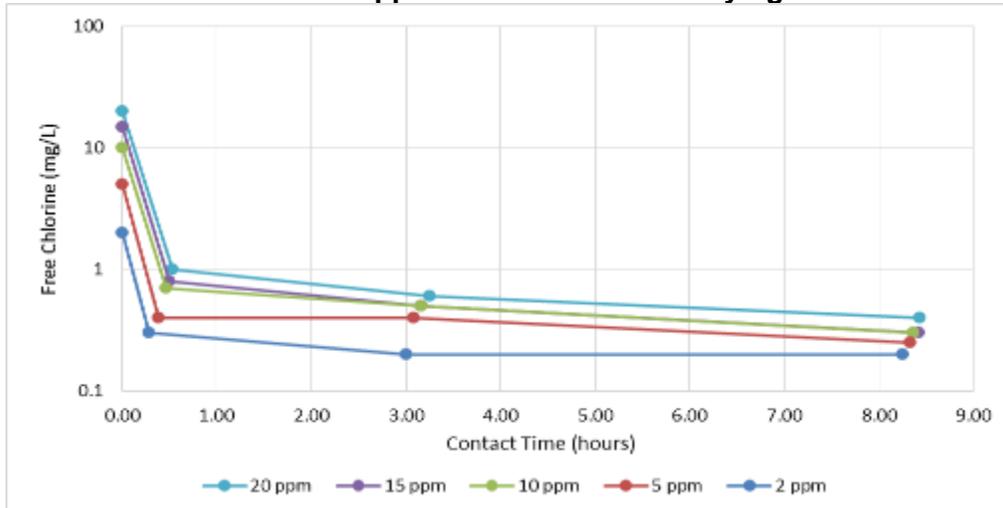




Generally the higher initial concentration of free chlorine in the solution, the longer the residual would last. The raw apple wastewater held higher chlorine residual for the longest contact time. This was attributed to the low turbidity present in the sample prior to testing. The filtered samples also maintained a chlorine residual longer likely due to the reduction of organic matter from filtration.

The second chlorine residual testing was performed on the second apple wastewater sample taken farther downstream the process line. Specifically for this testing, different beginning chlorine concentrations were used and monitored over time to determine how they varied. This is shown in the following figure.

**Figure 9. Residual Chlorine of Apple Wastewater with varying Initial Concentrations**



Regardless of the beginning concentrations of the wastewater, all tests ended with a free chlorine residual greater than 0.1 mg/L. This residual lasted for at least eight hours through all tests. Considering that a typical disinfection treatment system aims to maintain a chlorine distribution in water throughout the distribution system of at least 0.5 mg/L for 30 minutes of contact time, this treatment method is feasible for removing microbes and maintaining water a quality that is reusable.

#### **Water Reduction Summary Sheets**

Attached to this report are three checklists/worksheets for water reduction strategies that were tested, observed, and researched as a part of this study.

- Tier I checklist contains strategies that a facility can input at little to no capital cost.

- Tier II checklist contains strategies that a facility can input that have some initial capital cost but are used at many water conscious facilities.
- Tier III worksheet contains a summary of Treatment Technology options and how well they address the critical components from Table 7.

#### GOALS AND OUTCOMES ACHIEVED

As described in the sections above, LEI was able to readily quantify numerous water reduction opportunities which are summarized and totaled in the table below. These equate to a 5% overall water use reduction. These quantified reductions get PFI to half of the 10% goal initially outlined. However, many of the reductions described are very easy to implement and can be extrapolated for use at every line and plant at PFI.

**Table 10: Summary of Readily Achievable Reduction Opportunities**

	Daily Average (gallons)	Annual Water Discharge (gallons)	Reduced Water Consumption	Strategy, % Reduced
<b>Annual Wastewater Discharge (2015)</b>	--	<b>431,876,000</b>	--	--
Main Plant Overflows (quantified - cherry)	58,272	2,330,880	1,864,704	Resize, redirect, 80%
Sieve Overflow (quantified – cherry)	15,648	625,920	312,960	Resize, 50%
Main and Fresh Plant (est. valves, assume 18)	19,347	4,836,816	2,902,090	Increase attentiveness, 60%
Blancher Discharge	18,912	1,512,960	1,512,960	different source
Cooling Tower (1)	203	49,329	44,396	90% Other Water Source
Cooling Towers (all)	2,436	591,948	532,753	90% Other Water Source
Boilers (all)	812	197,316	177,584	90% Other Water Source
CA Rooms	35,000	9,240,000	9,240,000	Switch type (hot gas)
Fresh Plant Hose		--	2,266,650	Reduce at Fresh Plant
Sanitation - dump tanks		--	1,965,744	At Fresh and Main Plant (apple line)
<b>Total</b>	--	--	<b>20,815,841</b>	--

LEI believes that each of the three facilities has the ability to further meet the goals previously described using employee engagement and consistency. If each facility was able to meet the water use ratio goals, the facility would achieve a total water savings of 31,333,413 gallons per year (based on 2015 production data, 2015 meter data, and approximately 39% of overall use from Main Plant).

**Table 11: Summary of Water Use Goals and Potential Reduction**

Plant ID	Goal Water Use Ratio	Goal Water Use, based on 2015 production	Actual Water Use, 2015	Water Reduction Potential
		<b>Gallons</b>		
Main Plant	2.0 gal/pound	150,868,650	165,963,330	15,094,680
Fresh Plant	2.0 gal/pound	72,132,045	87,472,792	15,340,747
Juice Plant	1.0 gal/pound	62,874,403	63,772,389	897,986

#### BENEFICIARIES

The entire food processing sector is able to benefit from the findings of this study. Water use restrictions are becoming increasingly prevalent in the coming years and food processors need to be ahead of the trend with regards to water reduction. Michigan is set apart from other states due to our abundance of fresh water. Nonetheless, future regulations will soon restrict the amount of water used and discharged at facilities, such as PFI. Working toward overall water minimization will keep food processing facilities in compliance with future regulations. The food processing industry uses a lot of water in sanitation, product transportation, heating, cooling, etc. and measures will need to be instated to reduce water for each of these operations. This study provides an outline of in-depth water tracking and analysis that can be used at any food processing facility. Treatment technology options need to be pilot tested at any individual facility, however the research included in this study provides other food processors a starting point for what may be viable for their facility.

#### LESSONS LEARNED

As discussed in detail in previous reports many issues arose regarding seasonal production and water tracking. An extension was granted for this study to address a few of these issues and allow for a second peak season at the facility to be included with this study.

In the course of this research and analysis at PFI it became increasingly aware to LEI that facility operations are extremely variable based on a number of factors. Many quantifications LEI expected to have or be able to track were not as feasible as initially expected. Water use varies based on temperature, employee awareness, commodities, time of day, and infinite other factors. This made specific tracking of equipment impossible. LEI was able to measure water use from a specific day but any quantification could vary from what was recorded that day. For facilities looking to embark on a water reduction project, it is essential that the facility have adequate metering and baseline data from the start. Baseline data of six months to one year is recommended. A facility cannot reduce what it does not track.

#### CONTACT PERSON

Lakeshore Environmental, Inc.  
 803 VerHoeks Street, Grand Haven, Michigan 49417  
 Ms. Erin R. Gerber: 616-844-5050

#### ADDITIONAL INFORMATION

A continuation grant was approved in October 2015. This grant will use the treatment technology information and conclusions described above to continue testing for redundancy and applicability to other processes and commodities.

## **PROJECT TITLE: MICHIGAN VEGETABLE COUNCIL, INC – Survey to Develop Data on Labor-Shortage Responses by Michigan Vegetable Growers for Use as Planning Tools for Future Industry Competitiveness - FINAL**

### **PARTNER ORGANIZATION**

Michigan Vegetable Council, Inc.

### **PROJECT SUMMARY**

Vegetable growers in Michigan experienced significant shortages of seasonal workers in 2013. Here are some examples:

- About two million pounds or one-tenth of the Michigan asparagus crop had to be mowed off at a loss of \$1.8 million.
- In a survey of vegetable growers in southeast Michigan conducted by the MSU Extension vegetable crops educator for the area, the number of seasonal workers hired in 2013 was only 56% of the number hired in 2012 (324 hired in 2013, compared to 579 in 2012). More than half of the respondents to the survey estimated crop losses of 20% or more due to a lack of labor in 2013.
- A fresh market vegetable grower in southwest Michigan reported a shortage of seasonal workers needed for harvesting of about 25%. He said this was typical for other vegetable growers in the area. He said he normally hired about 160 workers for harvesting, but only had about 120 in 2013. The farm left 30 acres of round tomatoes unharvested and only harvested another 30 acres of Roma tomatoes once. About 25% of the cantaloupes grown on this farm were not harvested. Cucumbers were only harvested 4-6 times, rather than the normal eight pickings.

In response to the labor shortages experienced in 2013, the Michigan Vegetable Council commissioned a survey by the National Agricultural Statistics Service (NASS) of the Michigan vegetable industry's labor needs and shortages in 2014. In separate surveys, NASS also assessed the labor situation experienced by fruit and greenhouse/nursery growers. This snapshot of labor needs and availability was intended to be used as a guide for future strategies to sustain and enhance the industry's competitiveness.

The survey substantiated significant labor shortages in all the commodity sectors surveyed.

The estimated loss of sales from worker shortages for the 2014 crop was:

Fruit	\$9,900,000
Vegetable	\$6,600,000
Greenhouse/Nursery	\$3,200,000

### **PROJECT PURPOSE**

The labor-intensive sector of the Michigan vegetable industry is at a crossroads and needs a clear understanding of its current position. A critical mass of harvested production is required to sustain its infrastructure. Costly packing facilities need minimum volumes to be profitable. Reduced supplies and unfilled orders would harm the industry's reputation and could convert Michigan to a last-resort or fill-in region for buyers. The produce trucking sector thrives from concentrated high-volume shipping points and could recast Michigan as an out-of-the-way supplier of fresh produce.

Michigan's labor-intensive vegetable industry finds itself reacting to the previous year's labor needs. A long-term approach is needed to resolve unpredictable labor shortages which can develop just ahead of when labor is needed.

The timeliness of this project cannot be overstated. The labor shortages of 2013 and 2014 continued for the 2015 crop. It is likely that Michigan will again face labor shortages in 2016.

## PROJECT ACTIVITIES

As originally proposed, the Michigan Vegetable Council (MVC) arranged to have the Michigan Field Office of USDA's National Agricultural Statistics Service (NASS) conduct a survey of vegetable growers to assess labor needs and shortages, particularly for seasonal labor. NASS designed and planned a comprehensive labor survey for vegetable growers. This included questionnaire design. MVC staff had an opportunity to review the questionnaire and offered input on some of the information requested in the survey. NASS's activities also included sample design, planning and oversight of data collection, editing and analysis of data, summary of data, and the design and generation of a final report.

The survey was publicized at the Great Lakes Fruit, Vegetable and Farm Market EXPO, which was held on December 9-11, 2014. A letter from the MVC, making growers aware of the survey and encouraging them to complete it, was handed out in each of the vegetable crop sessions and the labor session. A power point slide explaining the survey was also projected before the start of each of these sessions and moderators made an announcement about the survey during the sessions. In addition, the survey was publicized at the MVC booth in the trade show.

The survey was mailed in January 2015 to Michigan vegetable producers growing at least 15 acres of vegetables (based on the 2012 Census of Agriculture). A letter from the MVC encouraging growers to complete the survey was included in the mailing. A total of 580 vegetable growers responded to the survey.

The survey of vegetable growers was completed in conjunction with surveys of fruit producers and greenhouse/nursery growers. These other surveys covered several aspects of the production of these crops, including questions on labor needs and shortages. NASS's final report on specialty crop labor included the survey results of the vegetable, fruit and greenhouse/nursery surveys.

The survey results for vegetables reported a peak of 88 vegetable farms in September 2014 that needed additional workers. As expected, labor shortages caused lost sales. Vegetable growers reported losing sales of \$6.6 million because of worker shortages. These shortages occurred in spite of paying higher wages. The average hourly wage paid by the vegetable farms surveyed increased from \$9.90 in 2013 to \$10.40 in 2014.

During the time the survey was being completed, the MVC was involved in working with state agencies, commodity groups, growers and processors to better understand and address the labor situation. The survey results will be important in continuing this work.

A presentation on the findings of the survey for vegetable, fruit and greenhouse/nursery growers was made at the 2015 Great Lakes Fruit, Vegetable and Farm Market EXPO. The MVC's summary paper on the labor situation was sent to nearly 1,200 members in its Spring 2016 newsletter mailing.

## GOALS AND OUTCOMES ACHIEVED

The snapshot of the labor shortage provided by the survey, which showed worker numbers and dollars lost, put the problem in perspective and painted a picture of the future. Reaction by growers is deliberate and will result in some permanent changes.

The most alarming and permanent change in labor availability is simply an “aging out” of a generation of agricultural workers. Each farm in Michigan has its own set of labor circumstances, but the common thread is the decline in the number of workers available for agricultural work.

The attempt to build the necessary workforce is well under way. Michigan Farm Bureau has created Great Lakes Ag Labor Services, LLC. This new organization was created to work on finding and bringing in H-2A labor. A pilot program was started in 2014 and a scaled-up version of the program, including creating the LLC, commenced in 2015. For 2016, this organization will be working with 20 farms and bringing in about 900 workers. The program is well run and focused on making H-2A usable by growers. Plans are to scale up over time to accommodate as many participants as possible. Independent contractors have also become more active in offering H-2A programs that follow the letter of the law.

In addition, rebuilding a workforce includes active recruitment of domestic workers. The Michigan Work Force Development Agency (MWDA) has responded by attempting to source agricultural labor from the U.S. domestic population. Success with these programs has been mainly with processing and packing facilities.

Agricultural representatives continue to meet with MWDA. These meetings are intended to sort through a long list of issues agriculture faces in hiring labor. The availability of current NASS data is critical to the discussions. Using modern technology to communicate is important in the recruitment of workers. The Michigan Public Service Commission is attempting to improve broadband service in rural areas of Michigan.

The Michigan Vegetable Council continues to include labor on programs held at the annual Great Lakes Fruit, Vegetable and Farm Market EXPO. The MVC developed a labor summary paper that includes NASS data, as well as other pertinent information regarding the Michigan labor situation. Labor issues have been addressed in the MVC’s semi-annual newsletters to members. The MVC’s staff has been involved in many other activities, including meetings with the Michigan Work Force Development Agency, tours and on-site visits to farms.

## **BENEFICIARIES**

Because this project was a collaboration of effort between the fruit, vegetable and greenhouse/nursery sectors of the specialty crop industry, the entire industry is using the same information to help solve the labor crisis. This is appropriate as workers move between the three specialty crop groups. Benefactors of this work are vegetable growers, fruit growers, and greenhouse/nursery growers, as labor is shared across the specialty crop industries. Also benefitting are associations that represent vegetable, fruit and greenhouse/nursery agriculture, as well as the Michigan Workforce Development Agency, Michigan Works, Michigan Department of Agriculture & Rural Development, and Michigan State University Extension.

## **LESSONS LEARNED**

The goal of developing a set of basic facts regarding labor trends in Michigan was achieved. The agricultural industry is dependent on NASS’s statistical generating capabilities in many ways. A common set of facts to work with is important to all parties involved in labor issues.

We underestimated the time required to put together and conduct grower surveys. Part of the extra time required was the result of our collaboration with the other surveys of fruit and greenhouse/nursery growers.

## CONTACT PERSON

Dave Smith, Executive Director Michigan Vegetable Council  
[mivegetablecouncil@charter.net](mailto:mivegetablecouncil@charter.net)

## ADDITIONAL INFORMATION

Dave Smith, MVC Executive Director, spent approximately 20 hours on this project. Ben Kudwa, MVC Director of External Relations, logged approximately 100 hours related to the survey and labor matters during the reporting period. Staff work included:

- Reviewing and providing comments on the survey instrument created by NASS.
- Coordinating labor survey activities with other commodity groups to make the best use of NASS's staff time and resources.
- Working with state agencies, commodity groups, growers and processors to gain a better understanding of the Michigan labor situation.
- Working with the Michigan State University Product Center to inform and educate growers about the labor situation.
- Providing assistance to the Michigan Workforce Development Agency and others attempting to assimilate domestic and international workers as a partial solution to the labor shortages.
- Monitoring the labor situation during the 2015 growing season, including the use of H-2A to bring seasonal labor into the state.

USDA NASS Labor Survey

**United States Department of Agriculture  
National Agricultural Statistics Service  
Great Lakes Region**

**News Release  
Specialty Crop Labor - 2014**

**September 23, 2015**

Specialty crop farms in Michigan hired 44,000 workers in 2014, based on surveys of fruit, vegetable, greenhouse, and nursery operations. These surveys were funded by USDA specialty crop grants administered by the Michigan Department of Agriculture and Resource Development. There were 1,945 fruit, 1,140 nursery/greenhouse, and 580 vegetable operations included. (Vegetable farms with less than 15 acres were excluded.) An operation

could be counted in more than one sector—fruit, vegetable, nursery/greenhouse. Employees, however, were attributed to only one sector. There were 9,150 permanent employees and 31,850 seasonal employees. The actual number of people in the seasonal category would be lower, as seasonal workers can be employed on more than one farm in a year. Migrant employment was 17,400.

### Vegetable Farm Workers By Category 2014

Category	Permanent <i>Number</i>	Seasonal <i>Number</i>
AGRICULTURAL		
Full-time	1,150	3,350
Part-time	200	2,450
NON- AGRICULTURAL	60	210
Full-time	( <sup>1</sup> )	150
Part-time		

CONTRACT	15	180
Full-time	( <sup>1</sup> )	60
Part-time		
TOTAL	1,450	6,400

<sup>1</sup> Withheld to avoid disclosing data for individual operations or due to insufficient data.

**Vegetable Farm Worker Shortage By Category 2014**

Category	Permanent	Seasonal
	<i>Number</i>	<i>Number</i>
AGRICULTURAL		
Full-time	( <sup>1</sup> )	640
Part-time	( <sup>1</sup> )	250
NON-AGRICULTURAL	( <sup>1</sup> )	( <sup>1</sup> )
Full-time	( <sup>1</sup> )	( <sup>1</sup> )
Part-time		
CONTRACT	( <sup>1</sup> )	( <sup>1</sup> )
Full-time	( <sup>1</sup> )	( <sup>1</sup> )

**Fruit Farm Workers By Category 2014**

Category	Permanent	Seasonal
	<i>Number</i>	<i>Number</i>
AGRICULTURAL		
Full-time	1,750	10,300
Part-time	270	5,050
NON-AGRICULTURAL	220	450
Full-time	140	600
Part-time		
CONTRACT	( <sup>1</sup> )	290
Full-time	( <sup>1</sup> )	760
Part-time		
<b>TOTAL</b>	<b>2,450</b>	<b>17,450</b>

<sup>1</sup> Withheld to avoid disclosing data for individual operations or due to insufficient data.

Part-time	20	910
<b>TOTAL</b>		

<sup>1</sup> Withheld to avoid disclosing data for individual operations or due to insufficient data.

**Fruit Farm Worker Shortage By Category 2014**

Category	Permanent	Seasonal
	<i>Number</i>	<i>Number</i>
AGRICULTURAL		
Full-time	50	1,810
Part-time	10	830
NON-AGRICULTURAL	( <sup>1</sup> )	( <sup>1</sup> )
Full-time	( <sup>1</sup> )	( <sup>1</sup> )
Part-time		
CONTRACT	( <sup>1</sup> )	( <sup>1</sup> )
Full-time	( <sup>1</sup> )	90
Part-time		
<b>TOTAL</b>	<b>80</b>	<b>2,770</b>

<sup>1</sup> Withheld to avoid disclosing data for individual operations or due to insufficient data.

**Greenhouse/Nursery Workers By Category 2014**

Category	Permanent <i>Number</i>	Seasonal <i>Number</i>
AGRICULTURAL		
Full-time	3,350	3,900
Part-time	790	2,050
NON-AGRICULTURAL	850	600
Full-time	120	430
Part-time		
CONTRACT	130	290
Full-time	10	730
Part-time		
TOTAL	5,250	8,000

<sup>1</sup> Withheld to avoid disclosing data for individual operations or due to insufficient data.

**Greenhouse/Nursery Worker Shortage By Category 2014**

Category	Permanent <i>Number</i>	Seasonal <i>Number</i>
AGRICULTURAL		
Full-time	190	540
Part-time	( <sup>1</sup> )	230
NON-AGRICULTURAL	( <sup>1</sup> )	( <sup>1</sup> )
Full-time	( <sup>1</sup> )	( <sup>1</sup> )
Part-time		
CONTRACT	( <sup>1</sup> )	( <sup>1</sup> )
Full-time	( <sup>1</sup> )	35
Part-time		
TOTAL	240	850

<sup>1</sup> Withheld to avoid disclosing data for individual operations or due to insufficient data.

**Migrant Workers By Sector 2014**

	Vegetable <i>Number</i>	Fruit <i>Number</i>	Nursery/Greenhouse <i>Number</i>
Farms hiring	200	460	60
Migrant workers	4,000	12,000	1,400
Previously employed	2,550	8,100	1,150
Housing provided	2,800	7,700	500

**Recruiting Sources By Sector 2014 <sup>1</sup>**

Sources	Vegetable <i>Percent</i>	Fruit <i>Percent</i>	Nursery/Greenhouse <i>Percent</i>
Local labor force/want ads	16	17	28
Michigan Works! Ag employment	14	16	11
H-2A temporary Ag worker	3	2	2
Employment agency	2	1	3
Temporary service company	1	1	7
Other	49	61	39

<sup>1</sup> For farms with hired labor.

### Farms With Paid Workers By Sector 2014

Number of Workers	Vegetable	Fruit	Nursery/Greenhouse
	<i>Number</i>	<i>Number</i>	<i>Number</i>
None	145	840	520
1 - 9	260	710	350
10 or more	175	395	270
TOTAL	580	1,945	1,140

### Quantiles and Means of Wages Paid by Farms to Seasonal Workers by Year and Sector

Type of Wages	Vegetable		Fruit		Nursery/Greenhouse	
	2013	2014	2013	2014	2013	2014
	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Minimum-25%	7.75	8.10	8.00	8.40	7.75	8.00
Minimum-50%	8.15	8.50	9.00	9.00	8.00	8.50
Minimum-75%	9.00	9.00	10.00	10.00	9.00	9.50
Minimum-mean	8.50	8.85	9.20	9.60	8.50	9.00
Average-25%	8.50	9.00	9.00	9.50	8.25	8.85
Average-50%	9.50	10.00	10.00	10.00	9.00	9.75
Average-75%	10.50	11.00	12.00	12.00	10.00	10.90
Average-mean	9.90	10.40	10.70	11.10	9.60	10.00

### Estimated Lost Sales From Worker Shortage By Sector 2014

Sector	Dollars
Fruit	9,900,000
Vegetable	6,600,000
Nursery/Greenhouse	3,200,000

### Farms Needing Additional Workers By Month and Sector

Month	Vegetable	Fruit	Nursery/Greenhouse
	<i>Number</i>	<i>Number</i>	<i>Number</i>
January	0	8	2
February	0	11	10
March	0	11	46
April	5	21	105
May	27	34	117
June	30	46	64
July	51	107	43
August	74	125	36
September	88	162	31
October	61	136	22
November	8	27	15
December	0	8	2

## **Definitions of Key Terms:**

**Full-time Worker:** Employees who perform 30 hours or more per week.

**Part-time Worker:** Employees who perform 29 hours or less per week

**Permanent Worker:** Employees who worked 121 days or more in calendar year 2014.

**Seasonal Worker:** Employees who worked 120 days or less in calendar year 2014.

**Migrant Worker:** Employees who travel to work and are unable to return to permanent residence the same day.

**Contract Worker:** Workers whose services are negotiated through a third party and form whom no W-2 (IRS Wage and Tax Statement) is provided by the farm operator. Contract workers are paid by a crew leader, contractor, buyer, processor, cooperative, or other person who has an oral or written agreement with a farmer.

**Agricultural Worker:** Employees engaged in planting, tending and harvesting crops including operation of farm machinery on crop farms. Workers are classified as agricultural or non-agricultural based on the majority of time spent.

**Non-agricultural Worker:** Employees engaged in ancillary tasks such as packing, office, retail, sales, or transportation. Workers are classified as agricultural or non-agricultural based on the majority of time spent.

**Shortage:** The additional workers that would have been hired if available.

## **Vegetable Labor Survey Results and Implications**

### **Description of the Survey**

In recent years, vegetable growers have experienced crop and sales losses as a result of seasonal labor shortages. Growers have also passed on opportunities to expand production because of concerns about labor availability. To get a current snapshot of labor needs and shortages, the Michigan Vegetable Council commissioned a survey of vegetable growers by the National Agricultural Statistics Service (NASS) for the 2014 crop year. Growers of 15 or more acres of vegetable crops were surveyed. A total of 580 vegetable operations completed the survey. In separate surveys, fruit and greenhouse/nursery growers also provided information on their labor needs and availability.

### **Current Situation**

Michigan is ideally suited by climate and soils for growing a broad diversity of vegetables. By its nature, much of this production is labor-intensive. Over the years, the supply of seasonal labor to harvest and pack crops has cyclically fluctuated between adequate and tight. Today's critical shortage is unprecedented and demands action if growers are to stay competitive in growing these crops.

A number of factors have caused today's needs for labor to exceed the supply. Consumer demand for "locally grown" produce, along with freight cost advantages over western states, has strengthened the market for Michigan-grown fruit and vegetables. At the same time, some of the traditional migrant labor population has been "aging out," while some former farm workers have moved on to jobs outside of agriculture. The federal H-2A guest worker program, which was initiated in 1986 to bring in foreign nationals on temporary work visas, is cumbersome, slow-moving and fraught with administrative perils to growers. Until the last few years, H-2A was used by only a few growers in Michigan.

Michigan's Work Force Development Agency has responded to the agricultural labor shortage by attempting to source farm labor from the U.S. domestic population. However, growers have not had much success with the well-intended attempts of this agency to find workers willing to perform traditional agricultural labor.

The labor-intensive sector of the Michigan vegetable industry is at a crossroads and needs a clear understanding of its current position. A critical mass of harvested production is required to sustain its infrastructure. Costly packing facilities need minimum volumes maintain profitability. Reduced supplies and unfilled orders would harm the industry's reputation and could cause Michigan to again become a last-resort or fill-in region for buyers. The produce trucking sector thrives on concentrated high-volume shipping points and could recast Michigan as an out-of-the-way supplier of fresh produce.

#### Results of the Survey

The survey results for vegetables reported a peak of 88 vegetable farms in September 2014 that needed additional workers. As expected, labor shortages caused lost sales. Vegetable growers reported losing sales of \$6.6 million because of worker shortages. Although not measured in the survey, there are numerous accounts of sales lost from crops that were never planted because of concerns about labor availability. The labor shortages occurred in spite of paying higher wages. The average hourly wage paid by the vegetable farms surveyed increased from \$9.90 in 2013 to \$10.40 in 2014.

The vegetable farms surveyed hired 4,000 migrant workers, which accounted for 63% of all seasonal workers. Of this total, 2,550 (64%) had been previously employed by the farm and 2,800 (70%) were provided housing.

Of the vegetable farms surveyed, 17% used want ads and other means to recruit locally and 16% used agricultural employment specialists from state agencies (e.g., Michigan Works!). Only 3% of the farms surveyed used H-2A as a source of workers in 2014.

#### Implications for the Future

- 1) The supply of workers from the traditional migrant labor force will continue to decline in response to the "aging out" of these workers, along with a likely increase of enforcement efforts directed at workers not legally documented.
- 2) In spite of the cost and difficulties associated with the H-2A guest worker program, the use of this program can be expected to increase. Great Lakes Ag Labor Services, LLC was started as a pilot project by Michigan Farm Bureau in 2014, bringing in 90 workers for four fruit farms in Michigan using the H-2A program. Great Lakes provides compliance, application and worker services for growers using the H-2A program. In 2015, Great Lakes expanded to 10 fruit and vegetable farms and 405 workers. In 2016, the program is again being expanded to about 20 farms and 900 workers. In addition, other growers are working with independent contractors to bring in H-2A workers.
- 3) Partly because of increased use of H-2A workers, hourly labor costs will likely continue to increase. The minimum hourly wage for H-2A workers in 2015 was \$11.56.
- 4) Growers will continue to look for ways to increase labor efficiency, both through efforts to retain the best seasonal workers each year and to develop or improve mechanical picking aids.
- 5) Some growers will respond to opportunities to grow vegetable crops that can be mechanically harvested and others will downsize or get out of growing vegetables.

#### Summary Comments

The most alarming and permanent change in labor availability is simply an "aging out" of a generation of agricultural workers. Each farm in Michigan has its own story, but the common thread is that there is a decline in the number of workers available for seasonal agricultural work. Many growers are still relying on historical relationships with a pool of worker families and facilitators that spans several generations of employees.

Improved efforts by growers to recruit and retain labor continue to be the most promising solution to the labor crisis. Growers need to recognize that the "aging out" of agricultural workers, changed family structures, and competition for employees are on-going trends. Solutions range from developing long-term relationships with labor contractors, to providing new

services and benefits to farm workers, to using the H-2A program in some cases for seasonal labor needs.

**PROJECT TITLE: MICHIGAN NURSERY & FLORICULTURE PRODUCT MIX, SALES, ENERGY, AND LABOR SURVEY – Michigan Nursery & Floriculture Product Mix, Sales, Energy, and Labor Survey - FINAL**

**PARTNER ORGANIZATION**

USDA

**PROJECT SUMMARY**

This project was a survey conducted by USDA NASS of nursery and floriculture growers in Michigan to support maintaining and improving the competitiveness of Michigan’s nursery and floriculture industry. It is critical that the industry and other agricultural interest groups have current information to enable them to effectively plan economic development, promotion, and public policy activities. This information is also important to establish the future needs of the industry as it faces the challenge of remaining competitive in the marketplace.

**PROJECT PURPOSE**

There hasn’t been a survey of nursery production since 2004 and floriculture production has never had a State survey completed. With changes in inputs, not having accurate data puts us at a competitive disadvantage when remediating current issues.

**PROJECT ACTIVITIES**

The project partners met to review project plans and responsibilities. The industry partners then met with their respective producers to determine what should be included in the questionnaire, based on information that would be most useful for future growth. In addition, the sample lists of producers were identified, generated, and tested by NASS to qualify.

Based on the information identified, project partner NASS then designed, planned, and conducted a comprehensive survey for nursery and floriculture growers. This included questionnaire design, sample design, planning and oversight of data collection, editing and analysis of data, summary of data, and concluded with the design and generation of a final report.

**GOALS AND OUTCOMES ACHIEVED**

The questionnaire was sent to 1,140 qualifying nursery, floriculture, and greenhouse producers. With an overall response rate of 75%, information was collected and compiled from 696 respondents and other sources including the Census of Horticulture, which ran concurrent with this survey. Our goal for responses was 82.5% of producers.

The survey consisted of three parts—nurseries, floriculture, and greenhouses and contained specific questions for each industry.

For nurseries the questions asked and information collected includes:

- the number of field and container grown operations and total acres,
- number of operations and sales, by sales categories,
- sales of nursery stock and propagative materials,
- number of operations and acres in production of woody plants and herbaceous plants by size group and MDARD region,

- number of operations and area in production of propagative materials,
- number of operations and acres by county and MDARD region.

For floriculture the questions asked and information collected includes:

- number of operations and sales by sales category,
- wholesale sales by market type and sales class,
- top five states by percentage of sales,
- percent of production not sold by sales class,
- number of operations which were asked by customers if plants were treated with neonicotinoids by sales class,
- percent of operations planning to use neonicotinoids in 2015 by sales class,
- type of control utilized for pest/disease management by sales class,
- irrigation water sources by sales class,
- maximum daily water withdrawal/use by sales class
- water draw reduction method, present of operations using them, by sales class
- current or future production problems
- sources of information for business decision making
- communication and research methods
- operations that use MI Floriculture Growers Council as primary legislative contact by sales class
- social media used for business
- year firm was established
- year operator was born
- establishment of business succession plan by sales class
- intentions to expand within the next year by sales class

For greenhouses the questions asked and information collected includes:

- operations and area by size class
- production area by type
- principal type of heater by size class
- average heating costs by fuel type and size class
- lighting used to control plant grower/flowering size by size class
- average electricity expenditures for lighting to control plant growth and flowering by size class
- energy conservation strategies in effect during 2014
- alternative energy sources used
- number of operations and acres by county and MDARD region

The final report provides reliable data to allow for good decision-making by growers, handlers, input suppliers, the industry, governmental agencies, research and extension specialists, and policy makers at the local, regional, and national levels. Collection and distribution of this data may impact how our industry responds to and benefits from the more current and accurate economic production data.

Next steps are to distribute the results through our print and electronic publications and at our annual Expositions.

## **BENEFICIARIES**

The beneficiaries of this project are the 1,140 nursery and floriculture growers in the state of Michigan who will be impacted by having at their disposal this valuable information on the industry.

The final report provides reliable data on a variety of topics and areas (as listed in previous Goals and Outcomes achieved) to allow for good decision-making by growers, handlers, input

suppliers, the industry, governmental agencies, research and extension specialists, and policy makers at the local, regional, and national levels.

#### LESSONS LEARNED

Overall the project went without complication and we were able to obtain good information. One insight we learned is that our industries are asked to complete national surveys on a regular basis. If we were to do this again we would plan it for a year that they weren't already filling out another survey. Also there is a hesitancy now to fill out these surveys for a variety of reasons that include time constraints and fear that competitors will see the information.

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#### ADDITIONAL INFORMATION

The following is the final report with results of the Michigan Nursery & Floriculture Product Mix, Sales, Energy, and Labor Survey.

#### Nurseries: Number of operations and acres, by category, 2014

Category	Field grow		Container		Total	
	Operations	Acres	Operations	Acres	Operations	Acres
Deciduous trees	183	2,025	89	405	243	2,430
Deciduous shrubs	50	130	122	1,140	166	1,270
Narrow-leaved evergreens	213	4,215	74	245	260	4,460
Broad-leaved evergreens	21	80	60	75	75	155
Roses	0	0	66	55	67	55
Fruit trees	12	110	27	85	38	195
Small fruits	10	240	39	45	45	285
All woody plants	293	6,800	177	2,050	403	8,850
Daylillies	50	90	89	20	130	110
Hosta	36	50	143	50	171	100
Ornamental grasses	29	37	103	28	127	65
Other herbaceous perennials	58	570	200	185	242	755
Vines and ground covers	14	10	59	130	69	140
Bulbs, corms and rhizomes	23	460	26	15	47	475
Water garden (aquatic)	5	3	13	2	16	5
	124	1,220	252	430	341	1,650

#### Nurseries: Number of operations and sales, by sales category, 2014

Sales category	Operations	Perce	Dollars	Perce
\$1,000 or less	87	13.8	50,00	0.0
\$1,001 to \$10,000	200	31.7	0	0.4
\$10,001 to \$100,000	190	30.2	950,00	3.5
\$100,001 to \$250,000	51	8.1	0	3.7
\$250,001 to \$1,000,000	71	11.3	8,000,00	14.5
\$1,000,001 or more	31	4.9	0	77.9
			8,500,00	
Michigan	1 630		0	
			33,500,00	
			0	
			180,000,00	
			0	
			231,000,00	
			0	

<sup>1</sup> Includes 18 operations which produced only propagative materials.

**Nurseries: Sales of nursery stock and propagative materials, 2014**

Category	Sales 1,000 dollars
Woody Plants	
Wholesale	88,10
Retail	14,80
Through own landscaping	3,40
Herbaceous Plants	
Wholesale	82,30
Retail	12,30
Through own landscaping	800
Propagative Materials	
Wholesale	29,200
Retail	100
Michigan <sup>1</sup>	261,000

<sup>1</sup> Wholesales: Michigan - 45%, to other states - 54%, to other countries - 1%.

**Nurseries: Number of operations and acres in production of woody plants, by size group, 1999-2014**

Size	Operation			Acre		
	1999	2004	2014	1999	2004	2014
1 acre or less	185	223	116	90	100	50
1.1 to 5 acres	272	308	110	830	940	340
5.1 to 10 acres	129	120	48	1,00	920	380
10.1 to 25 acres	119	144	68	0	2,390	1,180
25.1 to 50 acres	65	64	33	2,05	2,300	1,250
50 acres or more	57	52	28	0	10,980	5,650
Michigan	827	911	403	2,23 0 16,35 0	17,630	8,850

**Nurseries: Number of operations and acres in production of woody plants, by Michigan Department of Agriculture and Rural Development Region, 2014**

MDARD regio	Field		Container grown		Total	
	Operations	Acre	Operations	Acre	Operations	Acres
1	105	2,555	51	45	136	2,600
2	88	2,540	67	1,910	134	4,450
3	100	1,705	59	95	133	1,800
Michigan	293	6,800	177	2,050	403	8,850

**Nurseries: Number of operations and acres in production of herbaceous plants, by size group, 1999-2014**

Size group	Operation			Acre		
	1999	2004	2014	1999	2004	2014
0.5 acre or less	274	314	200	75	65	40
0.6 to 1 acre	88	86	63	75	70	55
1.1 to 5 acres	113	109	59	250	235	145
5.1 acres or more	32	40	19	1,550	2,600	1,410
Michigan	507	549	341	1,950	2,970	1,650

**Nurseries: Number of operations and acres in production of herbaceous plants, by Michigan Department of Agriculture and Rural Development region, 2014**

MDARD regio	Field		Container grown		Total	
	Operations	Acre	Operations	Acre	Operations	Acres
1	43	50	69	120	105	170
2	43	1,130	102	270	128	1,400
3	38	40	81	40	108	80
Michigan	124	1,220	252	430	341	1,650

**Nurseries: Number of operations and area in production of propagative materials, 2014**

Category	Operation	1,000 sq
Woody plants	82	7,970
Herbaceous plants	84	1,750
	112	9,720
Michigan		

**Nurseries: Number of operations and acres, by county and Michigan Department of Agriculture and Rural Development region, 2014**

County and MDARD region	Operations	Acres
Alcona	1	
Alger	4	65
Alpena	1	5
Antrim	9	
Arenac	1	100
Baraga	1	160
Bay	7	185
Benzie	3	25
Charlevoix	3	
Cheboygan	1	195
Chippewa	2	
Clare	1	75
Delta	1	
Emmet	12	10
Genesee	15	1,950
Gladwin	2	2,770
Grand Traverse	7	
Houghton	1	
Huron	5	
Iosco	2	
Isabella	5	
Kalkaska	2	
Lapeer	14	
Leelanau	12	
Luce	1	
Mackinac	1	
Manistee	7	
Marquette	2	
Mason	6	
Mecosta	1	
Midland	5	
Missaukee	4	
Montcalm	9	
Muskegon	9	
Newaygo	6	
Oceana	2	
Ogemaw	2	
Osceola	2	
Otsego	2	
Saginaw	17	
Sanilac	6	
Schoolcraft	1	
Tuscola	3	
Wexford	4	
Others <sup>1</sup>		
<b>Region 1</b>	<b>202</b>	

**Nurseries: Number of operations and acres, by county and Michigan Department of Agriculture and Rural Development region, 2014**

County and MDA region	Operations	Acres
Allegan	28	1,100
Barry	2	
Berrien	31	460
Branch	5	5
Calhoun	9	85
Cass	7	15
Ionia	5	
Kalamazoo	21	115
Kent	26	170
Ottawa	68	2,890
St. Joseph	6	
Van Buren	20	330
Others <sup>1</sup>		680
<b>Region 2</b>	228	5,850
Clinton	13	85
Eaton	10	80
Gratiot	3	
Hillsdale	5	155
Ingham	16	110
Jackson	10	220
Lenawee	12	
Livingston	17	170
Macomb	12	
Monroe	22	280
Oakland	26	
St. Clair	8	780
Shiawassee	6	1,880
Washtenaw	23	
Wayne	17	10,500
Others <sup>1</sup>		
<b>Region 3</b>	200	
<b>Michigan</b>	<sup>2</sup> 630	

<sup>1</sup> Not published separately to avoid disclosure of individual operations.

<sup>2</sup> Includes 16 operations which produced only propagative materials.

**Floriculture**

**Floriculture: Number of operations and sales, by sales category, 2014**

Sales Class	Operations	Total Sales	Wholesale Sales	Retail Sales
	<i>Number</i>	<i>1,000 dollars</i>	<i>1,000 dollars</i>	<i>1,000 dollars</i>
\$1 - \$9,999	159	500	100	400
\$10,000 - \$99,999	210	9,300	1,700	7,600
\$100,00 - \$499,999	145	34,600	16,800	17,800
\$500,000+	137	428,000	370,700	57,300
<b>Michigan</b>	651	472,400	389,300	83,100

**Floriculture: Wholesale sales, by market type and sales class, 2014**

Market type	Sales				
	\$1-\$9,999	\$10,000-\$99,999	\$100,000-\$499,999	\$500,000+	Michigan
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Mass merchandisers	3	2	12	28	27
Home centers	11	10	9	21	21
Single location gardens or retail florists	56	46	38	10	11
Multiple location garden stores (chains)	0	3	11	5	5
Landscape firms (in-house or external)	7	13	11	4	4
Re-wholesalers (brokers, other growers, etc.)	23	26	19	32	32

**Floriculture: Top five destination states by percent of sales, 2014**

State	Percent
Michigan	55
Illinois	20
Indiana	6
Wisconsin	5
Ohio	4
Others	10

**Floriculture: Percent of production not sold by sales class, 2014**

Class	Percent
\$1 - \$9,999	12
\$10,000 - \$99,999	6
\$100,000 - \$499,999	6
\$500,000 +	8
Michigan	7

**Floriculture: Percent of operations  
which were asked by customers if  
plants were treated with  
neonicotinoids, by sales class,  
2014**

Class	Percent
\$1 - \$9,999	8
\$10,000 - \$99,999	9
\$100,000 - \$499,999	19
\$500,000 +	33
Michigan	16

**Floriculture: Percent of operations  
planning to use neonicotinoids in  
2015, by sales class**

Class	Percent
\$1 - \$9,999	3
\$10,000 - \$99,999	11
\$100,000 - \$499,999	31
\$500,000 +	49
Michigan	20

**Floriculture: Pest/disease management - percent of production  
by type and sales class, 2014**

Type of control	Sales class				Michigan
	\$1-\$9,999	\$10,000-\$99,999	\$100,000-\$499,000	\$500,000 +	
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Biological only	12	11	10	13	13
Chemical only	19	50	58	50	51
Biological & chemical	24	23	20	34	33
None	45	16	12	3	3

**Floriculture: Irrigation water sources, by sales class, 2014**

Source	Sales class				Michigan
	\$1-\$9,999	\$10,000-\$99,999	\$100,000-\$499,999	\$500,000+	
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Natural surface	9	10	12	3	4
City (potable)	12	25	19	34	33
Captured/reclaimed	5	1	4	11	10
Well	74	64	65	52	53

**Floriculture: Maximum  
daily water  
withdrawal/use by sales class, 2014**

Class	Gallons
	<i>Average</i>
\$1-9,999	750
\$10,000-99,999	2,550
\$100,000-499,999	4,900
\$500,000+	24,800
Michigan	7,300

**Floriculture: Water draw reduction methods, percent of operations using, by sales class, 2014**

Method	Sales				Michigan
	\$1-\$9,999	\$10,000-\$99,999	\$100,000-\$499,999	\$500,000+	
Capture & use rain water	37	26	21	12	25
Reuse/recycle water	10	8	10	15	10
Smart irrigation <sup>1</sup>	42	44	52	73	10
Minimal leaching	42	59	68	76	51
Other	12	9	10	5	60
					9

<sup>1</sup> Technology or practices that keep water from falling in non-crop areas.

**Floriculture: Current or future production problems**

Proble	First choice	Second	Third choice	Fourth	Fifth choice
Availability of financing	4	3	3	5	4
Competition	16	10	12	10	9
Energy availability/costs	13	11	11	12	9
Excessive debt	1	3	4	2	9
Government regulations	11	9	6	8	3
Labor availability	15	8	7	11	9
Labor costs	8	18	14	9	7
Loss of chemical registration	8	18	3	4	7
Market demand	1	1	11	11	4
Marketing	9	12	7	8	13
Non-native pest information	2	5	2	4	6
	1	2	16	12	5
	16	16	3	3	17

**Floriculture: Sources of information for business decision making, 2014**

Sourc	First choice	Second choice	Third choice	Fourth choice
Other growers	41	17	19	14
Michigan State University Extension	26	18	20	17
Commercial service	9	22	20	18
tech. reps	8	22	17	13
Greenhouse association	3	7	11	18
Private consultant	4	7	4	9
Other college/university	1	2	4	8
Other	8	5	5	3

**Floriculture: Business communication  
and research methods, 2014**

Medium	Percent
Face-to-face contact	79
Internet	62
Magazines/journals	65
Podcast	4
Seminars/trade shows	43
Social media	10
Telephone/fax	32
Webinars	9
Other	2

**Floriculture: Operations using Michigan  
Floriculture Growers Council as primary  
legislative contact, by sales class, 2014**

Class	Percent
\$1 - \$9,999	10
\$10,000 - \$99,999	25
\$100,000 - \$499,999	45
\$500,000+	64
Michigan	34

**Floriculture: To represent  
business social media  
used, 2014**

Medium	Percent
Blog	4
Facebook	46
LinkedIn	5
Pinterest	7
QR Codes	3
Twitter	5
Website	46
Other	4
None	34

**Floriculture: Year firm established, 2014**

Year	Perce
1975 or earlier	26
1976 - 1990	28
1991 - 2000	21
2001 or later	25

**Floriculture: Year operator born, 2014**

Year born	Percent
1945 or earlier	17
1946 - 1955	31
1956 - 1965	32
1966 or later	20

**Floriculture: Establishment of business succession plan, by sales class, 2014**

Class	Percent
\$1 - \$9,999	20
\$10,000 - \$99,999	26
\$100,000 -	38
\$500,000+	52
Michigan	33

**Floriculture: Intentions to expand within the next year, by sales class, 2014**

Class	Percent
\$1 - \$9,999	21
\$10,000 - \$99,999	8
\$100,000 - \$500,000	14
\$500,000+	20
Michigan	15

**Greenhouses**

**Greenhouses: Operations and area by size class, 2014**

Size class	Operations	Area
	<i>Number</i>	<i>1,000 sq. feet</i>
Less than 4,000 sq. feet	172	295
4,000 - 24,999 sq. feet	254	2,920
25,000 - 99,999 sq. feet	162	8,920
100,000 or more sq. ft	117	38,265
Michigan	705	50,400

**Greenhouses: Greenhouse production area by type**

Type	Operations	Area
	<i>Number</i>	<i>1,000 sq. feet</i>
Glass	74	4,000
Rigid plastic	131	3,470
Double layer poly	551	41,165
Single layer poly	152	5
Other	5	1,680
Michigan	705	85
		50,400

**Greenhouses: Principal type of heater by size class, 2014**

Type	Size				Michigan
	LT 4,000 SF	4,000 - 24,999 SF	25,000 - 99,999 SF	100,000+ SF	
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Vented unit heater	46	73	85	84	71
Direct fire unit heater	12	4	5	4	6
Condensing boiler	4	6	2	6	5
Non-condensing boiler	2	4	5	6	4
Biomass burner/wood stove	12	6	1	0	5
None	24	7	2	0	9

**Greenhouses: Average heating costs by fuel type and size class, 2014 <sup>1</sup>**

Type	Size				
	LT 4,000 SF	4,000	25,000	100,000+ SF	Michigan
	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Natural gas	1,200	3,150	24,900	177,000	36,500
Fuel oil-heating oil, kerosene	180	570	270	100	350
Propane	850	1,900	2,350	6,20	2,45
Electricity	30	70	410	0	0
Biomass & wood logs	40	110	70	6,80	1,25
				0	0
Total	2,300	5,800	28,000	2,20	450
				192,300	41,000

<sup>1</sup> Mean of total greenhouses.

**Greenhouses: Lighting used to control plant growth/flowering by size class, 2014**

Type	Size				
	LT 4,000 SF	4,000-24,999	25,000-99,999	100,000+ SF	Michigan
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Fluorescent	14	18	22	37	21
Incandescent	6	12	15	47	17
MH (metal halide)	1	1	6	14	4
HPS (high pressure sodium)	0	3	28	72	19
LED (light emitting diodes)	0	3	1	8	3
Other	1	1	1	4	1
None	81	72	66	23	65

**Greenhouses: Average electricity expenditures for lighting to control plant growth and flowering, by size class, 2014 <sup>1</sup>**

Size class	Dollars
Less than 4,000 sq. feet	180
4,000-24,999 sq. feet	460
25,000-99,999 sq. feet	3,360
100,000 or more sq. feet	32,650
Michigan	6,400

<sup>1</sup> Mean of total greenhouses.

**Greenhouses: Energy conservation strategies in effect during 2014, by size class**

Strategy	Size				
	LT 4,000	4,000 -	25,000 -	100,000+	Michigan
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Used photoperiodic lighting for long day plants	2	5	22	61	17
Used high intensity lighting for young plants	2	4	22	56	16
Purchased more efficient growing lights	2	4	8	31	9
Purchased more efficient heaters/heating system	6	21	32	52	25
Managed temperatures based on crop & finish date	20	42	62	83	48
Used temperature integration	7	9	18	34	15
Reduced air leaks	35	60	73	76	60
Transplanted larger plugs & liners	11	26	31	54	28
Installed and/or used retractable curtains	6	9	18	42	16
Installed and/or used horizontal air flow fans	21	34	49	70	40
Installed/used infrared anti-condensate poly film	8	18	34	63	27
Insulated side, knee, and/or end walls	15	22	28	46	24
Other	5	3	0	6	5
None	42	22	9	3	21

**Greenhouses:  
Alternative energy sources used, 2014**

Source	Percent
Solar	4
Biomass	10
Wind or	1
None	86

**Greenhouses: Number of operations and area,  
by county and Michigan Department of  
Agriculture and Rural Development region, 2014**

County and MDARD Region	Operations	Area
	<i>Number</i>	<i>1,000 sq. ft.</i>
Alcona	2	
Alger	5	30
Alpena	2	
Antrim	6	87
Arenac	2	
Baraga	1	
Bay	9	
Benzie	2	
Charlevoix	5	38
Cheboygan	4	
Chippewa	1	
Clare	1	
Delta	4	
Dickinson	2	
Emmet	8	46
Genesee	20	
Gladwin	3	11
Gogebic	1	
Grand Traverse	5	
Houghton	4	
Huron	2	
Iosco	1	
Isabella	1	
Kalkaska	1	
Lake	2	
Lapeer	11	218
Leelanau	9	
Luce	2	
Manistee	3	
Marquette	2	
Mason	1	
Mecosta	5	18
Menominee	3	
Midland	4	
Missaukee	4	
Montcalm	10	46
Muskegon	15	867
Newaygo	4	36
Oceana	2	
Ogemaw	1	
Osceola	3	
Otsego	1	
Presque Isle	2	
Saginaw	8	361
Sanilac	6	65
Tuscola	4	21
Wexford	4	11
Others <sup>1</sup>		2,890
<b>Region 1</b>	198	4,745

**Greenhouses: Number of operations and area,  
by county and Michigan Department of  
Agriculture and Rural Development region, 2014**

County and MDARD Region	Operations	Area
	<i>Number</i>	<i>1,000 sq. ft.</i>
Allegan	19	1,235
Barry	6	264
Berrien	27	1,735
Branch	5	46
Calhoun	7	
Cass	6	
Ionia	3	
Kalamazoo	50	12,550
Kent	34	3,780
Ottawa	97	11,700
St. Joseph	4	42
Van Buren	18	818
Others <sup>1</sup>		1,260
<b>Region 2</b>	276	33,430
Clinton	8	
Eaton	3	
Gratiot	2	
Hillsdale	7	
Ingham	12	530
Jackson	13	206
Lenawee	11	257
Livingston	13	215
Macomb	30	2,265
Monroe	31	2,655
Oakland	25	785
St. Clair	12	
Shiawassee	4	47
Washtenaw	27	1,035
Wayne	33	3,040
Others <sup>1</sup>		1,190
<b>Region 3</b>	231	12,225
<b>Michigan</b>	705	50,400

<sup>1</sup> Not published separately to avoid disclosure of individual operations.

## **PROJECT TITLE: MICHIGAN FARM BUREAU – 2015 Fruit Inventory Survey - FINAL**

### **PARTNER ORGANIZATION**

Michigan Farm Bureau; USDA National Agricultural Statistics Service (NASS)

### **PROJECT SUMMARY**

Michigan Farm Bureau, in Collaboration with USDA/NASS Great Lakes Field Office, performed the 2014-2015 Fruit Acreage Inventory Survey. This project was funded to attain acreage of specialty crop varieties in existence, new plantings, tear-outs, etc. A part of this project also included the Labor Survey, which developed the number workers in Michigan on farms, by commodity. After an in depth process, we were able to publish the stats that were collected and aggregated, to reflect the appropriate acreage of specialty crop commodities in Michigan. This type of information is undoubtedly critical for farmers and producers, in making decisions on plantings, marketing, and regular on farm decisions.

### **PROJECT PURPOSE**

The purpose of this project was to update numbers of acres of specialty crops in Michigan. This type of information has not been updated since 2011, leaving many growers and producers to make tough decisions on what variety of tree/bush/ plant to purchase, based on outdated information. This type of project used to be a regular occurrence for USDA to take on, but due to budget cuts, there was a four year gap from the last one, and this one. Michigan Farm Bureau was able to successfully attain a grant to fund the work through USDA-NASS, to make to transform this project from a dream to a reality. This project builds on the 2011-2012 project, which was essentially after the same data; so USDA-NASS, along with the surveyed grower body, knew what to expect. This paid dividends, with over 70% participation among all specialty crops as an average.

### **PROJECT ACTIVITIES**

The USDA-NASS- GREAT LAKES FIELD OFFICE carried out duties related to commodities based on their percentage of participation. As of October 1, 2015, NASS had only been able to successfully carry out the Labor portion of the survey project. At that time, I met with Marty Saffell, the statistician specialist assigned to our project, and laid out a timeline, and each deadline was met successfully. There was a considerable amount of work that was completed between October 2015 and May of 2016. On 10/23/15, the cherry data was published onto the USDA/NASS fruit inventory website. The next commodity to be successfully completed was grapes, which was published on 11/20/15. Blueberry data was published on 12/18/15, followed by nursery/greenhouse/floriculture on 01/15/16. Apple data was next on 02/12/16, which is later than normal. The reason this occurred was solely based on their percentage of participation in the survey. Marty and I thought the fairest way to execute this project was to work on those commodities that had the greatest number of participating growers, relative to number of growers, from most to least. Apple growers settled in at 66% participation. On 03/25/16, the peach data was published, followed by minor tree fruit on 04/22/16, followed by the last group, minor berries, on 05/13/16.

Survey Process: USDA-NASS-GREAT LAKES FIELD OFFICE STAFF sent out surveys to Michigan's 1,945 commercial fruit growing operations. Of those, 1,373 completed the survey. 604 completed them by mail, 483 by phone, and 286 were via personal interview. The folks over at NASS-GLFO did their due diligence in getting as many growers as possible to fill out the survey. Their efforts are commendable.

The survey response rates were as follows:

Apples- 66%; Tart Cherries- 72%; Sweet Cherries- 70%; Peaches- 62%; Blueberries- 72%; Grapes- 75%; Nectarines- 71%; Pears- 66%; Plums- 60%; Brambles- 68%; Strawberries- 56%; Cranberries- 75%; Total: 71%.

These percentages, albeit a bit lower than anticipated, aided in making significant progress towards achieving the expected measurable outcomes that we laid out in our project proposal. The fruit block database was updated, to reflect the new acreage of new plantings. During this process, USDA/NASS also updated the database by deleting varietal acreage that was labeled as “acreage removed” from the landscape. A plethora of computer edits were made during this process, along with creating summaries. Excel spreadsheets were formed and tabulated for .csv files, to be imported into publishing software. This particular type of software warranted us the ability to turn spreadsheets into word documents, which were then uploaded to the website, for grower/producer use. That website is

[www.nass.usda.gov/Statistics\\_by\\_State/Michigan/Publications/Michigan\\_Rotational\\_Surveys](http://www.nass.usda.gov/Statistics_by_State/Michigan/Publications/Michigan_Rotational_Surveys)

#### GOALS AND OUTCOMES ACHIEVED

We were able to publish all 12 specialty crop acreage totals on the website, giving growers of those commodities the opportunity to disseminate the results, and make informed decisions on what varieties are best to plant, given market and varietal trends. We were able to pave the way for folks to understand the struggles that folks are having in finding a viable, reliable workforce on their farms.

#### BENEFICIARIES

Michigan Farm Bureau, Michigan Asparagus Committee, Michigan Carrot Committee, Michigan Onion Committee, Michigan Cherry Committee, Michigan Apple Committee, Michigan Vegetable Council, Potato Growers of Michigan, Michigan Blueberry Advisory Committee, Michigan Grape and Wine Council, Michigan State Horticulture Society, Michigan State University. The specialty crop industry in Michigan is one that spans across the entire state. There are over 50,000 farms, farming over 9,000,000 acres that will benefit from the data created.

#### LESSONS LEARNED

Throughout this project, we learned some valuable lessons. Even though USDA/NASS was grateful for the partnership, and the collaborative opportunity this grant gave them, it was hard for them to meet commodity data deadlines, due to the lack of staff. It is absolutely imperative that we work closer with USDA/NASS, to assure that they have the appropriate staffing to achieve timelines of these much needed grants. Many growers and commodity groups found themselves getting the data they needed much later than originally anticipated. MDARD and USDA/NASS were great partners to work with, filing for an extension, to make certain that the work was going to be completed successfully.

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## ADDITIONAL INFORMATION

### Rotational Survey:

[https://www.nass.usda.gov/Statistics by State/Michigan/Publications/Michigan Rotational Surveys/](https://www.nass.usda.gov/Statistics_by_State/Michigan/Publications/Michigan_Rotational_Surveys/)

**PROJECT TITLE: MICHIGAN FOOD AND FARMING SYSTEMS (through MI Department of Agriculture & Rural Development) – Food Safety Needs Assessment for Michigan Farmers - FINAL**

## PARTNER ORGANIZATION

Michigan Food and Farming Systems (MIFFS)

## PROJECT SUMMARY

MIFFS engaged specialty crop growers throughout the state to discuss the best ways to reach them with food safety updates and educational information in order to help those growers comply with food safety requirements and stay competitive. MIFFS accomplished this in partnership with groups across the state, particularly those groups serving beginning and/or historically underserved specialty crop farmers. MIFFS performed regional focus group sessions, interviewed subject matter experts, performed a statewide survey, and held a larger group meeting to review and discuss the results. These processes enabled MIFFS to identify specialty crop growers' food safety needs, clarify the preferred delivery modes and highlight natural connections for food safety information delivery. As a result of the project six recommendations to improve food safety came to light:

1. Listen and leverage the wisdom of farmers
2. Establish self-assessment tools, guides and processes
3. Grow and fund collaborative pilots
4. Create a “decision making” smart phone app
5. Provide for “one stop” food safety information
6. Focus on creating a food safety culture

Addressing these recommendations will assist Michigan's specialty crop growers with meeting or exceeding the federal food safety standards and the market driven requirements for safe food.

## PROJECT PURPOSE

The project purpose was to perform a food safety needs assessment with Michigan's specialty crop farmers. The project targeted specialty crop growers that will be impacted by the Food Safety Modernization Act (FSMA) and the increasingly stringent market driven food safety standards. The outreach process included subject matter expert interviews, focus groups and a statewide survey to gather information on growers' current food safety needs and work with them to anticipate future needs.

Regulators recognize many of the food safety related obstacles that growers will encounter in the future. However, the food safety regulators do not have a direct connection to growers. Growers are not required to be licensed. As a result, regulators do not have a list of the locations that could be impacted by future regulations. This makes communicating with specialty crop growers difficult. The project was established to help bridge the current disconnect between food safety regulators and specialty crop growers.

Based on past experience MDARD and MIFFS agreed a facilitated discussion was required. There was a need to understand the food safety needs of the group, how to effectively deliver solutions to these needs, and who should deliver the services. In order to gain a clearer understanding, it was important to gather the majority of the feedback in settings where questions of clarification and discussions could take place.

The project is important to help reduce the risk of Michigan specialty crops causing foodborne illness, ensure Michigan growers are able to comply with future FSMA regulations and allow Michigan growers to stay competitive by meeting market driven food safety requirements. Passage of FSMA in 2011 is driving the most sweeping overhaul of national food safety regulations impacting specialty crop growers in over 70 years. This project is timely due to FSMA and the attention given to specialty crops due to recent foodborne illness outbreaks. Based on the current timeline, the FSMA regulations will need to be implemented starting late 2017 for large farms through 2019 for very small farms.

Similar market driven standards are expected sooner. On-farm food safety practices can require significant capital investments as well as detailed planning and training. Effective implementation of food safety practices often requires a multi-year business plan. This project generated needed information to develop a delivery strategy for food safety education and technical assistance in 2016. With this information a delivery plan could be developed and implemented before the specialty crop growers are subject to the regulations. It would provide specialty crop growers time to begin implementing the necessary food safety practices.

The objectives of the project were to:

1. Design interview format, questionnaires, and surveys
2. Perform outreach to gain participants
3. Conduct a minimum of four interviews with subject matter experts
4. Plan and hold a minimum of six, but up to 12 small focus groups though out the state.
5. Evaluate information generated from the activities
6. Survey a broader range of specialty crop growers
7. Hold a larger group meeting to review/discuss the results
8. Produce a report detailing feedback from the growers
9. Make a recommendation to the department on a strategy that will provide education and technical assistance to specialty crop farmers.

## PROJECT ACTIVITIES

### 1. Focus Groups

The target audience for the project was specialty crop growers that may be impacted by the requirements coming out of the Food Safety Modernization Act (FSMA) and the increasing market demand for documentation of higher food safety standards. During the early months of the grant MIFFS designed the format and questions for the focus group sessions. MIFFS strategy was to arrange the sessions in collaboration with existing organizations that already offer resources and support to specialty crop growers. The approach was intended to increase participation by combining the focus group session with other ongoing activities. This collaborative strategy also directly responded to what many growers identified as “farmer fatigue” due to the multitude of meetings hosted on their behalf.

Early in 2015 MIFFS reached out to organizations across the state with the goal of engaging a broad array of specialty crop farmers and capturing their specific food safety needs.

- In the Upper Peninsula, MIFFS partnered with the UP Food Exchange to offer a focus group session in conjunction with the GAP/GAP Prep meeting.
- In Flint, the focus group was held as part of a Women-in-Agriculture meeting.

- In Detroit, the focus group session was hosted by Earthworks Urban Farm and targeted traditionally underserved urban growers.
- In Lansing, the focus group at the Allen Marketplace targeted beginning and military veteran growers.
- In Ann Arbor Township, the session drew on growers and supporters involved in the Tilian Farm Development Center.
- The Traverse City session brought together beginning and long-term specialty crop growers to share food safety approaches and to identify current and future food safety informational needs.
- In Southwest Michigan, MIFFS partnered with the Farm Research Cooperative.
- In West Michigan, MIFFS worked with the West Michigan Growers Group as they developed their strategic plan so they and their farms flourish within a sustainable local food system.

During the focus group sessions, MIFFS gathered input from specialty crop growers on their current and anticipated future food safety needs, how to effectively deliver food safety information to them, and who should deliver these services.

The participants responded to three questions:

1. Where do they currently get their food safety information?
2. What would help them address food safety requirements?
3. What would be the most effective time, type and location for food safety training?

The summary charts for the focus group responses are provided as Appendix A in the Additional Information section.

### **Focus Group Conclusions and Recommendations**

The goal of the focus group sessions was to gather information on the current food safety needs of the growers and to initiate discussions regarding future needs. Below are four recommendations based on the feedback provided in the focus group sessions.

- One consistent element of feedback was the need to have “on farm” training as a part of the food safety information delivery system. The “on farm” comment came through in regards to where people currently learn food safety information; the most effective location for training and it was also identified as what would help them address the food safety requirements.
- Another dimension of feedback identified the need to have food safety information that could be accessed electronically. Examples of the types of beneficial formats were: YouTube videos of on farm presentations, webinars, blogs, message boards, and apps for smart phones and tablets. In addition, numerous types of online forms were also identified: templates, checklist, best practices outlines, and downloadable pdfs. The feedback also stressed the need to have the resource materials available in hard copy formats, as some areas of the state do not have strong internet service.
- In terms of where people currently obtain their food safety information the resources identified covered a broad array of providers: federal (USDA FSA), state (MDARD), university (MSUE, MSU Product Center), national organizations (NSAC), statewide organizations (MIFFS, MIFMA), programs (MAEAP, GAP, Safe Food-A-Syst), local resources (Co-ops, Earthworks Urban Farm and Conservation Districts). This broad array of identified resources highlights the need to establish a collaborative network across these providers so consistent food safety information is delivered to Michigan’s specialty crop growers across the state.
- Funding was also identified as a significant need in order to help specialty crop growers address food safety. The funding discussions identified the need for funding to help

cover the grower's implementation costs, the cost of training resources (technicians, trainers, trainings) and for research.

## **2. Subject Matter Expert Interviews**

MIFFS interviewed four subject matter experts. The focus of the interviews was to capture the understandings and beliefs of the subject matter experts as to what is needed to assist beginning and small to midsize specialty crop growers with meeting the emerging food safety requirements. The subject matter experts interviewed were:

- Sophia Kruszewski, Policy Specialist with the National Sustainable Agriculture Coalition, Washington, DC.
- Roland McReynolds, Executive Director of the Carolina Farm Stewardship Association, Pittsboro, North Carolina.
- Phil Tocco, Extension Educator Michigan State University Extension, Jackson County office, Jackson MI.
- Steve Warshawer, Enterprise Development Manager at La Montanita COOP Santa Fe, New Mexico

### **Subject Matter Interview Conclusions and Recommendations**

Roland McReynolds stressed the need to help growers understand "What part of the rules apply to me?" He stated the food safety rules are complicated. He suggested development of an app, which would take a farmer through a series of questions to identify where/what they need to do. He also noted university extension programs will need to identify what they can do to build trust with grassroots organizations.

Sophia Kruszewski emphasized that one of the concerns of specialty crop growers is identifying who to trust. It is complex to clearly separate advising from regulation and certification. She noted that regulators can only advise so much and then it may become a conflict. It is important to establish a timeline of guidance from the FDA with an emphasis on training first.

Both Roland and Sophia stressed the need to establish a process for when and where to go on a farm. There will be a need for transparency and inclusiveness. It is time to realize farmers want to be partners.

In addition, Roland and Sophia highlighted the importance of the non-regulatory impacts of the market reaction. Farmers need to make sure they talk with their buyers about food safety and find out what types of questions buyers will be asking.

Steve Warshawer shared his opinion that small to midsize growers are facing market demands and regulatory demands. He believes it is essential to teach risk assessment at the farm level regarding food safety hazards in such a way that the individual farmers can conduct assessments as it applies to their farm. Steve believes that everything flows from understanding hazard and risk related to water, soil amendments, previous land use, domesticated/wildlife and hygiene.

In the discussion with Phil Tocco, he stressed the need for trust. He pointed out that what is being said is not always the key, it is often who is saying it. The key is to have partners and develop a level of credibility with them. It is important to create a flow of information in and out, so that people sense that you both listen to them and are willing to share what you know. He stated that it is important for small to mid-size growers to be ahead of the Food Safety Modernization Act. He believes that growers need to have a food safety mind set right from the

beginning. Long term Phil believes we need to develop a better understanding of the role of bacteria in the soil and its relationship with the human gut.

When Steve and Phil were asked about what has worked well in terms of delivering food safety information to date to small and mid-size growers, Steve identified that farmer field days where one farmer shares with other farmers as a successful method for sharing food safety information. He also noted that scenario training can be an effective method to show how external information can be internalized to their farms. Phil Tocco stressed the importance of delivering food safety information by and with local partners, who have an ongoing relationship with the growers.

### **3. Survey a Broader Range of Specialty Crop Growers**

MIFFS original timeline for the survey outreach was spring of 2015. MIFFS designed and refined the survey questions in the spring. At that time, it was determined distributing the survey through other partner organizations necessitated an adjustment to the timeline. The survey outreach needed to seamlessly meld with the partners' outreach timelines.

In mid-July 2015, MIFFS launched a nine-question survey to gather feedback from specialty crop growers across Michigan about their current and future information needs on food safety. The launch took place after beta testing the content and technology with internal stakeholders, including specialty crop growers. A paper version of the survey was also created in September to allow for hard copy survey collection.

After composing a standard script introducing the survey, MIFFS conducted extensive outreach to specialty crop growers via social media, email newsletters, listservs, and direct contact. Organizations that shared the information included: MIFFS listserv and social media accounts, the Michigan Food Hub listserv, the Michigan Farmers Market Listserv, AgroEco Listserv at MSU, MidMichigan Food listserv, Michigan's Conservation Districts, Michigan Voices for Good Food, and the Michigan Young Farmer Coalition.

Before the survey was closed in September 2015, MIFFS collected 116 survey responses from specialty crop growers in 103 unique zip codes across the state of Michigan. The survey aimed to complement other information gathering activities with a broad set of qualitative feedback about specialty crop growers perceived needs. The survey was designed to be a proactive way to gather information for MDARD and identify ways to get food safety information to specialty crop growers in advance of forthcoming changes to the FSMA.

The map displaying the geographic reach of the survey is provided in the Additional Information section as Appendix B.

### **Survey a Broader Range of Specialty Crop Growers Conclusions and Recommendations**

In analyzing the survey response pattern, we found growers identified a clear preference for outreach programs in January, February. March and December were identified as the next two potential timeframes. This information can assist with planning for future outreach and programmatic opportunities for specialty crop growers.

In terms of identifying specific elements of how MDARD could help specialty crop growers with food safety the survey responses identified:

The survey respondents self-identified that less than half of them (41.4%) are actively participating in any food safety verification or certification programs. These responses point to a

need to increase the participation of specialty crop growers in food safety programs. The survey responses noted that too many times producers feel threatened by the USDA and MDARD about failing an audit. Relationship building around a mutual goal of food safety is needed. Presently producers often feel like the audits are geared toward finding something wrong.

The survey responses identified a need for consideration regarding the increased cost of making the required changes in order to meet the compliance requirements. Keeping the cost of food safety compliance low is essential to the growers' success.

Consistency and simplicity of information were noted as essential elements of what MDARD can do to help specialty crop growers with the challenges of incorporating food safety into their processes.

#### **4. Larger Group Meeting to Review/Discuss Results**

On March 7, 2016 MIFFS hosted its annual meeting at the Michigan Public Health Institute Offices in Okemos MI. Thirty-eight people from across the state attended the meeting. The results of the survey were shared in a series of four slides. (See Additional Information Appendix C).

#### **Larger Group Meeting Conclusions and Recommendations**

Following the survey explanation and slide presentation the participants discussed the results and identified six areas for outreach, education and support. They also identified benefits and hurdles related to each of the recommendations below.

1. Listen and leverage the wisdom of farmers;
2. Establish self-assessment tools, guides and processes;
3. Grow and fund collaborative pilots,
4. Create a “decision making” smart phone app;
5. Provide for “one stop” food safety information,
6. Focus on creating a food safety culture.

### **GOALS AND OUTCOMES ACHIEVED**

#### **1. Focus Groups**

MIFFS successfully met the grant goal of conducting six – twelve focus groups throughout the state with its eleven focus group sessions. The focus group sessions were held in seven communities across the state: Upper Peninsula (Marquette), northern Michigan (Traverse City), southwest Michigan (Berrien County, and Bloomingdale), central Michigan (Flint and Lansing), southeast Michigan (Ann Arbor Township and Detroit) and west Michigan.

During the focus group sessions, MIFFS gathered input from an array of specialty crop growers in an attempt to identifying the best methodologies for delivering food safety information. MIFFS gathered the input from over 200 people either directly engaged in small to mid-size specialty crop growing or individuals exploring the feasibility of becoming a specialty crop grower. As a result of the focus groups sessions, there is a clear awareness that a variety of information options are needed to assist specialty crop growers with staying up to date on food safety.

#### **2. Interviews with Subject Matter Experts**

MIFFS met the minimum requirement of four interviews with subject matter experts. In order to inform the project with a broad array of perspectives, knowledge and awareness of the impact of changes in the food safety requirements and market driven practices, MIFFS elected to interview a grower from outside the state of Michigan (Steve Warshawer of New Mexico, who has a long standing three-acre specialty crop market garden), an MSU Extension expert who works directly with specialty crop growers (Phil Tocco), the executive director of a farm

stewardship association (Roland McReynolds, Esq. of the Carolina Farm Stewardship Association) and a Policy Specialist with the National Sustainable Agriculture Coalition (Sophia Kruszewski).

### 3. Survey with a Broader Range of Specialty Crop Growers.

In mid-July 2015, MIFFS launched a nine-question survey to gather feedback from specialty crop growers across Michigan about their current and future information needs on food safety. Before the survey was closed in September 2015, MIFFS collected 116 survey responses from specialty crop growers in 103 unique zip codes across the state of Michigan. The survey was useful for identifying several types of information on specialty crop growers, including:

1. A sense of the current ways in which these growers interact with food safety certification and / or verification programs.
  - For example, 58.6% of respondents indicated they were not actively participating in any food safety verification or certification programs, whereas 41.4% that indicated they were.
    - Those 41.4% of respondents that indicated they are *actively participating* in food safety; the two most popular programs were the USDA Good Agricultural Practices (GAP) / Good Handling Practices (GHP) at 22.41%.
2. Information on where growers currently obtain information on food safety.
  - When asked where they currently get food safety information, respondents selected a variety of sources of current information, with Michigan State University Extension being the most popular source of current food safety information. Workshops, Organization Websites, and Farm Conferences were close behind, all garnering responses from over half of those that completed the survey.
3. The current challenges facing specialty crop growers regarding food safety.
  - Complexity: A consistent theme MIFFS identified was navigating the complex nature of food safety certification. There is a sense of frustration in understanding requirements coming from different government agencies and for different products. Many respondents identified a general sentiment of government overreach. Furthermore, many of the respondents stated that the authors of the regulations do not have necessary grower knowledge to write relevant and/or feasible regulations. Finally, they identified there is already a burdensome amount of paper work and feared more was coming.
  - Cost and time: Many respondents identified that keeping up with food safety certifications and regulations is incredibly costly and time-consuming. Combined with the complexity issue, this leaves many of them questioning whether certification is a worthwhile process.
  - Equipment and/or facility requirements: Refrigeration and cooler space was a major concern, along with food preservation in general. One respondent referred to having difficulty providing the necessary “cold chain from field to delivery”. There also was some concern about having sufficient storage space and finding suitable, cost-effective containers.
  - Water and soil: The quality of soil and water available to specialty crop growers was a concern, along with having access to chlorinated water for sanitizing.
  - Various wildlife and/or insect issues: Specific animals mentioned were: mice, white fly, drosophila fly, tomato hornworm, voles, deer, birds, and others. There was some concern about fencing requirements that were seen to be too burdensome and unrealistic.

- Several respondents mentioned the small scope of the cottage food law and having difficulty determining exactly how the law applied to their products.
  - Employees: Some respondents find it difficult to find a qualified workforce and then to keep them up to date on rules and regulations. Even when up to date, it is also hard to guarantee that employees will follow rules (such as hand washing).
4. Specialty crop growers desired assistance in addressing future food safety needs.
- Simplicity. The number one comment from respondents was that the information should be conveyed in the simplest means possible.
  - Following on simplicity, respondents requested a “one-stop-shop” for food safety information. Many suggested having a common, consistent place to go, “Establish one source of information specific to Food Safety, if possible.”
  - Consistency among inspectors and auditors – many respondents suggested that negative experiences with previous audits and inspection processes that have given them a disincentive to participate in future verifications and certifications.
  - One respondent explained:  
“Too many times producers feel threatened by the USDA & MDARD about failing an audit, so I see producers that do not want to get GAP certified. (At my most recent audit), I felt that our GAP Auditor was trying to find something wrong; this does not create a good relationship between producer and government.”
  - Value-added products: several respondents specifically mentioned needing assistance with navigating forthcoming changes to value-added product safety requirements.
  - Unique nature of small farms and family farms – several respondents mentioned taking size into consideration, that size and context are extremely important.
  - Electronic/internet-based information: A number of respondents emphasized the need for food safety information to be accessible via the web and regularly updated.
  - Keeping costs down: a number of respondents sympathized with the need for food safety requirements but requested that changes consider the cost of compliance.
  - Respondents also underscored the need for in-person content delivery. One respondent summarized this sentiment in a concise manner:
  - “Provide in-person educational outreach rather than only doing outreach through the web.”
5. The format that specialty crop growers would prefer to receive future food safety information.
- The majority of respondents, or 58.62%, preferred an E-newsletter as the best means by which to receive information. Workshops at relevant conferences garnered the second highest percentage of responses (45.69%), followed by through existing ag-related meetings (36.21%) and classroom workshops (34.48%) and online courses (also 34.48%).
  - These responses appear to indicate a few key findings:
    - Respondents prefer food safety information is distributed via multiple channels, including via both written communication as well as in-person workshops.
    - There was a strong preference for some form of workshop, whether through existing events, on-farm, or in the classroom.

- The #2 and #3 choices indicate a preference for inserting food safety programming into pre-existing conferences and ag-related meetings so participants can access information through events and entities that they are already familiar with. This is consistent with the MIFFS observation of “farmer fatigue” discussed in our summary of the focus groups.
  - Aside from e-newsletters, respondents had a much lower preference for passive means of communication, including Associations publications, blogs, and MDARD representatives at events.
6. The timing of future food safety information delivery.
- Regarding the preferred time of day, at 38%, respondents slightly favored evening workshops over morning workshops (35.3%). There was the least preference for afternoon workshops, with just 26.7% selecting this option.
  - Respondents *preferred time of year* to attend a food safety workshop were the winter months of January and February, each garnering 94 votes. Stated another way, 81% of respondents chose January as a preferred option, and 81% of respondents chose February.
  - After analyzing the data further, MIFFS found that 83 of 116 respondents chose *both January and February* as an option, showing a clear preference for those two months at 71.5% of respondents. March was close behind at 72 votes. Next highest was December, gathering 49 votes, which is under 50% of respondents.

#### 4. Larger Group Meeting

MIFFS met the project objective of hosting a larger group meeting to review and discuss the project results. As a statewide organization MIFFS was able to host a meeting with representatives from across the state. During the discussion six major recommendations were identified. The discussion also focused on the benefits and hurdles in regards to each recommendation. The information below details the recommendations and the participants’ conclusions regarding the benefits and hurdles related to each one.

In regards to the first recommendation “Listen and leverage the wisdom of farmers” they identified the benefits as: mutual respect, important as farmers do the work, allows for co-creation of effective approaches, should facilitate a positive relationship between farmers and regulators, farmers trust and listen better to farmers and take away more, shared experiences, anecdotal experiences from farmers in laymen’s terms, focused on what farmers needs and want and farmers teaching other farmers.

They noted the hurdles as: communication, availability of technology, the importance of not having a top down process from the regulators, they also noted not all areas/regions are the same, how to make sure the outreach is equitable, finding ways to convene farmers as networks don’t exist in all places, balancing varied opinions, getting farmers to say what they want, may be difficult to get the conversations going, and it may be difficult to change relationship of farmers with auditors from authoritative to collaborative.

With the second recommendation “Establish self-assessment tools, guides and processes” the discussion highlighted these benefits: MAEAP as a benefits, tons of groundwork already laid, it will allow individual farms to see their success, and it could help establish base line golden rules for food safety.

The hurdles identified for recommendation two were: communication, finding effective ways to organize access to them, creating the tools, creating practical visuals of good/bad practices so

farmers can easily understand, these would be learning aides and someone would still need to be coaching on the practices or might be addressed through consultative audits.

The group believed the benefit of the third recommendation “Grow and fund collaborative pilots” was it required trust in your neighbors. The hurdles were identified as awareness and fairness of distribution to ensure all farmers would be included.

For recommendation number four “Create a decision-making smart phone app” the benefits were highlighted as: easy to use phone applications, having the app coordinated with “one-stop” information sources, digital listservs, keeping it simple, awareness as a phone app is currently available at farmcommons.org, continuity and consistency of records.

The hurdles noted for the fourth recommendation focused on: technical accessibility for farmers, teaching people how to use the products, smart phone access, the need to also make the same information available in print and on webpages, the fact that someone has to create it, maintain it and make sure the information continues to be accurate.

The benefits identified for the fifth recommendation “Provide for “one stop” food safety information” were: support small scale farms, bring together the expertise of everyone working on food safety in Michigan, consider creating a “Wikipedia page, make it easier to find and understand, lead to more compliance, put both parties (inspectors and producers) on the same page, clarity around what is expected, responds to request from the field.

The hurdles identified for the fifth recommendation were: needs to be easy for all, information needs to line up with governmental guidelines, not all farmers are tech savvy, collaboration challenges across information sources, logistics of where it will be hosted, how it will be managed, one on one coaching would still be needed, information would need to be tailored to specific farms, will need to include multiple sources (links to other sites seeds, equipment etc.), who would implement and maintain it, funding for the “one stop”, ability to interface with other tools, requires respect for what others are doing, and it could be difficult to bring all of the information to one location.

The discussion related to the sixth recommendation “Focus on creating a food safety culture” identified the benefits as: leveraging peer pressure for adopting responsible practices, both parties understanding each other’s struggles, much more sustainable, and longer-term it will make the folks on both sides accept the necessity of a food safety culture.

The noted hurdles for the sixth recommendation were: lack of consistent resources for implementation practices, what if the culture is not the same as the rules, getting buyers excited about the product, convincing farmers that they need to change and creating the culture.

## **BENEFICIARIES**

- The 116 Michigan-based specialty crop growers that were able to identify their current and future food safety information needs via our Food Safety Survey.
- The 200 + growers, from those just getting started to the long time specialty crop growers, who participated with other growers in the focus group discussions.
- The 38 people from across the region who reviewed and discussed the findings and developed the recommendations for this project.
- MIFFS and other organizations throughout the state serving specialty crop growers, who strengthened their connections with each other and their constituents.

- MDARD who now has specific information obtained directly from growers about what is needed, and how best to provide information and guidance on food safety implementation strategies.
- The 116 Michigan-based specialty crop growers that were able to identify their current and future food safety information needs via our Food Safety Survey.
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- MDARD who now has specific information obtained directly from growers about what is needed, and how best to provide information and guidance on food safety implementation strategies.

## LESSONS LEARNED

- Based on the discussions and response, specialty crop growers understand the need to build food safety into their business practices right from the beginning.
- It is important to diligently try to keep the cost of implementing new food safety requirements low in order to increase specialty crop growers' compliance.
- While there is a high need for food safety technology tools, guides and supportive processes for growers (apps, web based information etc.), there is an equally high need for direct farmer to farmer connection and one on one farm specific coaching on food safety practices and solutions.
- Growers self-identify that they learn best when the information and discussions come from other farmers.
- Food safety information needs to be clear, simplistic and consistent across the various regulatory agencies involved in audits and compliance.
- Given the emerging nature of food safety guidelines and regulations, growers need to be able to trust that they have an easy to access and essentially a "one stop" source for accurate, up-to-date food safety information.
- The information obtained through the survey provided a snap shot of responses that appear to align with the information obtained through the focus group process. In addition, the relatively small number (although geographically representative) of responses to MIFFS survey outreach in July and September, supports the feedback obtained through the survey regarding the preferred times of the year for workshops, networking, etc. The noted preferences were for January, February, March and December. MIFFS would make adjustments to future timelines regarding survey outreach to accommodate the noted preferences. There was also an anecdotal inference over the course of the project, which suggested that data collection is more effective when surveys are used in combination with face-to-face discussions.

## CONTACT PERSON

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## ADDITIONAL INFORMATION

### **Appendix A**

- Charts capturing focus group input. Statements repeated at more than one focus group session are bolded and placed at the top of the section. In addition, for ease of reading some of the information has been sub-categorized and clustered.

### **Appendix B**

- Survey analysis and map displaying the geographic reach of the survey.
- Complete Survey Results

### **Appendix C**

- Slides shared at the MIFFS Annual Meeting regarding the survey results and recommendations.

**Appendix A - What would help you address food safety requirements**

Technology	Individuals	Format	Training
<ul style="list-style-type: none"> <li>• <b>Videos</b></li> <li>• <b>Online</b></li> <li>• <b>YouTube</b></li> <li>• <b>Videos of on farm training</b></li> <li>• <b>Webinars</b></li> <li>• <b>IPad app</b></li> <li>• <b>Smart phone app for record keeping</b></li> <li>• Social media links</li> <li>• Direct emails</li> </ul>	<ul style="list-style-type: none"> <li>• In person presentations with Q &amp; A.</li> <li>• A person to help parse out the fine details.</li> <li>• Someone to turn to with food safety questions</li> </ul>	<p><b>Support materials</b></p> <ul style="list-style-type: none"> <li>• <b>Templates</b></li> <li>• <b>Easy access to information</b></li> <li>• <b>One-page fact sheet</b></li> <li>• <b>Checklist</b></li> <li>• <b>Simple outline of best practices</b></li> <li>• FAQs</li> <li>• Handbooks</li> <li>• Sample forms</li> <li>• Worksheets that fit any farm</li> <li>• Written materials with examples and simple pictures</li> <li>• Bulleted information</li> <li>• Comprehensive manual</li> <li>• Visual – flow chart of requirements</li> <li>• Pdf's that are downloadable</li> <li>• Hard copy for those who do not have internet access</li> </ul> <p><b>Face to face</b></p> <ul style="list-style-type: none"> <li>• MDARD needs to do more visits</li> <li>• Farm safety managers who come out to your farm</li> <li>• Farmers coming together – cooperatives</li> </ul> <p><b>Structure</b></p> <ul style="list-style-type: none"> <li>• <b>Fed &amp; State information on the same page.</b></li> <li>• Categorized by scale</li> <li>• Clear/unambiguous rules</li> <li>• Laws not ahead of research</li> <li>• All the information in one place</li> <li>• Targeted to specific groups</li> <li>• Clear guidelines for small growers</li> <li>• Annual updates-similar to how insurance companies give updates about what has changed since you last policy</li> <li>• Compare to GAP</li> </ul> <p><b>Funding</b></p> <ul style="list-style-type: none"> <li>• Research Funding</li> <li>• Funding made easier for farmers</li> <li>• Funds to cover implementation costs</li> <li>• Need help paying for practices</li> <li>• Fund implementation - Technicians, trainers, training, matching grants, equipment</li> <li>• Raises production costs – should educate on how it's a market expansion, additional cost (e.g. MAEAP process adds value)</li> </ul>	<ul style="list-style-type: none"> <li>• <b>On farm training</b></li> <li>• <b>Someone to visit &amp; help me define what I specifically need to comply</b></li> <li>• Training on rules, regulations and projected cost</li> <li>• NPR segments</li> </ul>

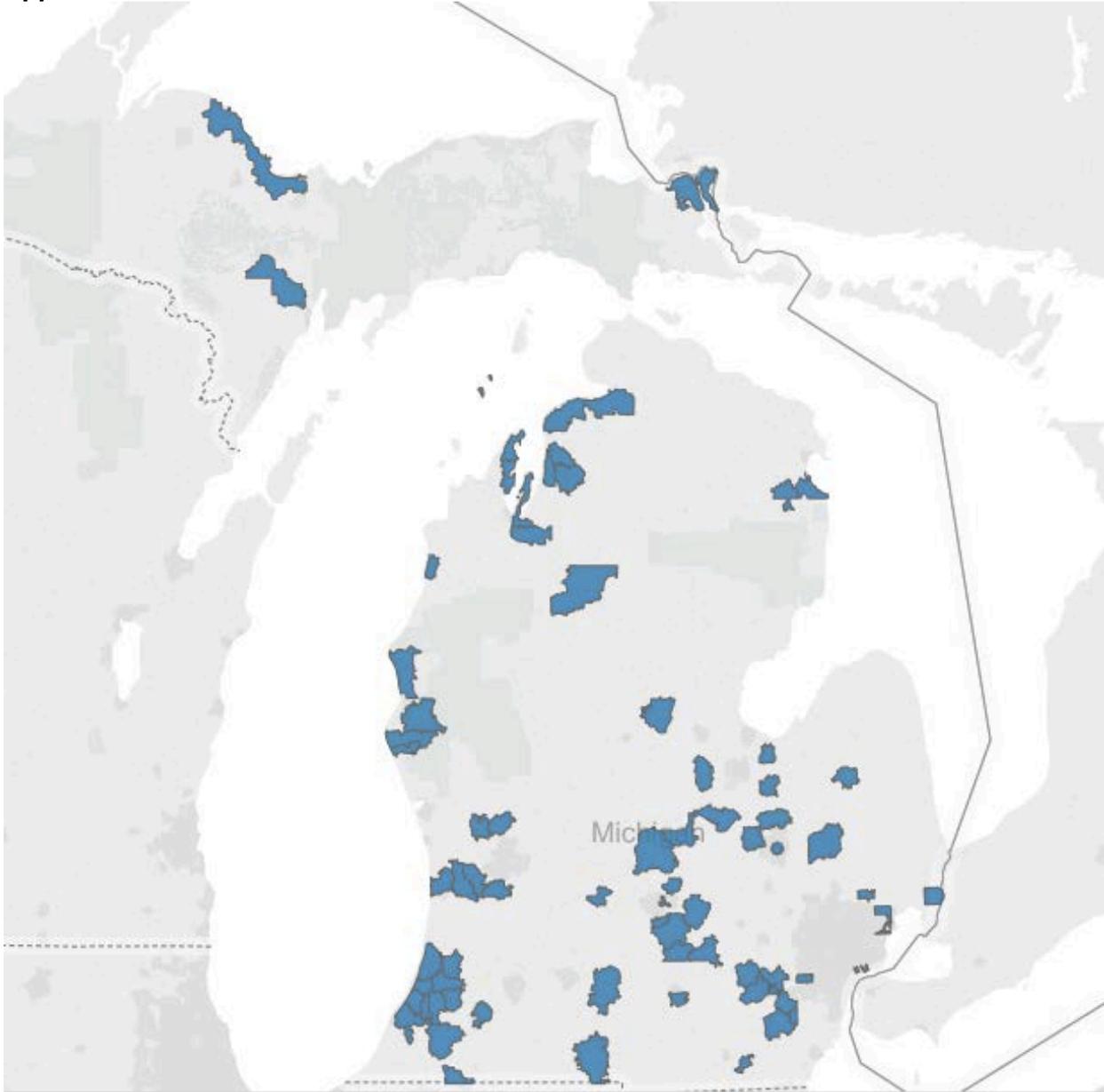
**Appendix A - Where do you get your food safety information?**

Technology	Individuals	Organizations/ Programs	Format	Training
<ul style="list-style-type: none"> <li>• <b>Google</b></li> <li>• <b>Internet</b></li> <li>• <b>Online research</b></li> <li>• <b>Websites – MDARD, FSA MIFMA, MSU-E</b></li> <li>• <b>Let's Farm Michigan - MIFFS managed online calendar</b></li> <li>• <b>Radio blurbs</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Phil Tocco</b></li> <li>• <b>Other farmers</b></li> <li>• <b>MSU-E educators</b></li> <li>• <b>Experienced growers</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Health Dept.</b></li> <li>• <b>MAEAP/GAP</b></li> <li>• <b>Conservation District</b></li> <li>• <b>Consultants</b></li> <li>• <b>GAP Audit</b></li> <li>• <b>Local Co-op</b></li> <li>• <b>MAEAP Technicians</b></li> <li>• <b>MDARD</b></li> <li>• <b>MIFFS Workshop</b></li> <li>• <b>MSU Product Center</b></li> <li>• <b>NSAC</b></li> <li>• <b>NYFC</b></li> <li>• <b>OEFFA Certification</b></li> <li>• <b>Safer Food *A* Syst</b></li> <li>• <b>Trade Associations</b></li> <li>• <b>USDA-FSA</b></li> <li>• <b>Word of mouth</b></li> </ul>	<p><b>People to people</b></p> <ul style="list-style-type: none"> <li>• <b>Word of mouth</b></li> <li>• <b>Farm Conferences</b></li> <li>• <b>Classes</b></li> <li>• <b>Regional group training</b></li> </ul> <p><b>Print materials</b></p> <ul style="list-style-type: none"> <li>• <b>Bi-lingual materials</b></li> <li>• <b>Checklist</b></li> <li>• <b>Checklist based on farm size, which takes you to a list of appropriate PDFs</b></li> <li>• <b>Decision tree-to make it easy to find what applies to you</b></li> <li>• <b>Flyers</b></li> <li>• <b>Food Safety Plan</b></li> <li>• <b>Newsletters</b></li> <li>• <b>Public Research Journals</b></li> <li>• <b>Research journals</b></li> <li>• <b>SOP templates</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>On farm demonstrations</b></li> <li>• <b>Food safety workshops</b></li> <li>• <b>Safe Serve Certification</b></li> <li>• <b>Restaurant Kitchen Safety Training</b></li> <li>•</li> </ul>

**Appendix A - What is the most effective time, type and location for training?**

Time	Type	Location
<p><b>Time of year</b></p> <ul style="list-style-type: none"> <li>• <b>Winter</b> – January or March Some farmers are gone in February</li> <li>• <b>Winter</b> – Monday mornings</li> <li>• <b>Winter</b> – evenings Monday or Tuesday.</li> <li>• Winter (Jan – Feb.) at conferences</li> <li>• January – April</li> <li>• Fall</li> <li>• Spring</li> </ul> <p><b>Day of the week</b></p> <ul style="list-style-type: none"> <li>• <b>Weekends</b></li> <li>• <b>Saturday</b> – afternoons, am or mid-day</li> <li>• Mondays during the day</li> <li>• Tuesdays</li> <li>• Friday nights</li> </ul> <p><b>Time of day</b></p> <ul style="list-style-type: none"> <li>• <b>Evening</b></li> <li>• Online between midnight and 2 am</li> </ul>	<p><b>Technology</b></p> <ul style="list-style-type: none"> <li>• <b>Online</b> – questionnaires, test</li> <li>• <b>Webinar</b> w/facilitator</li> <li>• <b>Webinar</b>-recorded</li> <li>• <b>Designated food safety website</b></li> <li>• <b>Blogs</b></li> <li>• Apps for SOP Templates</li> <li>• Videos</li> <li>• Videos on YouTube</li> <li>• Video of audit process</li> <li>• Video conference</li> <li>• Conference calls</li> <li>• Message boards</li> <li>• Easy access to groups to discuss food safety</li> </ul> <p><b>Face to face</b></p> <ul style="list-style-type: none"> <li>• <b>Hands on interactive</b></li> <li>• Train the trainer</li> <li>• Face to face workshops</li> <li>• One day vs. multiple shorter sessions.</li> <li>• FSMA techs – lead workshops</li> <li>• In person Q &amp; A</li> <li>• MDARD representatives at events</li> <li>• Significant advance notice</li> </ul> <p><b>Documents</b></p> <ul style="list-style-type: none"> <li>• Templates, forms</li> <li>• Pictures from farms</li> </ul> <p>Questions</p> <ul style="list-style-type: none"> <li>• How to get consumers to buy in?</li> <li>• How to dovetail with GAP?</li> </ul>	<ul style="list-style-type: none"> <li>• <b>On the farm training</b></li> <li>• <b>Local</b></li> <li>• <b>At farmers’ markets</b></li> <li>• At growers’ guilds or regional agencies</li> <li>• In person meetings</li> <li>• Within 1 hr. of where I live</li> <li>• Workshops at conferences</li> <li>• At Farmers Markets</li> <li>• Workshops at conferences</li> </ul> <p><b>Specific venues</b></p> <ul style="list-style-type: none"> <li>• At Tilian in Ann Arbor</li> <li>• Onsite – SEMPA</li> <li>• Washtenaw FPC</li> <li>• In Lansing</li> </ul>

## Appendix B - ADDITIONAL INFORMATION: GEOGRAPHIC REACH OF SURVEY



Note that this map above identifies the total area of the zip code where a respondent indicated where they farm or grow food. Zip codes have different geographic sizes depending on the population density in a given area. The map above also does not weight zip codes by the number of responses, although there were relatively few zip codes with multiple responses.

Of the total responses, six of the zip codes had three respondents complete the survey. Those were 48105 (Ann Arbor), 48207 (Detroit – East of Downtown including Belle Isle), 48912 (City of Lansing – East side), 49056 (Lacota / Grand Junction / Breedsville), 49057 (Hartford / Keeler), and 49682 (Suttons Bay / Leelanau County)

### **COMPLETE SURVEY RESULTS**

#### **Survey Results by Question**

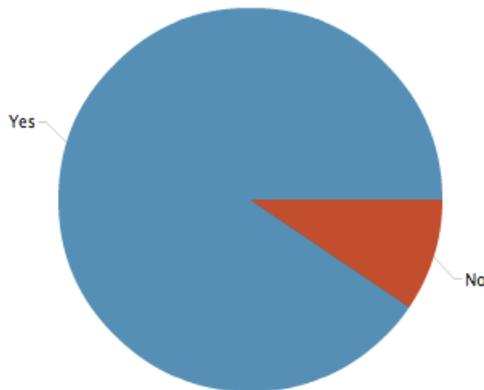
##### 1a. Do you farm or grow food in Michigan?

The first survey question was designed to clarify the intended audience of the survey: Michigan-based specialty crop growers. Respondents were asked whether or not they farmed or grew food

in Michigan, and if they answered no, they were prompted to describe their relationship to the intended survey audience. MIFFS hoped that this question design served to disincentivize non-Michigan specialty crop growers and those with only a cursory interest in the topic from responding to the survey.

Of the 116 total valid respondents, 90.5% or 105 of these self-identified as farming or growing food in Michigan.

Do you farm or grow food in Michigan?



1b. If no, please describe your connection to specialty crop growers in Michigan.

Those respondents that indicated that they did not farm or grow food in Michigan were asked to clarify their connection to specialty crop growers through a text entry. There was a mix of responses from the 9.5% that indicated that they did not farm or grow food in Michigan. Over half of these respondents (6) provide some kind of technical assistance to specialty crop growers in Michigan, with several specifically indicating that they are Michigan State University Extension Educators (5). Beyond the technical service providers, one respondent indicated that they operate a farmer's market.

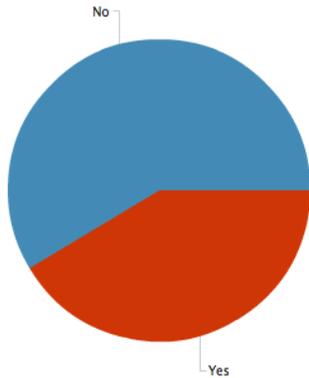
2. What is the zip code where you grow food?

The second question collected the zip code of the location where respondents grow food. Again, MIFFS worded the question to purposefully indicate the intended target audience of the survey by using the words "where you grow food."

3. Do you currently participate in any food safety verification or certification programs?

MIFFS designed Question #3 to gauge the extent to which respondents are taking advantage of existing food safety verification or certification programs. The responses were split, with 58.6% of respondents indicating they are not currently participating in any programs, compared with 41.4% that indicated they are:

Do you currently participate in any food safety verification or certification programs?



**3b. Please select the verification or certification programs you currently participate in:** Those 41.4% of respondents that indicated they are *currently participating* in food safety verification or certification programs were then asked to choose the programs in that they participate in, with the option to indicate more than one program at a time. MIFFS pre-populated a list of available programs and certifications, as shown below in the results. Note that the first “Other” category in the graph below represents a choice of “Other” where respondents could enter their own category. The second “Other” listed represents pre-populated programs that MIFFS included as a checkbox option on the survey, but that only garnered a single response.

Choices	Percentage	Count
USDA Good Agricultural Practices (GAP) / Good Handling Practices (GHP)	22.41%	26
PrimusLabs	19.83%	23
Other	7.76%	9
The Global Food Safety Initiative (GFSI)	6.90%	8
Organic Certification	4.31%	5
Global G.A.P.	2.59%	3
Michigan's Safe Food Risk Assessment	2.59%	3
Other		
Scientific Certification Systems	0.86%	1
Safe Quality Food (SQF and SQF 1000 Code)	0.86%	1
Michigan Group G.A.P. Pilot Program	0.86%	1
<b>Total Entries</b>		<b>116</b>
<i>Unanswered</i>		<i>69</i>

As shown above, the two most popular programs are the USDA Good Agricultural Practices (GAP) / Good Handling Practices (GHP) at 22.41%, and the PrimusLabs program at 19.83%. In the “Other” category, two respondents indicated that they participate in MAEAP, two respondents entered ServSafe, and another indicated Certified Naturally Grown.

**4. Where do you currently get your food safety information?**

MIFFS designed Question #4 to collect information on where respondents are currently obtaining food safety information as a means to inform where future information may be best circulated. Participants were asked to complete a pre-populated checkbox and were allowed to choose multiple information sources, as shown below:

Choices	Percentage	Count
MSU Extension (MSUE)	57.76%	67
Workshops	55.17%	64
Organization websites (e.g. MDARD, USDA, etc.)	53.45%	62
Farm conferences	51.72%	60
Internet Search	44.83%	52
Advice from experienced growers	44.83%	52
Conservation Districts	18.97%	22
Other		
Flyers	12.07%	14
Other	10.34%	12
<b>Total Entries</b>		<b>116</b>

Respondents selected a variety of sources of current information, with Michigan State University Extension being the most popular source of current food safety information. Workshops, Organization Websites, and Farm Conferences were close behind, all garnering responses from over half of those that completed the survey.

4b. Since you marked "Other" in the question above, what are the other sources where you get your food safety information?

Respondents that marked other were asked to identify additional sources of information. Of the 12 responses collected in this sub-question, three respondents specifically called our Primus as a source of food safety information. The rest of the responses were single mentions of specific websites (e.g. [www.familyfarmed.org](http://www.familyfarmed.org)), organizations (e.g. Wallace Center), or individuals (e.g. Don Keebler).

5. Please describe TWO food safety challenges you currently face as a specialty crop grower?

MIFFS designed Question #5 to gather more rich information about the current challenges that specialty crop growers face with regard to food safety. Respondents were asked to identify two specific challenges they face via a text entry.

Given the qualitative nature of the results, MIFFS analyzed the data to find common themes. The following items stood out from the data gathered from respondents in Question #5:

- Complexity: A consistent theme MIFFS identified was navigating the complex nature of food safety certification. There is a sense of frustration in understanding requirements coming from different government agencies and for different products. Many respondents identified a general sentiment of government overreach. Furthermore, many of the respondents stated that the authors of the regulations do not have necessary grower knowledge to write relevant and/or feasible regulations. Finally, they identified there is already a burdensome amount of paper work and feared more was coming.
- Cost and time: Many respondents identified that keeping up with food safety certifications and regulations is incredibly costly and time-consuming. Combined with the complexity issue, this leaves many of them questioning whether certification is a worthwhile process.
- Equipment and/or facility requirements: Refrigeration and cooler space was a major concern, along with food preservation in general. One respondent referred to having difficulty providing the necessary “cold chain from field to delivery”. There also was some concern about having sufficient storage space and finding suitable, cost-effective containers.
- Water and soil: The quality of soil and water available to specialty crop growers was a concern, along with having access to chlorinated water for sanitizing.

- Various wildlife and/or insect issues: Specific animals mentioned were: mice, white fly, drosophila fly, tomato hornworm, voles, deer, birds, and others. There was some concern about fencing requirements that were seen to be too burdensome and unrealistic.
- Several respondents mentioned the small scope of the cottage food law and having difficulty determining exactly how the law applied to their products.
- Employees: Some respondents find it difficult to find a qualified workforce and then to keep them up to date on rules and regulations. Even when up to date, it is also hard to guarantee that employees will follow rules (such as hand washing).

6. In what ways can MDARD assist you in addressing food safety issues, now and/or in the future?

Question #6 was another area where the MIFFS team wanted to collect rich, descriptive information, this time asking specifically how the Michigan Department of Agriculture and Rural Development can assist specialty crop growers to address future food safety issues.

Given the qualitative nature of the results, MIFFS analyzed the data to find common themes. The following items stood out from the data gathered in Question #6:

- Simplicity. The number one comment from respondents was that the information should be conveyed in the simplest means possible.
- Following on simplicity, respondents requested a “one-stop-shop” for food safety information. Many suggested having a common, consistent place to go: “Establish one source of information specific to Food Safety, if possible.”
- Consistency among inspectors and auditors – many respondents suggested that negative experiences with previous audits and inspection processes that have given them a disincentive to participate in future verifications and certifications. One respondent explained:

“Too many times producers feel threatened by the USDA & MDARD about failing an audit, so I see producers that do not want to get GAP certified. [At my most recent audit], I felt that our GAP Auditor was trying to find something wrong; this does not create a good relationship between producer and government.”

- Value-added products: several respondents specifically mentioned needing assistance with navigating forthcoming changes to value-added product safety requirements.
- Unique nature of small farms and family farms – several respondents mentioned taking size into consideration, that size and context are extremely important when
- Electronic / internet-based information: A number of respondents emphasized the need for food safety information to be accessible via the web and regularly updated.
- Keeping costs down: a number of respondents sympathized with the need for food safety requirements but requested that changes consider the cost of compliance.
- Respondents also underscored the need for in-person content delivery. One respondent summarized this sentiment in a concise manner:

“Provide in-person educational outreach rather than only doing outreach through the web.”

7. In what format would you prefer to receive information regarding food safety?

MIFFS designed the remainder of the survey questions (#7, #8, and #9) to gather information on how to format future food safety information distribution and technical assistance programming to most effectively reach specialty crop growers in Michigan.

Question #7 asked respondents to identify the *best formats* for receiving information regarding food safety. Under the assumption that specialty crop growers consume information from a variety of sources, respondents were allowed to select multiple options to fit their needs. The preferences of the respondents to this survey are shown below:

Choices	Percentage
E-newsletter	58.62%
Workshops at relevant conferences	45.69%
Through existing ag-related meetings	36.21%
Classroom workshops	34.48%
Online Courses (available at any time)	34.48%
On-farm workshops	33.62%
Webinars	27.59%
<b>Other</b>	
MDARD website	24.14%
Dedicated website (non-MDARD)	23.28%
Associations publications	15.52%
MDARD representatives at events	15.52%
Blogs	8.62%
Conference Calls	6.90%
Other	5.17%

As shown above, an E-newsletter was selected by a majority of respondents, or 58.62%. Workshops at relevant conferences garnered the second highest percentage of responses (45.69%), followed by through existing ag-related meetings (36.21%) and classroom workshops (34.48%) and online courses (also 34.48%).

These responses appear to indicate a few key findings:

- Respondents prefer food safety information is distributed via multiple channels, including via both written communication as well as in-person workshops.
- There was a strong preference for some form of workshop, whether through existing events, on-farm, or in the classroom.
- The #2 and #3 choices indicate a preference for inserting food safety programming into pre-existing conferences and ag-related meetings so that participants can access information through events and entities that they are already familiar with. This is consistent with the MIFFS observation of ‘farmer fatigue’ discussed in our summary of the focus groups.
- Aside from e-newsletters, respondents had a much lower preference for passive means of communication, including Associations publications, blogs, and MDARD representatives at events.

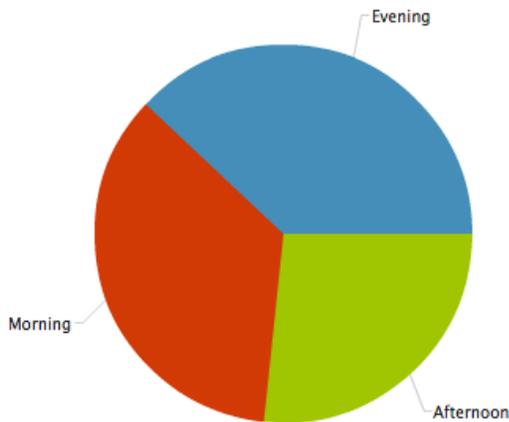
Analysis of the “Other” category revealed two specific requests for MSU Extension to deliver future food safety content.

8. During what time(s) of day are you most likely to attend a food safety workshop?

Question #8 asked respondents to weigh in on the *best time of day* to attend a food safety workshop. This question utilized a checkbox to allow respondents multiple choices among morning, afternoon, and evening.

At 38%, respondents slightly favored evening workshops over morning workshops (35.3%). There was the least preference for afternoon workshops, with just 26.7%. selecting this option. Across the entire survey, this question seemed to present the least clear recommendation. To best reach Michigan specialty crop growers, future food safety programming may need to be held at a variety of times of day.

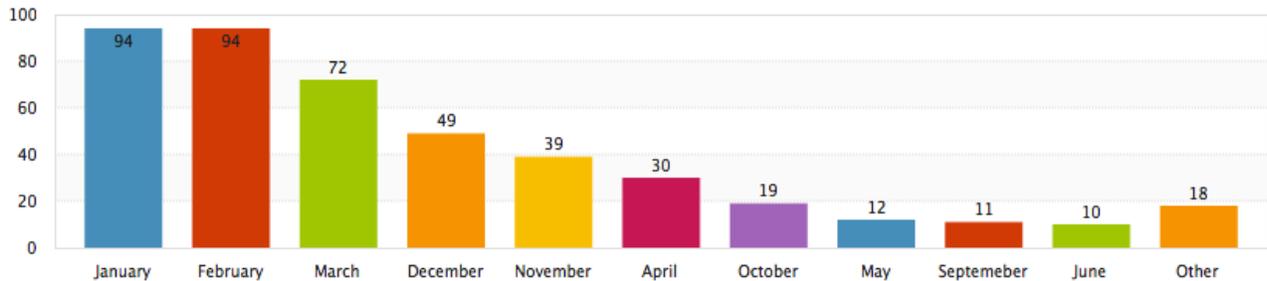
Preferred Time for Food Safety Workshop



9. During what month(s) are you most likely to attend a food safety workshop?

Question #9 was the final content question of the survey, and asked respondents to weigh in on the *preferred time of year* to attend a food safety workshop. This question utilized a checkbox to allow respondents multiple choices among morning, afternoon, and evening.

The winter months of January and February were the clear winners, each garnering 94 votes. Stated another way, 81% of respondents chose January as a preferred option, and 81% of respondents chose February. After analyzing the data further, MIFFS found that 83 of 116 respondents chose *both January and February* as an option, showing a clear preference for those two months at 71.5% of respondents. March was close behind at 72 votes. Next highest was December, gathering 49 votes, which is under 50% of respondents.



The preference for January and February may also be consistent with the results from Question #7 that indicated a preference for workshops and other in-person content that is combined with pre-existing events and conferences. Some that come to mind include the MIFFS Family Farms Conference as well as the annual Northern Michigan Small Farms Conference in Grayling.

Finally, MIFFS data analysis found that the months of July and August garnered fewer votes together than did October, suggesting that these months are not ideal for food safety workshop or similar programming.

**Appendix C – MIFFS Annual Meeting – Results and Recommendations**

NOW: Specialty crop grower interaction with food safety programs

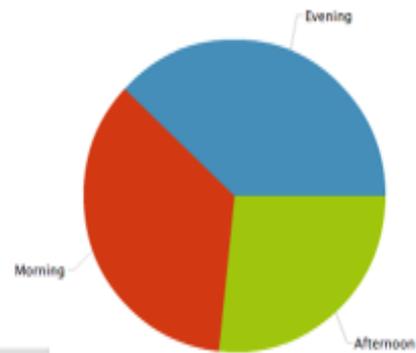
Do you currently participate in any food safety verification or certification programs?



Choices	Percentage	Count
USDA Good Agricultural Practices (GAP) / Good Handling Practices (GHP)	22.41%	26
PrimusLabs	19.82%	23
Other	7.76%	9
The Global Food Safety Initiative (GFSI)	6.90%	8
Organic Certification	4.31%	5
Global G.A.P.	2.59%	3
Michigan's Safe Food Risk Assessment	2.59%	3
Other		
Scientific Certification Systems	0.86%	1
Safe Quality Food (SQF and SQF 1000 Code)	0.86%	1
Michigan Group G.A.P. Pilot Program	0.86%	1
	<b>Total Entries</b>	<b>116</b>
	<i>Unanswered</i>	<i>69</i>

FUTURE: where and how specialty crop growers want to get information on food safety

Preferred Time for Food Safety Workshop



Choices	Percentage
E-newsletter	18.62%
Workshops at relevant conferences	45.63%
Through existing ag-related meetings	36.22%
Classroom workshops	34.48%
Online Courses (available at any time)	24.48%
On-farm workshops	13.62%
Webinars	27.59%
Other	
MDARD website	24.14%
Dedicated website (not-MDARD)	22.28%
Associations publications	15.52%
MDARD representatives at events	15.52%
Blogs	8.62%
Conference Calls	6.90%
Other	5.17%

FUTURE: How MDARD can help specialty crop growers with food safety challenges

Reduce COSTS.  
Create CONSISTENCY.

Ensure SIMPLICITY:  
"We need a one-stop-shop" for food safety info.  
"Establish one source of information specific to Food Safety, if possible."

Build RELATIONSHIPS:  
"Too many times producers feel threatened by the USDA & MDARD about failing an audit, so I see producers that do not want to get GAP Certified. [At my most recent audit,] I felt that our GAP Auditor was trying to find something wrong; this does not create a good relationship between producer and government."

# **MDARD PROJECTS**

## **PROJECT TITLE: MICHIGAN DEPARTMENT OF AGRICULTURE ENVIRONMENTAL STEWARDSHIP DIVISION – Specialty Crop Field Sanitation Septage Hauling and Food Safety – FINAL**

### **PARTNER ORGANIZATION**

Michigan Department of Environmental Quality  
Michigan Septage Hauler Association Michigan  
OSHA  
Michigan Farm Bureau  
Michigan Blueberry Growers Association

### **PROJECT SUMMARY**

Specialty crop producers are required to simultaneously meet Michigan Occupational Safety and Health Administration (MIOSHA) standards for portable toilets and hand washing. To meet market demand, specialty crop producers need to move portable toilets for easy access by their workforce. Under Part 117 of the Natural Resources and Environmental Protection Act (NREPA), PA 451 of 1994, as amended, a license for such movement is required. This includes training, equipment registration and fees. The training under Part 117 focuses almost entirely on the land application of septage for final disposal. Information on the safe movement of portable toilets and maintaining its interior in a sanitary condition is not adequately addressed. Yet, this is the only practical training that is germane to specialty crop producers and associated operations.

### **PROJECT PURPOSE**

The objective of this project was to remove the inapplicable technical training and legal impediments to specialty crop production in Michigan. Effective risk reduction practices for specialty crop field sanitation will be established by Michigan Department of Agriculture and Rural Development (MDARD). Targeted training for specialty crop producers will be provided and integrated with ongoing industry education efforts. The utilization of MDARD established practices, verified training, and use of a licensed septage hauler for final disposal of septage waste will serve as the legal basis for specialty crop producer's exemption from Part 117 license requirements.

### **PROJECT ACTIVITIES**

- Collected information on Risk Reduction Best Practices and cost estimates of available technology options.
- Privy research compilation of applicable laws, consulted with Michigan Farm Bureau (MFB) and the Michigan Department of Environmental Quality (MDEQ) to clarify regulatory situation.
- Developed Risk Reduction Best Practices PowerPoint presentation on March 31, 2016.
- Pump and storage research (researched technical feasibility, identified best solutions, clarified regulatory circumstances, documented requirements at various governmental levels, consulted with MDEQ).
- Compilation of risk reduction practices for managing portable toilets and improving food safety (employee training, required documentation, moving units in field, pumping and temporary storage, spill response, etc.).
- Completed several cycles of review and comment incorporation for the Risk Reduction Best Practices document.

- Revised Risk Reduction Best Practices to conform to MDEQ interpretation of NREPA, Part 117.
- Researched legal alternatives for providing field sanitation, while also properly managing waste streams.
- Researched various commercial products that may reduce the risk of portable toilet tank contents splashing/spilling during movement
- Further regulatory research on the "implement of husbandry" interpretation and exemptions under NREPA, Part 117. On November 2, 2016, the MDEQ provided an official interpretation of this law.
- On April 12, 2016, project staff held a meeting with five growers representing various segments of the industry, MDEQ staff, Michigan Farm Bureau, the Michigan Septage Haulers Association, the Michigan Septic Tank Association, and the Michigan Blueberry Growers Association. The purpose of the meeting was to discuss:
  - Risk reduction practices in the field from agricultural producers' perspective;
  - Risk reduction practices in the field from licensed septage haulers perspective;
  - Septage mobility needs and areas of concerns and concurrences;
  - Septage storage capacity needs and daily flow estimates;
  - Septage hauling and transportation needs and issues; and
  - Options for follow-up.

To facilitate the meeting, project staff developed a list of exploratory questions to help build a common understanding of problems and potential solutions.

  - "Implement of husbandry" clause under NREPA, Part 117 was discussed at length.
  - A great deal of information was exchanged and a follow-up meeting was scheduled with MDEQ on May 6, 2016, to further discuss exemptions under NREPA, Part 117.
- Training of all Migrant Labor Housing staff was completed on November 15, 2016.
- 109 trainings for specialty crop growers have been completed.
- A legal do's and don'ts guide has been posted to the MDARD website. The guide briefly describes legally acceptable and unacceptable practices.

#### GOALS AND OUTCOMES ACHIEVED

- **Output 1:** Utilize existing standards, training, and reference materials as the basis for specialty crop producer discussions on risk reduction practices. Target: 20 references obtained from government, academic, or commercial sources.

**Results:** The project literature review has resulted in 66 references to date.

- **Output 2:** Involve specialty crop producers and regulatory agencies in review and evaluation of potential risk reduction practices. Target: 10 producers and five agency staff, each participating in the review. Quarterly steering committee meetings will be used to guide progress.

Results: Twenty-nine specialty crop producers, five MDARD staff, MDEQ, MFB, and MIOSHA have participated in meetings and review of the Risk Reduction Best Practices.

- **Output 3:** Create a set of recommended risk reduction practices for specialty crop producers, addressing risks and requirements associated with portable toilet use for field sanitation. Target: 30 item PowerPoint presentation, poster board, and display panel each designed to train specialty crop producers on recommended practices and how to implement them.

**Results:** A draft Risk Reduction Best Practices was developed and released for vetting by industry and regulatory groups. After several rounds of comments, the document was finalized on November 2, 2016. The document, in addition to a portable toilet inspection checklist, and a legal “do’s and don’ts guide” is currently posted on the MDARD website ([www.michigan.gov/mlh](http://www.michigan.gov/mlh)). A PowerPoint presentation was completed on March 31, 2016, and recently updated due to the recent regulatory interpretation of NREPA, Part 117 by the MDEQ. The poster board and display panel are no longer required for training purposes due to the change in strategy from providing training in a group setting to one on one training.

- **Output 4:** Reach specialty crop producers with the materials developed in this project. Target: Hold five training events, cumulatively reaching 100 specialty crop producers.

**Results:** Migrant Labor Housing staff has completed 109 training of specialty crop growers.

- 85% of respondents indicated the trainings improved their understanding of the legal requirements of managing portable toilets.
- 56% of respondents indicated the training could help them improve food safety.
- 50% of respondents indicated that the training could help them improve worker safety.
- 66% of respondents indicated that the training could help reduce environmental risks associated with managing portable toilets.

As a result of educating the specialty crop community about legal requirements of septage movement under Part 117, the matter was placed on the Michigan Farm Bureau legislative agenda for 2016 so it can be tackled in 2017. It seems possible that the law that restricts moving portable toilets could be amended or removed as a result of this process.

- **Output 5:** Develop a model for an on-going program/process to maintain producer knowledge. Target: An adaptable training shell to accommodate various regulatory/consensus standards.

**Results:** The PowerPoint presentation serves as the model for the ongoing, adaptable training shell, and is posted on MDARD’s website ( [www.michigan.gov/mlh](http://www.michigan.gov/mlh)) The presentation will be reviewed on a regular basis and updated as needed to accommodate changing regulatory/consensus standards.

- **Output 6:** Reduce the frequency of legal action taken against specialty crop producers by the Department of Environmental Quality for non-compliance with Part 117 of the Natural Resources and Environmental Protection Act (PA 451 of 1994 as amended). Target: 50% of specialty crop producers will have reduced risk of legal action via knowledge gained during training. The target for future year’s enforcement action is zero.

**Results:** No additional specialty crop growers have had enforcement actions initiated against them during the grant period.

## **BENEFICIARIES**

Please see various output and results achieved under Goals and Outcomes for a list of direct and indirect beneficiaries of this project.

## **LESSONS LEARNED**

Working with diverse private and public organizations and gaining knowledge about existing rules, regulatory impediments and the level of influence these organizations have on field sanitation practices was highly rewarding. The information gathered, the training provided and

the knowledge gained will provide a solid basis for a more robust future legislative amendments to Part 117 that aligns well with the need of specialty crop growers and still provide assurances for the protection of workers health and the safety of the food chain.

#### CONTACT PERSONS

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#### ADDITIONAL INFORMATION

- The listed documents below can be found at [www.michigan.gov/mlh](http://www.michigan.gov/mlh)
  - Septage Power Point: Managing Portable Toilets in Specialty Crop Production
  - Portable Toilets Do and Don'ts
  - Septage Survey Form
  - Portable Toilet Inspection Checklist
  - Portable Toilet Risk Reduction Outline

## Managing Portable Toilets in Specialty Crop Production

**Hand labor operations**  
Environmental Stewardship Division

### Applicable Laws (1/3)

Purpose:

Help specialty crop growers improve food, worker, and environmental safety

Educate growers about legal requirements



### Outline

Applicable laws

Legal issues

Risk Reduction Practices

Inspection checklist



### **Applicable Laws (1/3)**

- OSHA field sanitation (1928.110) key requirements
  - Requires portable toilets to be available within ¼ mile of workers
  - 1 toilet per 20 employees minimum
  - Hand wash stations with portable water (tested/approved), paper towels and soap
  - Trash receptacle

### **Applicable laws (2/3)**

- OSHA field sanitation
  - Enforced by Michigan OSHA
  - Each employee must be informed of toilet location
  - Inform of importance of good hygiene practices
  - Maintain sanitary conditions
  - Some exemptions (less than 3 hour workday, less than 11 employees)

### **Applicable laws (3/3)**

- Natural Resources and Environmental Protection Act (NREPA) Part 117
  - Enforced by Michigan DEQ
  - Requires a license to service portable toilets
  - Mostly sets requirements for temporary storage and land application of septage

### **Legal issues (1/4)**

- The DEQ stated in 2016 that any movement of portable toilets with human waste in the tank without a license is illegal
  - Applies to private property
  - Potential enforcement action, including fines
    - Misdemeanor
    - Up to \$5,000 fine

### **Legal issues (2/4)**

- Many specialty crop growers have reported the need to move portable toilets
  - Public roads vs private roads
  - Key to food safety

- In addition to growers needing to meet field sanitation standards, many must also pass a 3<sup>rd</sup> party audit to access markets (GAP, Primus, etc.)

#### **Legal issues (3/4)**

- MDARD and several growers met with the DEQ and the Septage Haulers Association in 2016 to attempt to find a solution
  - An exemption was discussed along with several alternatives
  - Septage Haulers opposed to allowing growers to move portable toilets with waste inside

#### **Legal issues (4/4)**

- The Michigan Farm Bureau placed the issue of moving portable toilets on their 2017 Q1 legislative agenda
  - Possible solution in 2017



#### **Risk Reduction Practices (1/5)**

- Document to help growers implement within on- farm policy
  - Holistic policy
  - Meant to be customized by the farm
    - Specific needs
    - Available in electronic format: [www.mdard/mlh](http://www.mdard/mlh) (under Septage Grant heading)

### **Risk Reduction Practices (2/5)**

- Components of the policy
  - Emergency contacts
    - Saves valuable time in emergencies
    - Ensures the proper contacts are made
- Where to locate units
  - ¼ mile rule
  - Shade if possible
  - Away from sensitive areas
  - Protection of crop

### **Risk Reduction Practices (3/5)**

- Components of the policy
  - Number of units in field
    - 1:20 ratio
    - Responsible person
    - Daily sanitation inspections
    - Cleaning procedures to supplement weekly hauler servicing



### Risk Reduction Practices (4/5)

- Components of the policy
  - Transportation of units
    - Will be updated if legal situation changes
    - No movement of units with human waste inside
    - Common sense restrictions on movement of empty units



Hand wash stations

- Potable water with tested and approved source
- Employee training
- Signs in workers native languages

### Risk Reduction Practices (5/5)

- Components of the policy (continued)
  - What to expect from a weekly service agreement
  - Spill plan
    - Response personnel
    - Hygiene
    - PEP
    - Equipment





Portable Toilets Do and Dont

Placement & Relocation		<ul style="list-style-type: none"> <li><input type="checkbox"/> Transport <u>only when empty</u></li> <li><input type="checkbox"/> Transport portable toilets in secure manner</li> <li><input type="checkbox"/> Use vehicles specifically designed and equipped for transport</li> <li><input type="checkbox"/> Ok to move empty toilets mounted on trailers on public roads when empty</li> <li><input type="checkbox"/> Ensure appropriate number of units and distance from employees by referring to portable toilet risk reduction outline at <a href="http://www.michigan.gov/MLH">www.michigan.gov/MLH</a></li> </ul>
Servicing & Transport		<ul style="list-style-type: none"> <li>• Transport on public roadways only by licensed septage haulers</li> <li>• Use of properly equipped small pump out vehicles on the farm by licensed haulers</li> <li>• No transport of partially full toilets on or off the farm</li> </ul>
Routine Cleaning		<ul style="list-style-type: none"> <li>• Routine wipe down / sanitizing ok by grower</li> <li>• Rinse water from cleaning portable toilets cannot be disposed directly on ground surface</li> <li>• Use low volume hand sprayers for cleaning products</li> <li>• Check with your licensed hauler to confirm which cleaning products are acceptable</li> <li>• Keep wash area surfaces clean and in good condition.</li> </ul>
Final Disposal		<ul style="list-style-type: none"> <li>• Final disposal to offsite location <u>only</u> by MDEQ licensed septage hauler</li> <li>• No direct land application by grower</li> <li>• Discharge to septic tank drain field is <u>not acceptable</u> due the high organic strength &amp; biocides used for odor control</li> </ul>

**Spill Response**



- Spill plan can be accessed within the portable toilet risk reduction outline at [www.michigan.gov/MLH](http://www.michigan.gov/MLH)
- DEQ PEAS hotline (1-800-222-1222)
- Do not attempt to wash spill away
- Contain and remove contaminated material per spill plan

# MDARD Septage Training Survey

1. The information provided increased my understanding of managing portable toilets legally.

---

D Strongly agree    D Somewhat agree    Neutral    D Somewhat disagree    D Strongly disagree

2. The information provided can help me improve food safety.

---

D Strongly agree    D Somewhat agree    Neutral    D Somewhat disagree    D Strongly disagree

3. The information provided can help me improve worker safety.

---

D Strongly agree    D Somewhat agree    Neutral    D Somewhat disagree    D Strongly disagree

4. The information provided can help me reduce environmental risks related to portable toilets.

---

D Strongly agree    D Somewhat agree    Neutral    D Somewhat disagree    D Strongly disagree

5. Which inspector provided your training?

---

D Andy    D Brent    D Ginger    D Mary    D Robert  
 D Stefanie    D Steven

6. What are a few examples of specialty crops your farm grows (optional)?

Thank you very much for taking the time to complete this survey. Your feedback is valued and very much appreciated!

Training Survey · 2016



## Risk Reduction Practices for On-Farm Portable Toilets

The purpose of this document is to provide general guidelines on how to reduce human and food safety risks while also reducing potential for environmental releases. The following outline is intended to be made available for adoption into farm management and/or safety plans as needed by agricultural growers.

1. Emergency contacts (growers should insert their personal and local contact numbers):
  - a. Farm contacts such as owners, and supervisors.
  - b. Licensed septage hauler emergency number (grower's choice of licensed septage business)
  - c. Law enforcement: MI State Police (517-332-2521) and/or county sheriff department
  - d. American Association of Poison Control Centers hotline (1-800-222-1222)
  - e. Local and regional urgent care and hospitals
  - f. Department of Environmental Quality 24hr Pollution Emergency Alerting System (PEAS) (1-800-292-4706)
  - g. Local Health Department, Environmental Health Section – Michigan Association for Local Public Health Directory
2. Location of units in the field:
  - a. Locate units outside of harvest area if possible and prudent, but within 1/4 mile from workers.
  - b. Do not locate units near sensitive areas such as surface water, storm drains, water wells, packing areas, etc. The DEQ's Onsite Wastewater Program recommends a setback of 75 feet from surface waters and water wells.
  - c. When possible, place units in shade to aid in worker comfort.
  - d. Prior to the beginning of work, each employee must be informed where the sanitation facilities are located
3. Number of units in the field:
  - a. Provide a minimum of one portable toilet per 20 employees. Additional toilets may be needed depending on worker locations in the field in order to ensure the "1/4 mile" MIOSHA rule is met. Growers who are audited by private firms (Primus, etc) may have more stringent requirements to meet, such as dedicated male/female bathrooms.
  - b. Designate a responsible person to inspect units on a daily basis to ensure units are clean, stocked, and free of damage. The area around the units should be surveyed for trash and/or leakage.
  - c. Clean and restock toilets on a minimum of a daily basis but perform more often if needed to ensure sanitary conditions. This includes cleaning and sanitizing of the floors, walls, toilet seat area, doors, door handles, urinals, etc. Restock all paper products and soap/sanitizers. Ensure fresh water for hand washing is present in sufficient quantities. Empty trash if needed and collect any loose trash in or around the unit and dispose of properly.
  - d. Cleaning must not result in a release of septage to the field.

- e. Cleaning utensils such as brushes should not be used for any other purposes and should be labeled to prevent this from occurring. These utensils should be stored together as part of a portable toilet cleaning kit.
  - f. If gross amounts of septage are present, such as in the case of a tip or spill, refer to spill plan below.
4. Transportation of portable toilets
- a. Do not transport portable toilets with any human waste inside. The DEQ has stated that this activity is illegal per Part 117 of NREPA. Contact a licensed hauler if a portable toilet must be moved.
  - b. Only allow properly trained employees to transport empty portable toilets. An employee who will move units within a field should be experienced in operation of the equipment and have a working knowledge of the field (locations of any ruts or other hazards) in order to prevent an accident from occurring.
  - c. Ensure empty portable toilets are securely mounted to a road-worthy trailer. Strapping units down is often inadequate due to the plastic structure of the toilets deforming. It is usually best to secure a unit by bracing the base to the trailer.
5. Hand wash stations:
- a. Instruct all employees on proper hand wash procedure and use of toilets at time of hire. Document and file evidence of this training.
  - b. Ensure all portable toilets are provided with a hand wash station which is supplied with water from an approved source. Keep water quality testing information on file in the farm office. Licensed septage haulers will typically provide this documentation to growers so that it will be on-hand for any audits or inspections.
  - c. Ensure all units are stocked with soap, disposable hand drying towels, and trash containers with tight-fitting lids. A grower may opt to provide a hand sanitizer dispenser, but this is not a substitute for washing hands with water and soap.
  - d. Post signs in employees' native language(s) to remind employees of proper hand wash procedures: wash thoroughly before and after use of toilet.
6. Servicing of units by licensed septage hauler:
- a. Most growers opt to contract with a licensed septage hauler each growing season for ease of management.
  - b. The hauler should perform a weekly pump and cleaning at a minimum but should often restock soap and paper products as well.
  - c. The hauler can also move the units to new work locations as desired.
  - d. The farm should retain a written copy of the contract with the hauler.
7. Spill plan:

The farm spill plan establishes proper cleanup procedures and safety measures to be followed during sewage/portable toilet waste spill and remediation efforts. These procedures are designed to protect employees, the public, and the environment from the potentially harmful effects associated with sewage spills.

- a) Response personnel:
  - i) Farm personnel are the primary responders to sewage spills. Responsibilities include determining the cause of, and stopping, a sewage spill, contacting authorities, and proper cleanup and disposal of spilled sewage. Farm supervisors are responsible for ensuring that response personnel are trained prior to engaging in sewage spill clean-up efforts and that sewage spill clean-up efforts are done in accordance with this Plan.

- b) Health hazards:
  - i) Many disease-causing agents are potentially present in raw or partially treated sewage. These organisms include bacteria, viruses, fungi and parasites. In the U.S., most illnesses associated with sewage exposure produce mild to severe flu-like or cold-like symptoms. However, more serious illnesses, such as Hepatitis A, can be contracted through direct contact (mouth, eyes, nose, and ears) with raw sewage. With respect to HIV (AIDS) and HBV (Hepatitis B), the Division of Occupational Safety and Health (DOSH) has stated, in the Bloodborne Pathogen Standard, the following:
    - (1) There is no evidence to suggest that sewage plant or wastewater workers are at increased risk for hepatitis B infection. HBV and HIV may be present in wastewater, but only in a non-viable state and in very dilute concentrations, which would not be expected to pose a risk to wastewater workers or sewage plant workers.
    - (2) Since microorganisms can cause disease by entering the body through the mouth, eyes, ears, nose, or through cuts and abrasions to the skin, proper hygiene and appropriate personal protective equipment (PPE) must be utilized when the potential for direct contact with raw sewage is possible.
- c) Proper hygiene
  - i) Wear waterproof gloves
  - ii) Wash your hands thoroughly after clean-up work. Use plenty of soap, scrub for at least 30 seconds, and rinse thoroughly. Frequent, routine hand washing is the most important safeguard in preventing infection by agents present in sewage.
  - iii) Do not touch fecal matter or raw sewage with bare hands. Wear waterproof gloves and use an instrument such as tongs or a spade when direct contact with fecal material is necessary.
  - iv) Do not touch your nose, mouth, eyes or ears with your hands unless you have just washed.
  - v) Do not smoke, eat, drink, apply lip treatments, or chew gum while cleaning up fecal matter or raw sewage.
  - vi) Reduce exposure by keeping those who are not properly protected from coming in contact with the material.
  - vii) Clean everything, including clothes, tools, and footwear, that came in contact with the fecal matter or raw sewage. Use an approved sanitizer (H2Orange or other product) to wash down contaminated surfaces and cleanup equipment.
- d) Personal protective and clean up equipment:
  - i) As appropriate, use the following equipment when cleaning up sewage spills.
    - (1) Ensure vaccinations are up to date for tetanus and diphtheria. Vaccinations are also available for hepatitis A.
    - (2) Waterproof gloves
    - (3) Face Shield
    - (4) Impervious Coveralls
    - (5) Approved disinfectant detergent
    - (6) Buckets
    - (7) Wet/Dry Vacuum
    - (8) Commercial hand held sprayer(s) for applying disinfectants
    - (9) Mops
    - (10) Tongs
    - (11) Shovels
    - (12) Hydrated lime
  - ii) Clean up procedure:
    - (1) Call the DEQ's PEAS hotline.

- (2) Evaluate how big the spill is (or may become) and take actions to contain the spill in the smallest area possible. If possible, prevent the spill from entering a storm drain or surface water.
- (3) Secure area against unauthorized entry.
- (4) Investigate the potential for electrical hazards and de-energize electrical circuits as necessary.
- (5) Determine if confined space procedures are required and implement as necessary.
- (6) Follow the "Proper Hygiene" section of this document during any cleanup activities.
- (7) Acquire all appropriate Personal Protective Equipment (PPE) and cleanup equipment.
- (8) Prepare disinfectant detergent in bucket(s) and/or sprayer(s) in accordance with the manufacturer's directions.
- (9) Put on appropriate PPE.
- (10) Remove all items from the contaminated area.
- (11) Saturated items should be removed, wrapped in plastic, and delivered to a sanitary landfill.
- (12) If the spill is in a building all hard surfaces, such as linoleum, hardwood floors, concrete, wood moldings, wood, and metal items, etc. it should be thoroughly cleaned with hot water and disinfectant detergent. Let the surfaces air-dry or use fans and heaters to speed the drying process. Increasing the air circulation will reduce odors and mold growth.
- (13) Remove and replace drywall that has been saturated and are soft to the touch. If the surface has only been wetted, clean as you would a hard surface, but do not saturate the drywall.
- (14) Clean the portable toilet units, inside and out, with disinfectant detergent. Let air dry.
- (15) Contact licensed septage business to collect and dispose of spilled sewage and/or fecal matter.
- (17) Contaminated soil, sand or lawn should be allowed to degrade naturally as microbes will be inactivated within several days of exposure to UV radiation from sunlight. Bacterial numbers on grass are generally reduced to background levels within 20 days. Place barriers and signs to restrict access during this time. Following complete clean-up of the contaminated area, wash your hands thoroughly and launder soiled clothes separately. Disinfect "clean-up" mops, brooms, shovels, tongs, brushes, etc. with disinfectant detergent.
- (18) If you have any questions or concerns regarding the clean-up and disposal of fecal matter and/or raw sewage, please contact the Michigan Department of Environmental Quality.

iii) Exposure and first aid:

If you believe that raw sewage has come into direct contact with your eyes, mouth, ears, nose, or a cut, abrasion, puncture, etc., immediately and thoroughly wash the exposed area with copious amounts of soap and water and seek the care of an Occupational Physician.

**PROJECT TITLE: MICHIGAN DEPARTMENT OF AGRICULTURE & RURAL DEVELOPMENT – 2015 International and Domestic Activities to Increase Sales for Specialty Crops - FINAL**

**PARTNER ORGANIZATION**

Michigan Bean Commission  
Michigan Apple Committee  
Michigan Potato Commission  
Cherry Marketing Institute

**PROJECT PURPOSE**

The Michigan Department of Agriculture & Rural Development & Rural Development (MDARD), International Marketing Program worked with the Cherry Marketing Institute, Michigan Bean Commission, and the Michigan Apple Committee to promote specialty crop products both domestically and internationally through a variety of activities. The goal of participating in the various trade shows and conducting a trade mission are to increase sales and exports of specialty crop commodities. Exports continue as a priority for the specialty crop commodities, growers and companies as their production levels continue to increase and the need for markets grows as the production increases. The projects built on previous funded projects by exhibiting at new trade shows and showcasing new products that were not previously available.

**PROJECT ACTIVITIES**

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 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 provided a low cost opportunity for the specialty crop commodity groups and companies to see existing customers as well as find new buyers and markets.

MDARD's International Marketing Program staff meets with the project partners once the project is approved to discuss implementation and participation in the various trade shows. Additionally, 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 2015 calendar year. The commodity groups also helped to promote the shows and activities by sending information to their growers and processors. E-mails specific to each activity were also 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 2015. This magazine is distributed to nearly 8,000 readers in over 50 countries, and it is also distributed at the major international trade shows.

### **Activity 1**

#### **Fruit Logistica – February 4-6, 2015, Berlin, Germany**

MDARD, in cooperation with Cherry Marketing Institute and the Michigan Apple Committee staff a booth at the 2015 show. This project was intended to reach specifically to fruit buyers in Europe and from around the world. This show is very focused and provided a great opportunity to talk about tart cherries, apples and blueberries from Michigan. The Michigan specialty crop booth was able to collect leads that were then shared with Michigan specialty crop companies.

### **Activity 2**

#### **American Food Fair at the National Restaurant Association Show – May 16-19, 2015, Chicago, IL**

MDARD secured booth space at the National Restaurant Association Show in Chicago, Illinois, 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. Approximately 45,000 people attended the show, consisting of both international and domestic buyers. An MDARD employee represented Michigan specialty crops at a booth in the Michigan Pavilion in the American Food Fair. Information on Michigan specialty crops was distributed such as nutrition information and contact information for specific commodities. There was also literature available on Michigan apples as well as Michigan wineries. Specific interest was shown by many of the show's attendees including, restaurants looking to source specific Michigan ingredients, nutritional camps and culinary training programs looking to incorporate more healthy foods, food writers interested in learning more about Michigan specialty crops and wineries, as well as people looking for information on farmers markets and methods of sourcing Michigan specialty crops.

### **Activity 3**

#### **U.S Food Showcase at Food Marketing Institute Connect Show – June 9-11, 2015, Chicago, IL**

MDARD staff along with the Michigan Potato Industry Commission and Michigan Apple Committee promoted specialty crops from the state of Michigan. Literature and specialty crop value added products were available for tradeshow attendees to take and sample.

### **Activity 4**

#### **Michigan Pavilion at Anuga – October 10-14, 2015, Cologne, Germany**

MDARD Staff as well as two Michigan companies and one commodity group traveled to Cologne, Germany from October 10-14, 2015, to promote Michigan Specialty Crops to the international audience at the 2015 Anuga trade show at an affordable rate. Cherry Marketing Institute, Graceland Fruit and Safie Specialty Foods shared a booth space at the show. Show attendance was strong and literature and specialty crop value added products were available for tradeshow attendees to take and sample.

### **Activity 5**

#### **Americas Food & Beverage Show – October 26-27, 2015, Miami, FL**

Three specialty crop companies traveled to Miami, Florida on October 26-27, 2015, to exhibit at the 19th Americas Food and Beverage Show. The show drew a strong domestic and international crowd and primarily targeted buyers from the Caribbean, Central and South American markets. Cherry Central, Jack Brown Produce, Inc., and Findlay's Organics participated in the Michigan Pavilion at an affordable cost.

## GOALS AND OUTCOMES ACHIEVED

### **Fruit Logistica**

The show attracted over 65,000 visitors from 137 countries to the 2015 show. The show brought together importers and exporters along with wholesalers and retailers. The goal of having two commodity groups and Michigan specialty crop companies with reached with Cherry Marketing Institute, Michigan Apple Committee and Graceland Fruit Inc. participating. It was reported that two out of the three participants would enter a new market as a result of participating in the show. The new markets include China and Dubai. All three participants reported contacts with new buyers as a result of participating with a total of 21 new contacts being made meeting the minimum of five buyer contacts per participant. A total of 13-15 new buyer relationships were made during 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. This goal was achieved as both the Michigan Bean Commission and the Michigan Potato Industry attended the show.

Specialty crop groups, Michigan Potato Industry Commission and the Michigan Bean Commission, who exhibited at the show considered the show to be a success. The two groups reported 40 leads as a result of their participation which they classified as 'very good'. The Michigan Bean Commission reported an expected increase in domestic sales in the next 12 months as a result of exhibiting at the show. Both groups rated the overall effectiveness of the show as 'very good' or 'excellent'.

### **FMI**

The goal was to have a minimum of two Michigan specialty crop company and commodity groups attend the 2015 show was reached with the both the Michigan Apple Committee as well as the Michigan Potato Industry Commission having booths. They provide information and samples of their respective commodities they were representing. Michigan Apple Committee generated 12 leads from the show meeting the goal of a minimum of five leads. The Michigan Potato Industry Commission generated a total of 15 leads again meeting the minimum of five leads. A total of six additional leads for specialty crops were collected by MDARD staff and shared with the appropriate specialty crop commodity groups or companies selling those products.

### **Anuga**

The goal of promoting Michigan Specialty Crops to global buyers was accomplished while also helping to offset the cost of participation. Anuga is the world's leading trade show for the food & beverage industry and the five day show hosted a record breaking 7,063 exhibitors from 108 countries. The show also saw a growth in attendance with around 160,000 trade visitors from 192 countries. Cherry Marketing Institute, Graceland Fruit and Safie Specialty Foods exhibited in the Michigan Specialty Crops booth as part of the USA Pavilion.

Anuga provided exhibitors with the largest trading platform of the international food & beverage industry and the exhibitors in the Michigan Specialty Crops booth felt that the overall effectiveness of the show was excellent. International buyers sought out the Michigan specialty crop booth to discuss specific products and sample specialty crop value added products.

- The two specialty crop companies yielded a total of 80 new buyer contacts during the show and the one commodity group yielded a total of 17 new buyer contacts during the show, exceeding the goal that the two specialty crop companies and the one commodity group would each make five new buyer contacts or trade leads.
- The two specialty crop companies anticipate sales of \$265,000 over the next 6-12 months, meeting the goal of having at least 50% of the participating companies realize sales from participation.
- The two specialty crop companies reported that they would enter a new market as a result of the show, including Lebanon, Egypt, India, Moldova, and Turkey. This

exceeded the expectation that at least one company will enter a new export market due to participation.

### **Americas Food & Beverage Show**

There were over 500 companies with displays at the show who were exposed to over 10,500 food and beverage buyer from 63 countries. The show drew a strong domestic and international crowd and primarily targeted buyers from the Caribbean, Central and South American markets. Cherry Central, Jack Brown Produce, Inc., and Findlay's Organics participated in the Michigan Pavilion at an affordable cost. The show provided an excellent opportunity for exhibitors to meet with buyers from emerging marketing in the Caribbean and Latin American markets.

- The three companies made a total of 38 leads, exceeding the goal that each organization would make five new buyer contacts or trade leads.
- All three companies anticipate an approximate \$250,000 in export sales in the next 12 months as a result of the show, exceeding the goal of having at least 50% of the participating companies realize sales from participation.

## **BENEFICIARIES**

### **Fruit Logistica**

Participants included:

- Cherry Marketing Institute (Representing 450 Michigan tart cherry growers, 40 growers nationally, and 290 Michigan sweet cherry growers.)
- Michigan Apple Committee (Representing 850 Michigan apple growers and eight shipper/exporting organizations)
- Graceland Fruit Cooperative (Grower owned cooperative)

### **National Restaurant Association Show**

Participants included:

- Michigan Potato Industry Commission (representing 86 potato growers)
- Michigan Dry Bean Commission (representing 1500 Michigan dry bean growers)
- MDARD's International Marketing Program representing all Michigan specialty crops

### **Food Marketing Institute Show**

Participants included:

- Michigan Apple Committee (Representing 900 Michigan apple growers)
- Michigan Potato Industry Commission (Representing 86 potato growers)
- MDARD's International Marketing Program representing all Michigan specialty crops

### **Anuga**

Participants included:

- Cherry Marketing Institute (Representing 540 Michigan tart cherry growers, 60 growers nationally, 470 sweet cherry growers)
- Graceland Fruit (Grower owned cooperative)
- MDARD representing all Michigan specialty crops
- Safie Specialty Foods

### **Americas Food & Beverage Show**

Participants included:

- Cherry Central (Grower owned cooperative)
- MDARD representing all Michigan specialty crops
- Jack Brown Produce
- Findlay's Organics

## LESSONS LEARNED

The activities conducted both in the U.S. and abroad for the promotion of Michigan specialty crops continue to play a critical role for Michigan specialty crop companies and commodity groups in connecting them with new buyers and increasing sales. 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. The trade mission to Colombia and the Dominican Republic was canceled due to a lack of specialty crop commodity groups and companies registering for the event. Only the Michigan Apple Committee and one apple shipper was able to participate so it was decided that it would be best to cancel the event. The project committee decided that due to changes and other trade missions it was best not to pursue this trade mission but to re-evaluate and look at other markets.

## CONTACT PERSON

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## ADDITIONAL INFORMATION

### EVALUATION/FOLLOW-UP FOR INTERNATIONAL ACTIVITIES

#### Fruit Logistica Trade Show Evaluation

#### Michigan Specialty Crop Booth

Activity Date: February 4-6, 2015

**Evaluations Gathered from:** -Michigan Apple Committee; -Cherry Marketing Institute; -Graceland Fruit

#### Activity Evaluation

Does your industry/company anticipate an increase in purchases over the next 6-12 months as a result of the trade show? **Yes-2 No-1**

If Yes, approximately how much? \$357,500 Percentage increase: 5% & 40%

Did the Fruit Logistica Show yield contacts with new buyers?

**3 Yes No** If yes, how many? 21 (cumulative)

Did the Fruit Logistica Show result in any new buyer relationships; **2 Yes 1 No** If yes, how many? 13-15 (cumulative)

Will you enter any new markets as a result of exhibiting at the Fruit Logistica Show?

**2 Yes 1 No** If yes, which ones? Dubai, China

Please rate the activity on the following:

Pre-event planning & communication	average: 5
Program execution	average: 4.6
Fulfillment of your company needs	average: 4.3
Cost/benefit returns to your company	average: 5
Quality of contacts or information	average: 4.6

Please estimate company financial and 'overhead' expenses for the activity:

Total Number of Staff Hours for Planning, Participation & follow-up	190	Hours
Direct Costs of Planning Participation & Follow-up (including travel)	\$ 21,481.09	
Other Misc. Costs Associated with Participation in Activity	\$3500.00	
<b>Total</b>	<b>\$24,981.09</b>	

Please rate the overall effectiveness of the show:

  1   Excellent   1   Very Good   1   Average    Fair    Poor

Comments or recommendations:

- The Michigan Dept of Ag and Rural Development do a great job with these shows. We met with our traditional importers and were excited to make some new contacts for new business.
- Great Place for us to meet with existing customers and grow business/ partnership

**NRA Show– Michigan Pavilion**

Activity Date: May 16-19, 2015

Participants:

- Better Made Snack Foods*
- Cherry Central*
- Michigan Bean Commission*
- Michigan Potato Industry Commission*
- Naturipe*
- Temperance Distilling Co. (TDC)*
- The Great Lakes Potato Chip Co.*
- Zeeland Food Services Inc.*

**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:**

(Excellent=5, Very Good=4, Average=3, Fair=2, Poor=1).

Company Objective	Importance/Effectiveness
	Mean
Retailers	2.64
Foodservice/Hotel	2.43
Institutional	2.625
Caterer/Airline/Cruise Line	3.67
Wholesalers/Distributors/Import-Export	2.75
Brokers/Consolidators	4.57

**How many contacts/leads resulted from your participation?** (Total for all): 270

**How many employees does your company have?** (No. of companies)

1-25: 4	250-499: 1
26-50: 0	500-999: 0
51-99: 2	1000+: 0
100-249: 1	

**What is your primary business activity?** (No. of companies)

Manufacturer: 5	Exporter/Trading Company: 1
Distributor/Wholesaler:	Other: 3
Services: 1	(One company had multiple answers)

**How would you rate the quality of contacts/leads?** (No. of companies)

Excellent: 1	Fair:
Very Good: 4	Poor:

Average: 2  
(one company did not answer this question)

**Please rate the overall effectiveness of the show:** (No. of companies)

Excellent: 2  
Very Good: 3  
Average: 2  
(one company did not answer this question)

Fair:  
Poor:

**Is your company new to exporting?** (No. of companies)

Yes: 1  
No: 7

Maybe:  
N/A:

**Will you enter into a new export market as a result of your participation in the show?**

Yes: 1  
No: 3

Maybe: 1  
N/A: 3

**If yes, please list country (or countries):** Korea

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

Yes: 1  
No: 7

Unsure or N/A:  
Domestic: \$76,000    Export: \$15,000

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

Yes: 6  
No: 1  
Unsure or N/A: 1                      Domestic: \$905,000                      Export: \$20,000

**What product category (or categories) will you export as a result of the event?** Potato chips, spirits & wines, edible oil

**Would you have participated in this activity without the assistance of the Michigan Department of Agriculture (MDARD)?** (Number of Companies)

Yes: 2  
No: 3  
Unsure or N/A: 3

**Please rate the performance of the MDARD Agriculture Development staff for this activity, as applicable, for the following areas:** (Excellent=5, Very Good=4, Satisfactory=3, Fair=2, Poor=1).

**MDARD Staff Average**

<b>Pre-event planning and assistance</b>	4.86
<b>Communication regarding event</b>	4.86
<b>Assistance at event itself</b>	5

**Total Number of Staff Hours for Planning, Participation, and Follow-up:** 384 hours (one company did not answer this question)

**Direct Costs of Planning, Participation, and Follow-up (including travel):** \$56,850  
(one company did not answer this question)

**Other Misc. Costs Associated with Participation in Activity:** \$19,200  
(two companies did not answer this question)

**Comments or suggestions:**

Several companies had left some comments or suggestions. Listed below are the actual comments made from the companies that chose to leave a response.

- Good show, we will come again
- See ya next year
- Hannah and Jamie were awesome!
- Very valuable for our small company

**FMI– Michigan Pavilion**

Activity Date: June 9-11, 2015

Participants:

*Cherry Central Cooperative Inc.*  
*Findlay's Organics*  
*HoneyTree Inc,*  
*LorAnn Oils Inc.*

*Michigan Potato Industry Commission*  
*Michigan Apple Committee*  
*Microcide Inc.*  
*Safie Specialty Foods Co. Inc.*

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: (Excellent=5, Very Good=4, Average=3, Fair=2, Poor=1).

Company Objective	Importance/Effectiveness
	Mean
Retailers	3.71
Foodservice/Hotel	3.33
Institutional	3.17
Caterer/Airline/Cruise Line	1.8
Wholesalers/Distributors/Import-Export	4
Brokers/Consolidators	2.83

**How many contacts/leads resulted from your participation?** (Total for all who responded): 145

**How many employees does your company have?** (No. of companies)

1-25: 4	250-499: 0
26-50: 2	500-999: 0
51-99: 1	1000+: 0
100-249: 1	

**What is your primary business activity?** (No. of companies)

Manufacturer: 6	Exporter/Trading Company:
Distributor/Wholesaler:	Other: 1
Services: 1	

**How would you rate the quality of contacts/leads?** (No. of companies)

Excellent: 2	Fair:
Very Good: 5	Poor: 1
Average:	

**Please rate the overall effectiveness of the show:** (No. of companies)

Excellent:	Fair: 1
Very Good: 5	Poor: 1
Average: 1	

**Is your company new to exporting? (No. of companies)**

Yes: 2

Maybe: 0

No: 6

N/A: 0

**Will you enter into a new export market as a result of your participation in the show?**

Yes: 2

No: 3

Maybe: 2

N/A:

**If yes, please list country (or countries):** China, Japan, Pakistan, India

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

Yes: 2

No: 4

Unsure or N/A: 2

Domestic: \$20,000

Export: \$0

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

Yes: 5

No: 2

Unsure or N/A: 1

Domestic: \$100,000

Export: \$50,000

**What product category (or categories) will you export as a result of the event?**

Apples, flavors, ingredient, dried, freezer, manufacturing, food safety products, organic beans

**Would you have participated in this activity without the assistance of the Michigan Department of Agriculture & Rural Development(MDARD)? (Number of Companies)**

Yes: 0

No: 6

Unsure: 1

Please rate the performance of the MDARD Agriculture Development staff for this activity, as applicable, for the following areas: (Excellent=5, Very Good=4, Satisfactory=3, Fair=2, Poor=1).

<b>MDARD Staff Average</b>	
<b>Pre-event planning and assistance</b>	4.88
<b>Communication regarding event</b>	4.88
<b>Assistance at event itself</b>	4.88

**Total Number of Staff Hours for Planning, Participation, and Follow-up:** 800 hours (one company did not answer this question)

**Direct Costs of Planning, Participation, and Follow-up (including travel):** 53,000  
(one company did not answer this question)

**Other Misc. Costs Associated with Participation in Activity:** \$15,200  
(four companies did not answer this question)

**Comments or suggestions:**

Several companies had left some comments or suggestions. Listed below are the actual comments made from the companies that chose to leave a response.

- Booth location limited customer contact
- Try to get next year's location & booth sign up sooner
- Few but good contacts were made, meetings were a big plus!
- The show was extremely beneficial, made great contacts with retailers & wholesalers (Hy-Vee, Albertsons/Safeway). Can the department provide an identified "Pure Michigan" booth for all the participants...?.. a great state with high revenue in agriculture.
- Great Show! Much Appreciated!

**ANUGA Trade Show**

**Michigan Specialty Crop Booth Evaluation Report**

**Activity Date: October 10-14, 2015**

**Introduction**

Three Michigan specialty crop companies/commodity groups participated in the Michigan Specialty Crop Booth at the ANUGA Trade Show in Cologne, Germany October 10-14, 2015.

No. of Participants: 3

No. of Returned Evaluations: 3

**Specialty Crop Participants:**

Cherry Marketing Institute

Safie Specialty Foods

Graceland Fruit, Inc.

**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)**

\$265,000 (total)

**Did the ANUGA yield contacts with new buyers?**

Yes- 3

No- 0

If yes, how many?

80

Did the ANUGA Show result in any new buyer relationships?

Yes- 3

No- 0

If yes, how many?

13

Will you enter any new markets as a result of exhibiting at the Anuga Show?

Yes- 2

No- 1

If yes, which markets?

Lebanon, Egypt, India, Moldova, Turkey

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

RATE THE ACTIVITY	MEAN
Pre-event planning & communication	5
Program execution	5
Fulfillment of your company needs	5
Cost/benefit returns to your company	5
Quality of contacts or information	5

Please estimate company financial and 'overhead' expenses for the activity:

<b>Total Number of Staff Hours for Planning, Participation, &amp; Follow-up</b>	150
<b>Direct Costs of Planning, Participation, &amp; Follow-up (including travel)</b>	\$42,000.00
<b>Other Misc. Costs Associated with Participation in Activity</b>	\$13,000.00
<b>Total</b>	<b>\$55,000.00</b>

Please rate the overall effectiveness of the show:

Excellent- 3

Fair- 0

Very Good- 0

Poor- 0

Average- 0

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

- *"It was a pleasure working with Allie – Staff Personal. Very attentive to our needs, explained the how to's – A great team player."*
- *"We share a booth; we appear to have some limitations on signage. The visitors are confused, need some flexibility."*
- *"In Germany we have three new products and one newly integrated importer as a result of participating at Anuga. We also have five leads for the United Kingdom that we will follow up on as well. "*

**Americas Food & Beverage Trade Show  
Michigan Specialty Crop Booth Evaluation Report  
Miami, Florida**

**Activity Date: October 26-27, 2015**

**Introduction**

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

No. of Participants: 3  
 No. of Returned Evaluations: 3

**Specialty Crop Participants:**

Cherry Central; Jack Brown Produce, Inc.; Findlay's Organics

**How many contacts/leads resulted from your participation?**

38 (total for all participants)

**How would you rate the quality of contacts/leads?**

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

**Please rate the overall effectiveness of the show**

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

**Will you enter into a new export market as a result of your participation in the show?**

Yes- Maybe- 3, India, Trinidad, Bolivia, Brazil  
 No- No response -

**Does your company anticipate an increase in sales over the next 12 months as a result of the trade show?**

Yes- 3 Unsure –  
 No- N/A -

**If, yes approximately how much? (Please provide an estimated value)**

\$250,000 export (total)  
 \$40,000 domestic (total)

**Would you have participated in this activity without the assistance of the Michigan Department of Agriculture & Rural Development (MDARD)?**

Yes- Unsure- 1  
 No- 2

**Please estimate company financial and 'overhead' expenses for the activity:**

<b>Total Number of Staff Hours for Planning, Participation, &amp; Follow-up</b>	115
<b>Direct Costs of Planning, Participation, &amp; Follow-up (including travel)</b>	\$13,600
<b>Other Misc. Costs Associated with Participation in Activity</b>	\$1,900
<b>Total</b>	<b>\$15,500</b>

Rate the performance of staff 5= excellent, 1=poor

**Pre- Event Planning 5**  
**Communication 5**

**Assistance at event 5**

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

- *“Like the event and would love to participate in the near future”*
- *“Some contacts are expected to payout but nothing defined as of yet. MDARD- Jamie & Nancy are a big help!”*

**Show Photos**

**Fruit Logistica 2015 – Berlin, Germany**



**National Restaurant Association Show 2015 – Chicago, IL**



**Food Marketing Institute Connect Show 2015 – Chicago, IL**



**Anuga 2015 – Cologne, Germany**



**Americas Food & Beverage Show – Miami, FL**



## SCOPE CHANGE PROJECTS 2017:

### PROJECT TITLE: MICHIGAN ONION COMMITTEE / Evaluation of Onion Varieties for Production in Michigan - FINAL

#### PARTNER ORGANIZATION

Michigan Onion Committee, Promotion and Development Program was established in February 1977. The purpose of the MOC is to improve the economic position of Michigan onion growers by creating greater marketing opportunities for their product. This is accomplished through supporting research, conducting advertising and promotion programs, assembling and disseminating marketing information, and expanding the markets for Michigan onions.

Executive Director Val Vail-Shirey, [val@julianvail.com](mailto:val@julianvail.com)

Grower Bruce Klamer [bjklamer@gmail.com](mailto:bjklamer@gmail.com)

Michigan State University Onion Researchers, Researcher Darryl Warncke [warncke@msu.edu](mailto:warncke@msu.edu) and Extension Educator Ben Werling, [werlingb@anr.msu.edu](mailto:werlingb@anr.msu.edu)

#### PROJECT PURPOSE

Onions are grown in various geographical areas in Michigan. Each area has somewhat different growing conditions (rainfall, sunshine, temperatures, day length) each year. Onion variety trials were initiated by the Michigan Onion Committee over ten years ago to observe how different varieties grow in different growing areas. These trials have been done with the cooperation of several onion growers. Each year the onion variety trials have been grown at three locations. Over the years, trials have been located on farms with muck soils near Eaton Rapids, Gregory, Plainwell, Byron Center, and Grant. With increasing interest in growing onions on mineral soil, a trial was located the past two years on sandy soil near Fremont. These trials are available for growers to observe during the growing season. Each August there is a twilight meeting held at one of the sites, most recently Byron Center. This provides a good opportunity to observe the varieties and hear from seed company representatives and MSU Specialists. Observation information is collected during the summer.

The purpose of these trials is to give Michigan onion growers the opportunity to see how various onion varieties, available in Michigan, perform at various locations and on various soil conditions.

The objectives are:

Have good onion varieties that grow well on muck and sandy mineral soils in Michigan, and that produce bulbs of marketable size and quality, and store well through February.

Identify onion varieties that perform well on sandy mineral soil provides the opportunity for better crop rotation and expanded onion production.

Identifying varieties that grow well on mineral soil and that may have tolerance to diseases and insects.

#### PROJECT ACTIVITIES

Provide Michigan onion growers with the opportunity to evaluate 20 to 30 bulb onion varieties grown under a range of environments in Michigan.

Evaluate available onion varieties for growth and development, ability to tolerate diseases and insects, bulb size and quality (yield) and storability.

Provided growers the opportunity to evaluate the 20 – 30 onion varieties during the growing season at the respective locations.

Provided growers the opportunity to evaluate the onions at an onion grower meeting on August 17 at one of the locations.

Executive Director attend the National Onion Association summer conference, tour and research education on the national level.

#### GOALS AND OUTCOMES ACHIEVED

A goal to increase cultivation of new onion varieties in Michigan by 25%. Currently 7% of growers are cultivating new onion varieties but with increased education and outreach to growers on new varieties that will improve crops, production and ultimately gross sales and profit that number will increase. This target of 25% will not be measured until next year and after as growers are educated on new varieties and their success.

A goal of outreach and education to onion growers with a target of 20 to 30 growers attending the onion trials. Past onion trials have had 5 – 10 growers, of the Michigan total 30 plus growers, attend and a total of approximately 30 attendees. Through increased communication, personal visits and invitations the 2017 trials had approximately 20 growers attend and nearly 70 attendees in total. This includes stakeholder attendees, Michigan State University researchers and faculty, growers and their employees.

A goal to have the MOC Executive Director attend the NOA summer conference, tour and research education on the national level was obtained. As the MOC ED is new to the industry, this was a nearly 100% increase in research knowledge on the national level and networking with those participating on the national level to bring greater knowledge to Michigan growers and economic impact.

#### BENEFICIARIES

Michigan onion growers are the beneficiary of this project as the trial research was specifically with onion seed.

Approximately 20 growers attended the trials during the growing and demonstration period. This is an increase of over 50% from the past year.

Growers were invited to visit the field trials in three locations during the growing season and to see the results at the grower meeting on August 17.

#### LESSONS LEARNED

Goals and outcomes were achieved, but pacing disease and insect research with the trial research could improve the onion production in Michigan.

Grow the stakeholder invitation list and have as many stakeholders from the industry attend as possible.

Overall this trial is all positive and productive for the bottom line for Michigan onion growers.

Encouraging every grower to attend and inviting all stakeholders would increase the positive impact on the economic impact to Michigan growers.

#### CONTACT PERSON

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#### ADDITIONAL INFORMATION

Spreadsheet containing details of each growing area, company, variety, seed type, treatment, planting and harvest dates.

Michigan Onion Variety Trial 2017						Michigan Onion Variety Trial 2017							
Company	Variety	Lot	Germination	Date	Seeds/lb	Treatment	Company	#	Klamer	#	Vogel	#	Plakmyer
Bejo	Braddock	1010512	92	16-Nov	103512	Thiram/metalaxyl-M	Bejo	1	Expression	1	Expression	1	Expression
Bejo/Seedway	Cartier	1095989	93	16-Nov	86880	Thiram filmcoat	Solar	2	Champ	2	Champ	2	Champ
Bejo	Dawson	1092881	92	16-Oct	119856	Thiram/metalaxyl-M	Takii	3	Ridge Line	3	Ridge Line	3	Ridge Line
Bejo	Expression	1095928	92	16-Oct	109868	Thiram/metalaxyl-M	Bejo	4	Harbour	4	Harbour	4	Harbour
Bejo	Gunnison	1009415	92	16-Nov	98972	Thiram/metalaxyl-M	Bejo	5	Patterson	5	Patterson	5	Patterson
Bejo/Seedway	Harbour	1031426A	85	16-Dec	150274	Thiram/metalaxyl-M	Bejo	6	Braddock	6	Braddock	6	Braddock
Bejo/Seedway	Mondella	1092910	93	16-Oct	108052	Thiram/metalaxyl-M	Takii	7	Mountaineer	7	Mountaineer	7	Mountaineer
Bejo	Patterson	1097189	93	16-Nov	106236	Thiram Apron	Takii	8	Highlander	8	Highlander	8	Highlander
Bejo	Prince	1125870	90	17-Mar	92383	Thiram filmcoat	Bejo	9	Dawson	9	Dawson	9	Dawson
Bejo	Powell	1123628	93	17-Jan	115770	Thiram/metalaxyl-M	Takii	10	Milestone	10	Milestone	10	Milestone
Bejo	Prospector	1017417	93	16-Nov	101242	Thiram/metalaxyl-M	Solar	11	Aldrin	11	Aldrin	11	Aldrin

Bejo	Safrane	990953A	92	16-Dec	88530	Thiram/ metalaxyl-M	Bejo	12	Powell		12	Powell		12	Powell
Takii	Highlander	31600054 77	90	17-Feb	112790	Thiram	Solar	13	Armstrong		13	Armstrong		13	Armstrong
Takii	Milestone	31500076 23	90	16-Dec	100120	Thiram	Bejo	14	Safrane		14	Safrane		14	Safrane
Takii	Mountaineer	31300071 34	87	17-Jan	1069852	Thiram	Bejo	15	Gunnison		15	Gunnison		15	Gunnison
Takii	Ridge Line	31500103 66	89	17-Mar	96302	Thiram	Solar	16	Stanley		16	Stanley		16	Stanley
Monsanto/ Seminis	Catskill						Bejo	17	Mondella		17	Mondella		17	Mondella
Monsanto/ Seminis	Montclair						Bejo	18	Cartier		18	Cartier		18	Cartier
Monsanto/ Seminis	Pocono						Bejo	19	Prospector		19	Prospector		19	Prospector
Solar	Aldrin		93		66481	Farmore 1500	Seminis							20	Catskill
Solar	Armstrong		93		67259	Farmore 1501	Seminis							21	Montclair
Solar	Champ		93		62500	Farmore 1502	Seminis							22	Pocono
Solar	Stanley		93		69129	Farmore 1503									
						Farmore 1504	Bejo	R1	Red Carpet		R1	Red Carpet		R1	Red Carpet
Bejo/ Seedway	Red Carpet	1098430	90	16-Dec	103326	Thiram filmcoat	Bejo	R2	Red Hawk		R2	Red Hawk		R2	Red Hawk
Bejo	Red Hawk	1029828A	92	16-Dec	94886	Thiram/ metalaxyl-M	Bejo	R3	Red Jewel		R3	Red Jewel		R3	Red Jewel

Bejo	Red Jewel	1092548	80	16-Oct	96702	Thiram/ metalaxyl-M								
							Planting Date		26-Apr			14-Apr		29-Apr
Crookham sitting out this year.							Harvest Dates		5-Sep			30-Aug		12-Sep

**PROJECT TITLE: CHERRY MARKETING INSTITUTE / Improving Understanding of Spotted Wing Drosophila (SWD) Host Preference to Develop Sustainable Control Programs in Michigan Tart Cherry - FINAL**

**PARTNER ORGANIZATION**  
Cherry Marketing Institute

**PROJECT SUMMARY**

The Cherry Marketing Institute collaborated with Michigan State University researchers and Extension personnel to conduct applied research and outreach programming to help cherry growers manage the invasive insect pest: spotted wing *Drosophila* (SWD). This funding supported research efforts to develop effective and sustainable SWD management programs; programs were targeted on improving efficacy and reducing operator fatigue to control this pest. This project was also designed to better understand the role of non-crop hosts as well as host preferences for SWD. This information will help guide management recommendations. All information generated with this project will be reported directly back to growers, processors, and consultants to further refine future research priorities.

**PROJECT PURPOSE**

Spotted wing drosophila (SWD) (*Drosophila suzukii*) has posed significant challenges to Michigan's fruit industry since this pest arrived in the state in 2010. This pest is now the top research priority for the Cherry Marketing Institute. From 2013-2016, SWD populations have risen across the state, which has increased pressure to protect fruit from SWD infestation. Cherry growers that were surveyed (n=28) indicated that 39.3%, 67.9%, and 89.3% managed their crop for SWD in 2014, 2015, and 2016, respectively. More intensive SWD management is a result of earlier detections of adult flies each season and, more importantly, the earlier occurrence of exponential population growth of SWD now overlaps with tart cherry harvest and late season sweet cherry harvest in northwest Michigan.

The 2016 season was particularly challenging for Michigan cherry growers. The 2016 crop was the large, and to manage the processing piece of this supply chain, processors used quotas to limit the amount of fruit that growers could harvest in specified timeframes; a large crop coupled with quotas resulted in an extended harvest period. To prevent SWD from infesting fruit during the long harvest season, growers used two to six additional insecticide applications targeting SWD (Pochubay and Rothwell unpublished). Despite industry efforts to combat this pest, there were incidents of infested tart cherries at harvest in 2015 and 2016, and fruit were dumped in the orchard or at the processor resulting in an estimated 20% crop loss.

Based on the amount of infested fruit in commercial orchards, tart cherries appear to be suitable sites for SWD reproduction and this situation is especially true in Michigan where an abundance of tart cherry hosts are grown in confined regions throughout the state. There are 32,500 acres of tart cherries in Michigan, 18,000 acres of which (~55%) are located in northwest Michigan; nearly 70% of Michigan's tart cherry acreage is owned by farms that produce over 100 acres of this specialty crop. Additionally, tart cherry production focuses on maximizing yields rather than fruit size, firmness, or other qualitative measures. As a result, an average Michigan tart cherry orchard produces 10,000 pounds per acre per season at peak production age. This large volume of fruit provides tremendous host capacity to build SWD populations. Moreover, preliminary research has shown that the tart cherry fruit is a very suitable host for SWD. In 2016, we conducted no choice tests and exposed SWD to ripe Montmorency tart cherries and Regina sweet cherries. We found 6x more SWD larvae in the tart cherries. Further choice testing is needed, but these preliminary data suggest that tart cherries have adequate host

characteristics that may increase SWD reproductive success. During the 2017 growing season, we evaluated the host preference of SWD in choice and no choice tests.

For growers to adequately control SWD in tart cherries, we needed to evaluate season-long insecticide efficacy strategies, including effective tank mixes. In 2016, growers experienced tremendous 'operator fatigue' associated with the repeated applications for SWD control. We explored the use of insecticide tank mix strategies to help minimize the seemingly relentless retreatment intervals. In addition to evaluating insecticide tank mix applications, we evaluated new insecticides in a program in our efficacy trials conducted at the Northwest Michigan Horticultural Research Center (NWMHRC). Our goal for this research was to use research results generated from the following objectives to assist growers with developing sustainable and effective insecticide programs that minimize SWD infestation.

**Objective 1.** *Evaluate host preference for SWD.* Anecdotal evidence has suggested that SWD may prefer tart cherries to other fruit crops (ex. sweet cherries). However, whether SWD prefer tart cherry to non-crop hosts is unknown; the order of SWD preference for different non-crop hosts is also not well understood. A better understanding of host preference is needed to develop management strategies and provide recommendations for managing non-crop hosts near commercial tart cherry blocks.

**Objective 2.** *Develop insecticide spray programs that include tank mixes to maximize residual in the orchard to reduce SWD infestation.* We hypothesize that full cover applications of insecticide tank mix combinations could provide up to 10 days of effective residuals for SWD control. This strategy would minimize the amount of time cherry growers invest for SWD management, and reduce the number of applications per season.

This project builds on two other Michigan Specialty Block Grant Program projects: 1) *Assisting growers with detection, identification, and management of spotted wing drosophila on Michigan cherry farms* (SCGB791N6600406) and 2) *Refining spotted wing drosophila management practices in Michigan tart cherries* (SCBG 791N7700188).

## PROJECT ACTIVITIES

**Objective 1.** Spotted wing drosophila (SWD) host preference was evaluated in choice and no-choice laboratory tests conducted at the Northwest Michigan Horticultural Research Center (NWMHRC), Traverse City, MI. The following fruits were evaluated: tart cherry vars. Montmorency and Balaton, sweet cherry vars. Emperor Francis, Gold, Ulster, Regina, and mulberry, black raspberry, red raspberry, blackberry, and honeysuckle. Fruit were evaluated at different stages of ripeness. We also compared if SWD preferred SWD-infested fruit compared to clean fruit for Montmorency tart cherry. We placed different fruit species into bioassay containers, and exposed fruit to four male and five female SWD in no choice tests (Figure 1). To conduct choice tests, we placed multiple species of fruits at varying ripeness into large bug tents; we released 10 male and 10 female SWD into the tents. SWD adults were removed from the bioassay containers and tents after 48 hours, and larvae were counted five days after the addition of adult flies. To determine if there was a relationship between fruit maturity and larvae number, we measured a subset of all fruits at all ripeness for the following parameters: brix, fruit weight, and fruit flesh firmness.



Figure 1. No-Choice test bioassay containers.

**Objective 2.** We evaluated the efficacy of nine insecticide program combinations at the NWMHRC. The trial was conducted on bearing seven-year-old Montmorency tart cherry trees. Trees were sprayed with an airblast sprayer at 60 gal of water/acre, the grower standard in tart cherries. Treatments were applied at multiple timings using different insecticide combinations. Programs were developed based on efficacy results conducted in Michigan blueberries and other insecticide combinations that have been effective in other U.S. crops. To determine the level of SWD infestation, we examined three-gallons of fruit for SWD larvae at the optimal harvest timing for our location and seven days after harvest. Larvae were counted and reared out to ensure they were *D. suzukii*.

Both objectives benefit all Michigan fruit crops that are impacted by SWD. Efficacy results from this work can be extrapolated and applied to all Michigan berry crops or at the very minimum, our results can be used as a foundation to conduct insecticide efficacy in blueberry, raspberry, and strawberry. Additionally, our host preference work can be used to help cherry and berry crop growers understand the influence non-crop hosts on SWD population growth when these plants are located adjacent to the commercial crop. Our data show that SWD non-crop hosts such as mulberry, black raspberry, red raspberry, blackberry, and honeysuckle all provide adequate resources to support SWD growth. Using this information, growers can make annual decisions to best manage different non-crop hosts. Results will be disseminated at the 2017 Great Lakes EXPO in Grand Rapids in December. We will also present results at the 2018 NW Orchard and Vineyard Show and the 2018 IPM Kick-Off at the NWMHRC.

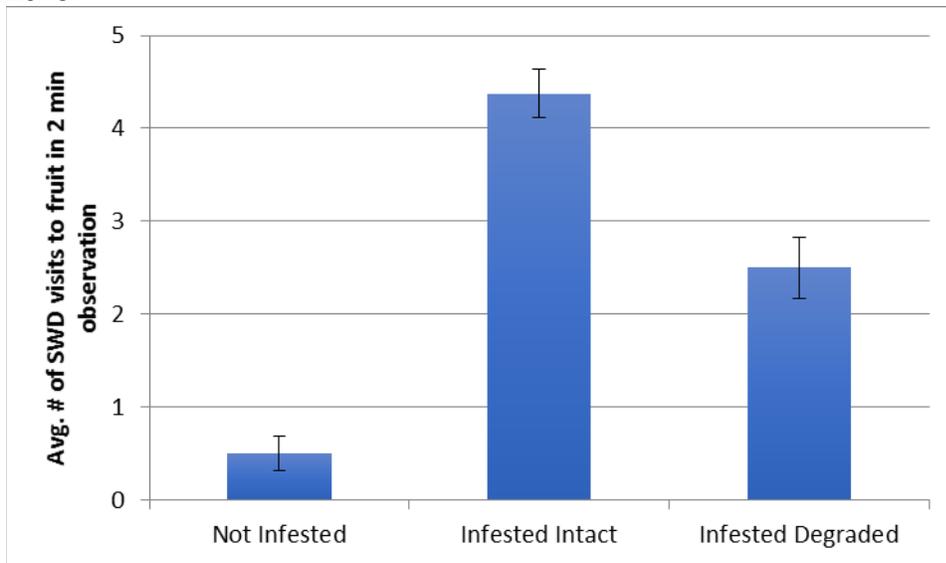
#### GOALS AND OUTCOMES ACHIEVED

Results from the host preference evaluation show that SWD is able to lay eggs and develop into larvae in all fruits in the trial. In no-choice trials, sweet cherry var. Gold was the least effective host for SWD, but other commercial and non-crop hosts tested provided relatively good resources for developing SWD (Table 1). When we combined all stages of host ripeness in no-choice trials, red raspberry has the highest number of SWD larvae (avg. 15.4) compared with the other hosts. Sweet cherry var. Ulster had the second highest number of SWD larvae (avg. 10.2), and sweet cherry vars. Regina and Emperor Francis had 5.9 and 5.7 larvae respectively. Montmorency tart cherry had an average of 3.2 SWD larvae, which were far fewer larvae than we had found in preliminary choice trials in 2016. When we separated out the different ripeness stages for all fruit species, we found more larvae in straw colored or just underripe fruit in the cherry varieties (vars. Montmorency, Regina, Emperor Francis, and Ulster), but we observed more larvae in the ripest stages of red raspberry, black raspberry, and mulberry. We also measured firmness, weight, and brix levels of the different fruits in respective development stages and found that there was no significant relationship among these characteristics and the number of larvae. The number of SWD larvae per replication varied considerably in our no-choice tests. For instance, in straw colored Montmorency, two replications had 16 and 23 larvae while the other two replications had only one and two larvae. This result was consistent among the replications for all development stages, which suggests that the number of replications should be increased when conducting no-choice tests to account for high variability of the data (data not shown).

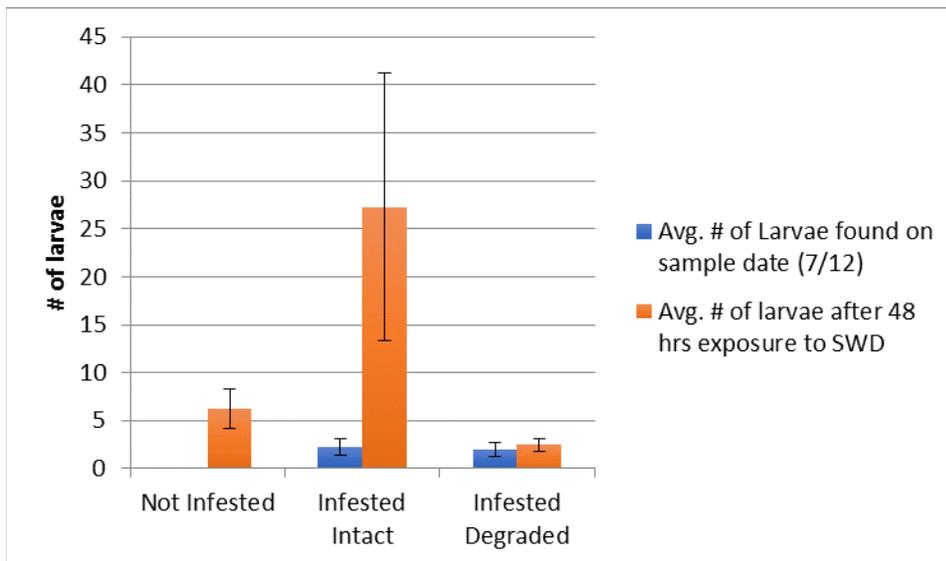
**Table 1.** Results from no-choice tests comparing the number of larvae/pupae found in different fruits at various ripeness stages.

<b>Variety</b>	<b>Ripeness</b>	<b>Date</b>	<b>Avg. # larvae/pupae</b>
Mont	green	21-Jun	0.0
Mont	straw	21-Jun	11.0
Mont	blush	26-Jun	2.0
Mont	red	3-Jul	1.1
Mont	red	10-Jul	1.5
Balaton	underripe	18-Jul	12.8
Emperor Francis	green	14-Jun	0.3
Emperor Francis	yellow/red	19-Jun	14.5
Emperor Francis	blush (50-75%)	28-Jun	1.0
Emperor Francis	blush (95%)	3-Jul	2.0
Emperor Francis	blush (100%)	10-Jul	10.8
Gold	green	14-Jun	0.0
Gold	yellow	19-Jun	0.0
Gold	yellow	28-Jun	0.3
Gold	yellow	3-Jul	1.0
Gold	yellow	10-Jul	2.3
Regina	green	14-Jun	0.0
Regina	green/yellow	19-Jun	0.0
Regina	red	28-Jun	1.0
Regina	red/purple (4)	5-Jul	26.0
Regina	dark red (5)	10-Jul	2.5
Ulster	green	12-Jun	0.0
Ulster	green/yellow	19-Jun	25.5
Ulster	dark red	26-Jun	11.0
Ulster	purple (5)	3-Jul	4.3
Mulberry	green	28-Jun	0.3
Mulberry	yellow/pink	28-Jun	1.3
Mulberry	pink/red	28-Jun	6.8
Mulberry	dark red	28-Jun	8.0
Black Raspberry	green	12-Jul	0.0
Black Raspberry	green/yellow	12-Jul	0.0
Black Raspberry	yellow/red	12-Jul	0.3
Black Raspberry	purple	12-Jul	10.5
Honeysuckle	green	5-Jul	0.0
Honeysuckle	orange	5-Jul	0.3
Honeysuckle	red	28-Jun	0.0
Raspberry	yellow/green	6-Jul	4.0
Raspberry	pink/yellow	6-Jul	5.3
Raspberry	red	6-Jul	37.0

In choice tests, we conducted visual observations to measure the degree of SWD attraction to different treatments (i.e. not infested, infested intact, and infested degraded). We found that SWD flies were more attracted to infested/intact Montmorency cherries rather than intact/non-infested Montmorency (Figure 2). Similarly, the highest number of SWD larvae was also found in intact/infested Montmorency in this choice test (Figure 3). We hypothesize that there may be a relationship between fruit volatiles given off post-oviposition that may increase fruit attractiveness to SWD. Perhaps the variability between replications in no-choice tests can be attributed in part to egg-laying activity within the no-choice containers. Further, more extensive choice and no-choice testing is needed, and we intend to repeat and scale up our testing for 2018.



**Figure 2.** Average number of SWD adult visits observed on Montmorency tart cherries in a choice test comparing fruit that was not infested, infested and intact, and infested and degraded.



**Figure 3.** Average number of larvae found in Montmorency tart cherries after 48 hours of exposure to male and female SWD in choice tests.

Results from the efficacy trial conducted this season at the NMWHRC show promising results that would provide good to excellent control of SWD in tart cherry systems; at the harvest

timing, all treatments had significantly fewer larvae than the untreated check (UTC) (Table 2). The results from the harvest timing show three insecticide programs where we found no larvae in three gallons of fruit: 1) Delegate 17D / Imidan 10D / Danitol 3D; 2) Exirel 21D / Imidan 14D / Exirel 7D; and 3) Mustang Max and Harvanta 20D / Mustang Max and Harvanta 10D. The remaining six programs also provided good control of SWD with an average of one larva or less in the three-gallon fruit sample from each of the treatments. These data indicate that we can achieve excellent SWD control in smaller bearing tart cherry trees with relatively open canopies. We plan to repeat this work in larger trees with fuller canopies which is likely an environment that is more conducive for high SWD pressure; our preliminary data from a concurrent trial show that SWD pressure and level of infestation increases in full size Montmorency tart cherry trees compared with smaller trees and canopies.

**Table 2.** Average number of SWD larvae found in 3 gallons of fruit at harvest (7/24/17) for nine insecticide spray programs.

Treatment	Avg. # of larvae in 3 gallons of fruit	Fisher's PLSD(0.05)
Delegate 17D / Imidan 10 D / Danitol 3D	0	a
Exirel 21D / Imidan 14 D / Exirel 7D	0	a
Mustang Max and Harvanta 20D / Mustang Max and Harvanta 10D	0	a
Mustang Max and Imidan 20D / Mustang Max and Imidan 10D	0.25	ab
Mustang Max and Assail 20D / Mustang Max and Assail 10D	0.25	ab
Imidan 21D / Mustang Max 14 D / Imidan 7	0.25	ab
Delegate 17D / Imidan 10 D / Mustang Max 3D	0.5	ab
Harvanta 21D / Imidan 14 D / Harvanta 7	0.5	ab
Exirel 17D / Imidan 10D / Exirel 3D	1	ab
Untreated Control	5.5	c

As insecticides age after they are applied in the field, they become less effective, and as expected, we observed more larvae overall in the one-week post-harvest evaluations (Table 3). Separation between treatments is more evident, but numerically, the Delegate 17D / Imidan 10D / Danitol 3D program had the fewest number of larvae. Efficacy programs that had a pyrethroid in the rotation had more SWD larvae than programs without this insecticide class. Pyrethroids are UV-sensitive and break down fairly quickly, and these data show that stretching programs with this insecticide class increase risk of SWD infestation. However, even after one week with no new insecticide application, all programs provided continued control against SWD compared with the UTC. Again, these programs need to be evaluated in standard sized trees to develop programs that minimize risk of SWD-infested fruit.

**Table 3.** Average number of SWD larvae found in 3 gallons of fruit one week post-harvest (7/31/17) for nine insecticide spray programs.

Treatment	Avg. # of larvae in 3 gallons of fruit	Fisher's PLSD(0.05)
Delegate 17D / Imidan 10 D / Danitol 3D	1.5	a
Exirel 17D / Imidan 10D / Exirel 3D	2.5	ab
Exirel 21D / Imidan 14 D / Exirel 7	2.75	ab
Mustang Max and Harvanta 20D / Mustang Max and Harvanta 10D	7.25	b
Mustang Max and Imidan 20D / Mustang Max and Imidan 10D	7.25	b
Delegate 17D / Imidan 10 D / Mustang Max 3D	7.25	b
Mustang Max and Assail 20D / Mustang Max and Assail 10D	8.5	b
Harvanta 21D / Imidan 14 D / Harvanta 7	15.25	bc
Imidan 21D / Mustang Max 14 D / Imidan 7	15.5	bc
UTC	154.75	c

#### BENEFICIARIES

The primary stakeholders that benefited from this Michigan Department of Agriculture and Rural Development (MDARD) project entitled, 'Improving understanding of spotted wing drosophila (SWD) host preference to develop sustainable control programs in Michigan tart cherry' are Michigan tart cherry growers. However, as mentioned above, we can extrapolate our efficacy results to other Michigan fruit crops, including sweet cherry, blueberry, raspberry, and strawberry if similar materials are labeled in all crops. The SWD host preference results can also be used directly and immediately (growing season 2018) by tart cherry growers as well as growers in the aforementioned crops.

Efficacy trial results will be used to provide SWD control recommendations for tart cherry growers in 2018. This information will be disseminated at MSU winter meetings via oral presentations and written recommendations. We will also combine our efficacy results with other insecticide trials conducted at MSU research centers to upgrade the 2018 MSU Michigan Fruit Management Guide (Bulletin E154), a key document that provides the most up-to-date and relevant insecticide ratings for SWD control. At this time, we estimate results from the efficacy work will directly benefit 600+ tart and sweet cherry growers in the state. Our results will also be used by tart cherry growers in WI, UT, WA, PA, NY, and OR, the other states with substantial acreage of tart cherries. In addition to tart cherry growers, Michigan berry growers will be better able to manage non-crop hosts adjacent to commercial blocks as a result of the host preference work conducted with these funds; we estimate over 800 Michigan berry growers will use this information in their SWD management strategies in 2018.

#### LESSONS LEARNED

This project was a key piece of better understanding SWD in Michigan tart cherry systems. The host preference information was instrumental in demonstrating that SWD can successfully propagate in many different hosts. We also have a better grasp on when SWD can lay eggs into different ripeness of fruit; this information can be used to better time first insecticide applications during the growing season. However, we likely need to repeat this host choice testing next season to refine results to provide the most accurate recommendations for initiating

spray programs in the spring. We also need to repeat this host choice testing to improve recommendations for managing non-crop hosts adjacent to crop acreage.

The spray program development component of the project adds to the collective body of efficacy work that is currently updated each year to provide growers with a list of most efficacious insecticides available that control SWD. Our results will be used to develop best management practices for SWD for the 2018 growing season.

#### CONTACT PERSON

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#### PROJECT TITLE: MICHIGAN APPLE COMMITTEE / Advertising and Social Media to Showcase Apple Availability - FINAL

#### PARTNER ORGANIZATION

Michigan Apple Committee

#### PROJECT SUMMARY

This project sought to improve the competitiveness of fresh Michigan Apples by educating retailers and consumers about varietal availability as well as the superior flavor of Michigan-grown apples. Efforts focused before and at the start of harvest time allowed MAC to kick-start consumer interest about harvest. We reminded retailers to contact their Michigan Apple suppliers in June, ensuring that orders would be made to provide plenty of product in stores as harvest began. As harvest drew near, a consumer effort to educate them about harvest dates for specific varieties helped to drive shoppers to stores seeking Michigan Apples. Social media, as well as targeted trade and consumer ads, supported the effort to reach our specific target audience.

#### PROJECT PURPOSE

In preparation for the 2017 harvest season, this project allowed MAC to leverage consumer excitement about the apple harvest by educating consumers about the estimated harvest dates as well as encouraging retailers to stock Michigan Apples as soon as possible once harvested. This project addressed the specific issue of beginning the harvest season with a strong demand for Michigan Apples. This effort was important and timely as Michigan's apple crop size continues to grow due to high-density planting and other technological advancements. As the crop size grows, it is important to continue to encourage strong movement of apples throughout the year – which means beginning the harvest season on strong footing is critical.

The objectives for this project were to implement an advertising campaign to showcase apple suppliers and varietal availability to targeted retailer and consumer publications, particularly The Packer and Midwest Living. In addition, MAC supported the advertising campaign with social media messaging around availability using the hashtag #MIapples.

This effort was solely focused on enhancing the competitiveness of Michigan Apples. This project was not submitted to or funded by any other grant program or entity.

While this project was not directly connected to any previously funded SCBGP-FB projects, it built on previous efforts funded directly by the MAC budget or by SCBGP-FB dollars. The Michigan Apple Committee engages in marketing, research, education and communication for the benefit of Michigan's apple growers. It is our mission to enhance the reputation of Michigan Apples, improve their share of sales in target markets and aid the profitability and sustainability of Michigan's apple industry. As such, this project complemented work done previously by MAC in that it focused dollars on the specific effort of helping us to "kick-start" the crop year with increased demand for Michigan Apples. The long term effects of all of our work is to increase movement and demand for Michigan Apples, as a way to aid the sustainability of Michigan's apple industry going forward.

#### PROJECT ACTIVITIES

During the grant period, a full-page ad was placed in *The Packer*, a publication targeted at retail produce buyers. Additionally, an ad was placed in the September issue of *Midwest Living*, to remind consumers about the Michigan Apple harvest. Boosted ads and social media posts were also placed on Facebook and Instagram as a way to educate consumers about the timing of varietal availability during harvest. Finally, in September, MAC analyzed shipment data to measure performance.

This project solely benefitted Michigan Apples.

#### GOALS AND OUTCOMES ACHIEVED

In June, a full-page ad was placed in *The Packer*, a publication targeted at retail produce buyers. In addition, a full-page ad was placed in the September issue of *Midwest Living* to remind consumers about the Michigan Apple harvest. At the beginning of the harvest season, one ad and three boosted social media posts were placed on Facebook and Instagram to educate consumers about the timing of varietal availability during harvest. Finally, in September, MAC analyzed shipment data to measure performance. *The Packer* reaches approximately 13,000 retailers, an important audience for Michigan Apples. *Midwest Living* has a circulation of 950,000. The boosted social media posts were well-received, with a combined reach of 395,255, engaging with 6,978 fans. The success of these posts is important as we continue to grow and cultivate our online audience and assess the role paid posts play in doing so.

Michigan Apple Committee's expected measurable outcome that supports the purpose of the project was to increase movement of Michigan Apples early in the season. Using the USDA Specialty Crops Market News Weekly Shipment Reports to measure shipment performance, MAC noted a benchmark of 214,094 cases of apples shipped in the third week of September 2016, and 244,570 cases of apples shipped in the fourth week of September 2016. In 2017, 205,603 apples were shipped in the third week of September, and 259,441 apples were shipped in the fourth week. With a goal of a five percent increase, that goal was not met in the third week, but was exceeded in the fourth week of September.

This project solely benefitted Michigan Apples.

#### BENEFICIARIES

Nearly every commercial apple grower in Michigan (825 family-run farms) has benefitted from this project. This project helped to build the strength of Michigan Apples in the marketplace, and the strength of the apple industry in Michigan, by raising brand awareness of Michigan-grown apples.

## LESSONS LEARNED

During this project, the work plan was successfully implemented and the goal was partially achieved. The administration of the project was fairly simple, as MAC staff has prior experience in implementing these tasks. Money savings and efficiencies in terms of print ad buys will continue as MAC continues to cultivate relationships with print advertising contacts. It also has become apparent that paid social media posts are a key element of building the online audience.

## CONTACT PERSON

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## ADDITIONAL INFORMATION

### Print Advertising

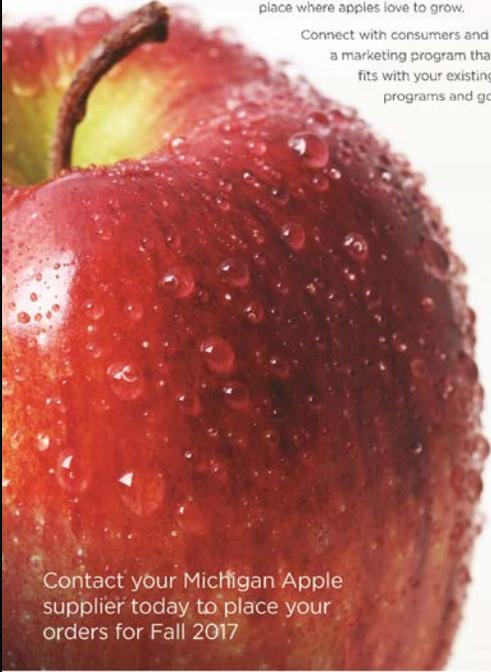


**Where Apples Love to Grow**

Michigan's dedicated growers produce the best-tasting, most flavorful apples in the world.

Let the Michigan Apple Committee help you drive consumer traffic and interest to your produce department with our marketing programs from the place where apples love to grow.

Connect with consumers and build a marketing program that fits with your existing programs and goals.



Contact your Michigan Apple supplier today to place your orders for Fall 2017

**Michigan Apple Fresh Shippers**

<b>ALL FRESH GPS, LLC</b> West Michigan Office 616-606-0200 East Michigan Office 517-447-3001 <a href="http://www.allfreshgps.com">www.allfreshgps.com</a>	<b>GREENRIDGE FRUIT, INC.</b> 616-784-2770 <a href="http://www.greenridgefruit.com">www.greenridgefruit.com</a>	<b>NORTH BAY PRODUCE, INC.</b> 231-946-1041 <a href="http://www.northbayproduce.com">www.northbayproduce.com</a>
<b>BELLEHARVEST SALES, INC.</b> 800-452-7753 <a href="http://www.belleharvest.com">www.belleharvest.com</a>	<b>GREG ORCHARDS &amp; PRODUCE</b> 269-944-5114 <a href="mailto:info@gregorchards.com">info@gregorchards.com</a>	<b>RIVERIDGE PRODUCE MARKETING, INC.</b> 800-968-8833 <a href="http://www.riveridgeproduce.com">www.riveridgeproduce.com</a>
<b>CORE FARMS, LLC</b> 269-621-0573 <a href="mailto:roger@kropfsapples.com">roger@kropfsapples.com</a>	<b>JACK BROWN PRODUCE, INC.</b> 800-548-0834 <a href="http://www.jackbrownproduce.com">www.jackbrownproduce.com</a>	

**MichiganApples.com**

Ad in June 12 issue of The Packer



# MICHIGAN APPLES

WHERE APPLES LOVE TO GROW™

Michigan's dedicated growers produce the best-tasting, most flavorful apples in the world. The climate and geography of the Mitten State help produce the best conditions for apple growing. Experience the flavor and tradition of autumn in Michigan by choosing fresh Michigan Apples from the place where apples love to grow.



[MichiganApples.com](http://MichiganApples.com)



Ad in Sept./Oct. issue of Midwest Living

## Paid/Boosted Posts

**Michigan Apples**  
Published by Gretchen Mensing [?] · August 30 at 2:42pm · 🌐

Galas are coming soon! These beautiful #Mlapples are consumer favorites with a soft bite and mellow sweetness. The projected harvest date for Galas is September 6, but in some parts of Michigan they are being harvested now! Prepare your taste buds for the flavor of fall!



**Michigan Apples**  
Food & Beverage Company

179,044 people reached [View Results](#)

👍👍👍 768      17 Comments 137 Shares

**Michigan Apples** shared their post.  
Published by Diane Smith [?] · August 16 · 🌐



**Michigan Apples**  
Published by Cole Koretos [?] · August 16 · 🌐

Children get 25% of their calories from snacks, so make sure they're choosing foods that can help fill nutrient gaps. Shari Steinbach, MS, RDN shares lots of tips on our Healthy Living blog at <http://bit.ly/2vIFkSM>! #Mlapples

45,388 people reached [View Results](#)

👍👍👍 Rach De La Rosa, Wanda Nieves and 2.7K others      26 Comments

**Michigan Apples**  
Sponsored

Great tasting 2017 crop Michigan Apples are available in stores now!  
#Mlapples



**Michigan Apples**  
Food & Beverage Company  
41268 people like this

[Like Page](#)

**Michigan Apples**  
Published by Gretchen Mensing [?] · September 1 at 2:29pm · 🌐

College football season is under way, and that means it's also tailgate season! Our friend Lori at Foxes Love Lemons created these amazing Caramel Apple Pie Moscow Mules for us, and we couldn't think of a better tailgate refreshment! Check out her recent guest post on our blog! <http://bit.ly/2wuuXVn> #Mlapples



84,225 people reached [View Results](#)

👍👍👍 619      15 Comments 78 Shares

[Like](#)   [Comment](#)   [Share](#)

## **PROJECT TITLE: MICHIGAN ASPARAGUS ADVISORY BOARD / Michigan Asparagus Marketing - FINAL**

### **PARTNER ORGANIZATION**

Michigan Asparagus Advisory Board

### **PROJECT SUMMARY**

The Michigan asparagus industry has rapidly shifted production from processed canned and frozen to the fresh market in the past five years responding to consumer preferences. Growing fresh market demand requires a focus on both retail education and consumer marketing that work together to facilitate knowledge of the benefits of USA-grown Michigan Asparagus for both retail buyers and traditional supermarket consumers.

This project utilized a two-prong approach for both retail trade and consumer marketing. For retail trade marketing we focused on trade educational tools, press releases, e-newsletters and the MAAB website to disseminate information related to recent research on asparagus category performance and consumer buying habits to retail buyers.

On a consumer level we utilized social food influencers to grow audience awareness of the attributes and benefits of Michigan asparagus as well as promote the availability of a digital coupon used as incentive to purchase.

Retail buyers were engaged with six e-newsletters sent throughout the season and hundreds of thousands of consumers were reached through various social media platforms. USDA NASS reports that Michigan sold 12 million lbs. of fresh in 2017 up from 11.7 in 2016 and 5.3 million in 2012.

### **PROJECT PURPOSE**

In the past decade Michigan went from an insignificant player to the 2<sup>nd</sup> largest\* shipper of fresh asparagus in the USA. The shift from a “processing” state to a fresh powerhouse has not come without some growing pains. “Buy Local” promotion programs that worked great when most fresh asparagus was sold in-state meant nothing when the asparagus was sold outside the state.

In 2016 the Michigan Asparagus Advisory Board (MAAB) used Specialty Crop Block Grant funds to undertake a project with the goal of becoming more strategic in identifying consumer preferences, purchase triggers and usage as well as evaluating MAAB’s current marketing programs. The following key research findings were the basis for this project that utilized SCBG funds to supplement and enhance MAAB’s promotion dollars.

#### Consumer research findings

- 64% of consumers surveyed purchase asparagus monthly or more
- Appearance (quality) and price were primary purchase triggers and many used digital coupons
- Most use online sources such as food blogs and social media to get food information
- 75% of consumers do not know where asparagus is grown and the majority said that they would prefer USA grown and would pay more for it.

#### Trade research findings

- Nearly 100% of grocers or food-service only stock asparagus from one location or buyer at a time. Implication – if they are not handling Michigan asparagus their customers will not have a chance to purchase it.
- Pricing is important and promotions and coupons drive sales
- Working directly with dietitians and in-store communications teams to promote the health / nutritional benefits would drive sales.
- Regular updates on crop conditions of the Michigan crop would be extremely beneficial.

Based on the above findings this project had three primary goals:

- 1) To increase the awareness of the availability and benefits of domestically grown Michigan Asparagus among retail trade buyers.
- 2) To increase consumer awareness and visibility of Michigan Asparagus during the primary market window of May 15 – June 20.
- 3) To boost sales of Michigan Asparagus during a historically slow period – the Memorial Day holiday week.

## PROJECT ACTIVITIES

### *Trade Press Releases*

One trade press release was submitted to approximately one dozen trade publications with a few reporting and links noted below. We do not maintain a monitoring/clipping service, but these note industry publications covering the article. A less than normal pickup rate was found on this release due to the Michigan Asparagus freeze news coverage and new packaging release coverage from two Michigan suppliers overshadowing this release.

<http://www.thepacker.com/news/michigan-asparagus-advisory-board-releases-consumer-research>

<http://www.freshplaza.com/article/174828/Knowing-the-health-benefits-of-asparagus-would-positively-impact-consumer-buying-decision>

<http://www.theshelbyreport.com/2017/05/03/michigan-asparagus-research/>

<http://www.perishablenews.com/index.php?article=0060054>

### *E-Newsletters*

A series of six e-newsletters were sent to industry professionals including retail, foodservice and wholesale buyers throughout the United States. The newsletters included crop updates, marketing program updates, and updates from the retail and consumer research highlight best practices, as well as links and contact information for Michigan asparagus suppliers.

Newsletters were sent to approximately 500 email addresses each distribution cycle.

Date	Open Rate	Clicks to Links	Total Opens
6/21/2017	18.2%	3	89
6/12/2017	16.6%	6	49
5/30/2017	22.1%	4	66
5/18/20017	18.8%	2	58
5/9/2017	24.2%	3	74
5/3/2017	27.1%	6	83

### *Marketing Graphics*

Brand graphics were created for social media, as well as for industry members. First a series of social media graphics were created to share valuable information about Michigan Asparagus.

Secondly, a marketing sell sheet was created for Michigan Asparagus suppliers to help them share program updates with their buyers.

*Social Media Graphics*

<p>All Michigan asparagus is hand snapped. That means we harvest all asparagus by hand, breaking it off at the ground rather than cutting it. This creates a natural break in the stem and gives you more usable asparagus and less fibrous ends.</p>	<p>After harvest, remaining spears are allowed to grow up. They actually leaf out and look like giant ferns and can grow up to 6 ft tall. Farmers continue to care for the top part of the plant which feeds the root system for the next year.</p>	<p>A single asparagus plant can produce 25 or more spears over the 7-week harvest season.</p>	<p>An asparagus field takes about four years to mature and will continue to produce for up to 15 years before needing to be replanted.</p>
<p>THE SPEAR FACTS MICHIGAN ASPARAGUS</p>	<p>THE SPEAR FACTS MICHIGAN ASPARAGUS</p>	<p>THE SPEAR FACTS MICHIGAN ASPARAGUS</p>	<p>THE SPEAR FACTS MICHIGAN ASPARAGUS</p>
<p>Asparagus grows so fast that fields are sometimes harvested twice a day.</p>	<p>About 120 Michigan farm families grow the fresh asparagus that is delivered to you May - June.</p>	<p>Oceana County is located in West Central Michigan along the shores of Lake Michigan and is considered the asparagus capital of the world.</p>	<p>New asparagus spears emerge every day and under ideal conditions may grow ½ inch per hour.</p>
<p>THE SPEAR FACTS MICHIGAN ASPARAGUS</p>	<p>THE SPEAR FACTS MICHIGAN ASPARAGUS</p>	<p>THE SPEAR FACTS MICHIGAN ASPARAGUS</p>	<p>THE SPEAR FACTS MICHIGAN ASPARAGUS</p>
<p>Asparagus growers make 25-45 trips over their fields each spring between early May and late June snapping off each spear when it reaches the perfect height.</p>	<p>GET THE MOBISAVE APP TO GET YOUR \$0.50 MICHIGAN ASPARAGUS COUPON SAVINGS *While supplies last</p> 		<p>Our deepest thanks to those who made the ultimate sacrifice.</p> 
<p>THE SPEAR FACTS MICHIGAN ASPARAGUS</p>	<p>MICHIGAN ASPARAGUS</p>	<p>MICHIGAN ASPARAGUS</p>	<p>MICHIGAN ASPARAGUS</p>
<p>LET IT always WAVE free</p> 	<p>GIVEAWAY \$50 Gift Card</p> 		<p>FACEBOOK LIVE FROM THE FARM &amp; KITCHEN Tuesday, May 16 Morning times will vary</p> 

Marketing Program Sell Sheet



**MICHIGAN ASPARAGUS RAISES AWARENESS WITH NEW CONSUMER PROGRAMS**

Michigan Asparagus is best known for its "hand snaped" quality but consumers around the country are learning more about the domestic green spear through a new consumer marketing campaign for 2017.

**CONSUMER PROGRAM TOOLS**

- Consumer Coupon
- Online Awareness

**COUPON PROGRAM DETAILS**

- Partnership with Mobisave (online app based savings tool)
- \$0.75 coupon
- Available at all grocery retailers that carry Michigan Asparagus
- Expansive consumer reach & impressions

**ONLINE AWARENESS PROGRAM DETAILS**

More than a dozen food bloggers will post about Michigan Asparagus both online and via their social media sites. This online awareness program will reach millions of target consumers sharing information about the benefits of Michigan Asparagus, usage ideas, recipes and promotion of the coupon.




**Contact your shopper partner for more information.**

Michigan Asparagus Advisory Committee  
PO Box 550, DeWitt, Michigan, 48820

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

### Retail Best Practices

The retail best practices were provided to trade members to share with their buyers and also uploaded on the industry website for access. This research was promoted through a press release and through weekly e-newsletters to trade buyers. Over 100 visitors accessed the data online.

### Coupon Program

Online digital coupon company Mobisave was used to promote Michigan Asparagus and incentivize consumer purchase.

Brand	Offer	Rebates Redeemed	Total Redemptions
Michigan Asparagus	Save \$0.50 on any Michigan Asparagus Products	\$4764.00	9528



## Food Blogger Program

Bloggers are considered the new peer influence and are often looked to as a means of information and recommendation about valued products. A total of six food bloggers were used to gain expanded reach and influence among consumers including a farm tour hosted by Brenda of A Farmgirl's Dabbles and Gina of Nom News. In addition to sponsored posts, Michigan Asparagus participated in two social events including #BrunchWeek and #BBQWeek as a sponsor. During these events more than 40 bloggers posted daily recipes and mentions of Michigan Asparagus along with a rafflecopter giveaway to drive additional social traffic.

### *#BrunchWeek Recap - May 8 - 13, 2017*

For May, Michigan Asparagus participated in #BrunchWeek May 2nd – 7th bloggers from all over shared new recipes using Michigan Asparagus. Branded content from the bloggers reached 270,347 and received 10,598 link clicks and 2,620 reactions.

- 23 food and travel bloggers

Combined reach of all participating bloggers:

- Facebook: 311,229
- Twitter: 179,021
- Pinterest: 332,234
- Instagram: 139,236

Giveaway

- 4,032 entries into giveaway

Overall stats

- Twitter
  - 4,510 tweets in total (with #Brunchweek tag)
  - 34.4 million timeline deliveries
  - 8.5 million reach
  - 809 contributors
- Instagram
  - 140 posts (with #Brunchweek tag)
  - 17,225 likes
  - 2,063 comments
  - 394,166 impressions

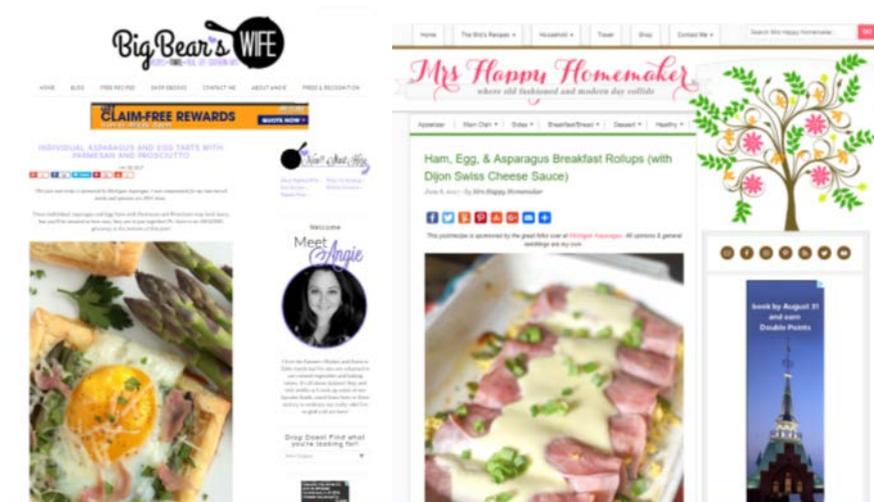
Blog posts mentioning/highlighting Michigan Asparagus (31)

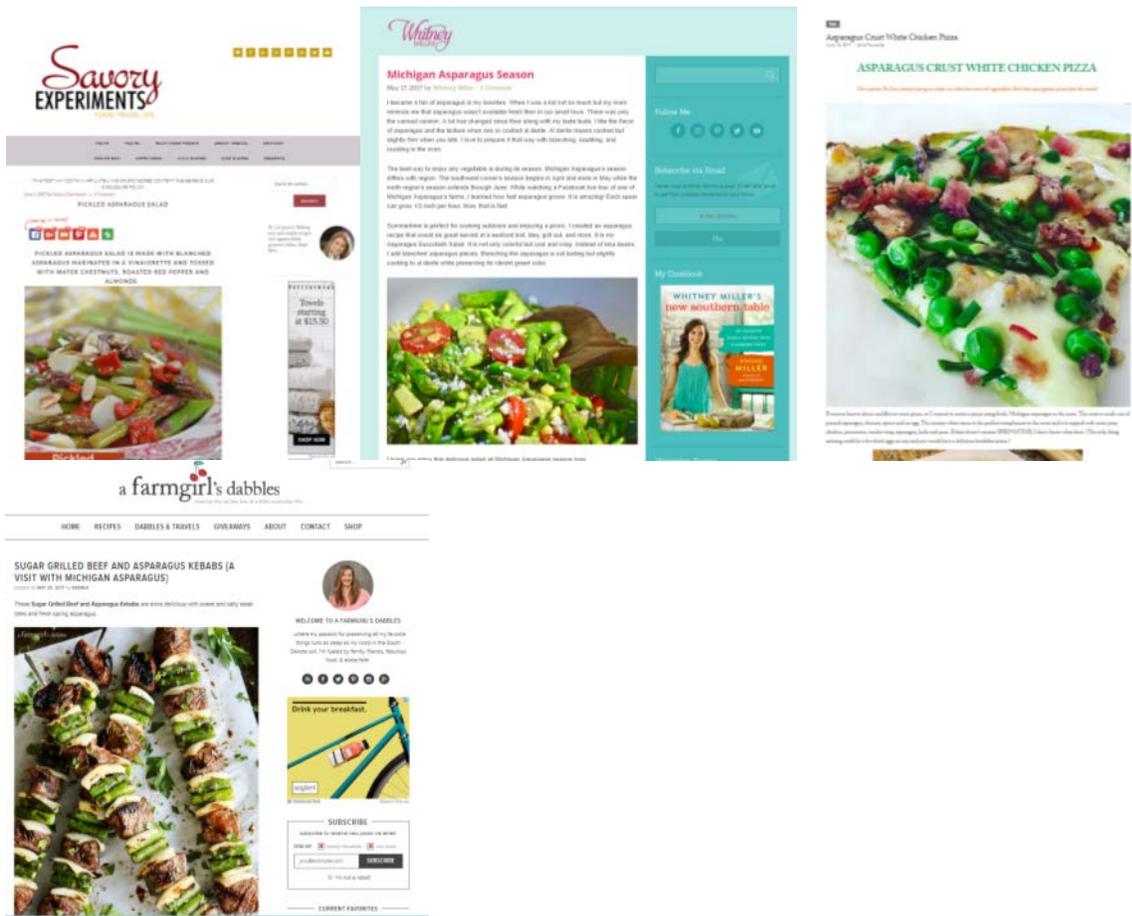
- <http://www.loveandconfections.com/2017/05/asparagus-egg-prosciutto-brunch-pizza.html>
- <http://www.thatskinnychickcanbake.com/asparagus-topped-eggs-with-hats/>
- <http://www.theredheadbaker.com/steak-eggs-oscar-style/>
- <http://www.kimchimom.com/food-blogger-brunchweek-2017/>
- <http://www.books-n-cooks.com/2017/05/08/welcome-to-brunchweek-2017/>
- <http://www.cookingwithcarlee.com/2017/05/parmesan-polenta-brunch-bowl-with.html>
- <http://www.cookingwithcarlee.com/2017/05/welcome-to-brunchweek-2017-and-awesome.html>
- <http://www.chefnextdoorblog.com/2017/05/asparagus-and-pancetta-frittata.html>
- <https://sewyouthinkyoucancook.com/2017/05/08/brunchweek-the-giveaway-2017/>
- <https://palatablepastime.com/2017/05/08/cinnamon-roll-pizza/>
- <http://hardlyagoddess.com/mesclun-salad-with-grilled-asparagus-raspberries-brunchweek/>
- <http://familyaroundthetable.com/2017/05/09/individual-swiss-asparagus-tarts/>
- <http://culinary-adventures-with-cam.blogspot.com/2017/05/brunchweek-2017-is-here-sponsor.html>
- <https://sewyouthinkyoucancook.com/2017/05/10/brunchweek-cheesy-potato-asparagus-tart/>
- <http://wholisticwoman.com/creamed-asparagus-omelet-brunchweek/>
- <https://palatablepastime.com/2017/05/10/goat-cheese-and-asparagus-breakfast-souffle/>
- <http://www.theniftyfoodie.com/2017/05/12/cheesy-asparagus-bacon-quiche-brunchweek/>

- <http://www.thespiffycookie.com/2017/05/08/eggs-benedict-breakfast-tacos-brunchweek/>
- <http://www.sarcasticcooking.com/2017/05/12/brunchweek-shaved-asparagus-herb-cream-cheese-and-smoked-salmon-pizza/>
- <http://www.cookaholicwife.com/2017/05/brunchweek-asparagus-salad.html>
- <http://www.cindysrecipesandwritings.com/smoked-eggs-brunchweek/>
- <http://www.amyscookingadventures.com/2017/05/cheddar-asparagus-mini-quiche-brunchweek.html>
- <http://www.amyscookingadventures.com/2017/05/welcome-to-brunchweek.html>
- <http://www.brunchnbites.com/sweet-potato-hash/>
- <http://www.cookingwithcarlee.com/2017/05/parmesan-polenta-brunch-bowl-with.html>
- <http://sweetbeginningsblog.com/asparagus-and-bacon-grilled-cheese-brunchweek/>
- <https://rantsfrommycrazykitchen.com/2017/05/12/ham-egg-and-asparagus-breakfast-pizza-brunchweek/>
- <http://adayinthelifeonthe farm.blogspot.com/2017/05/welcome-to-brunchweek-with-homemade.html>
- <http://adayinthelifeonthe farm.blogspot.com/2017/05/spring-vegetable-quiche-brunchweek.html>
- <http://www.akitchenhoorsadventures.com/get-ready-for-brunchweek-giveaway/>
- <http://itbakesmehappy.com/2017/05/white-cheddar-asparagus-breakfast-tarts.html>

### Sponsored Posts

Overall impressions with the six food bloggers exceeded one million impressions and our farm tour host Brenda at a Farmgirl's Dabbles shared a total of three unique recipes and Mrs. Happy Homemaker also created a recipe video in addition to her sponsored post.





## Social Media & Social Shares

Social media played an important role in sharing the messages about Michigan Asparagus. A total of six additional bloggers were used to share Michigan Asparagus messages on their social media accounts to amplify the total reach. They shared coupon info, availability info, recipes and farm tour videos.

A highlight of the social program was the farm tour hosted on Facebook Live with field and packing house tours, as well as a live cooking demonstration. The videos generated thousands of additional impressions and became a valuable consumer education tool. The event was promoted to bloggers around the U.S. and advertised on social media. These segments received 35,531 impressions and had 11,043 video views.

## Social Feedback Analytics

### May

Overall the social channels gained a net of 687 audience members, which is about four times the amount of growth in April. Facebook accounted for the most growth, with 463 new friends added. Pinterest was the fastest growing channel, with 56 new followers. About 51% of the audience is between 35-54 years old, and 72% are female.

Due to the increase of influencer marketing and an increase in promoted posts Facebook reached 197.9k people, 11.9k users were engaged, and the page received 2,063 reactions.

MOST ENGAGED FOLLOWERS					
Name	Retweet	Name	Mention	Name	Favs
John Tull	7	FamilyAroundTheTable	29	Tracy Forner	35
Stefanie	5	A Palatable Pastime	24	Jim Snyder	14
Gina Ferwerda	5	Cynthia Landrie	19	Girl Abroad	11
BottomLeftofMitten	5	Carlee	14	Cabot Cheese	10
Sarah   ChefNextDoor	4	Books n' Cooks	14	John Tull	9
Girl Abroad	4	Culinary Cam	13	Gina Ferwerda	9
Cynthia Landrie	4	Hezzi-Ds Books&Cooks	13	Cynthia Landrie	8
Brenda Score	3	hardyagoddess	10	Sarah   ChefNextDoor	7
Maureen Reynolds	2	Christie Campbell	10	FamilyAroundTheTable	7
BrunchWeek	2	Cabot Cheese	10	Jamie Petchell	7
Hezzi-Ds Books&Cooks	2	Cindy Kerschner	9	GlobalPlantGenetics	6
Angie Barrett	2	Stefanie	9	A Palatable Pastime	6
GlobalPlantGenetics	2	Tracy Forner	8	Ronald Hendrick	4
Bernadette Martin	2	Lauren Kathryn	8	Stefanie	4
Nicole Thomas	2	Sarah   ChefNextDoor	7	Brenda Score	4
A Palatable Pastime	2	Amy Kim	7	martinelli1000	4

### June

Michigan Asparagus social profiles grew by 347 followers over the course of June. Facebook gained 143 net likes, Instagram gained 10 new followers, Pinterest grew by 84 followers and Twitter added 110 net followers. This audience continues to consist mostly of women between the ages of 35 through 64.

Coming off the variety of boosted posts, live videos and blogger engagement from the previous month, there was a decline in overall engagement however, the momentum from the May campaign continued into June.

### Social Giveaways

A combination of social media flash giveaways of \$50 giftcards and a promoted rafflecopter giveaway of \$1000 in prizes for three winners was used to drive social engagement and traffic. For the small flash giveaways, a total of four giveaways were hosted generating the following engagement.

Date	Likes	Shares	Comments
5/23/2017	41	51	51
5/31/2017	19	33	32
6/8/2017	32	22	27
6/19/2017	35	46	46

The larger social giveaway was promoted on Facebook, as well as on sponsored posts of six bloggers generating 2438 total entries over a seven week period of time. The three winners were awarded a \$700 gift card, \$200 gift card and \$100 gift card respectively.



## GOALS AND OUTCOMES ACHIEVED

### ***Retail Education Programs***

Our goal was to increase the awareness of the availability and benefits of domestically grown Michigan Asparagus among retail trade buyers utilizing trade press releases and e-newsletters. One trade press release was submitted to approximately one dozen trade publications. Four trade publications picked up the release but a less than normal pickup rate was found on this release due to the Michigan Asparagus freeze news coverage and new packaging release coverage from two Michigan suppliers overshadowing this release.

A series of six e-newsletters were sent to industry professionals including retail, foodservice and wholesale buyers throughout the United States. The newsletters included crop updates, marketing program updates, and updates from the retail and consumer research highlight best practices, as well as links and contact information for Michigan asparagus suppliers. Newsletters were sent to approximately 500 email addresses each distribution cycle. Open rate averaged 21.2% greatly exceeding our target of 10%.

### ***Consumer Marketing Program***

#### **Coupon Program**

Our goal was to increase the sales of Michigan asparagus during the Memorial Day holiday time period utilizing a mobile phone coupon program via a digital app. Our target was a redemption/utilization of at least 1,000+ coupons. Total redemptions were 9528.

#### **Food Influencer Program**

Our goal was to increase the awareness and visibility of Michigan Asparagus during the market window of May 15 – June 20th through the use of food bloggers.

Our target for sponsored online content in blog posts and social media was expected to gain a total impression reach of 300,000 consumers with at least 500 entries to a consumer contest. A total of six food bloggers were used to gain expanded reach and influence among consumers including a farm tour hosted by Brenda of A Farmgirl's Dabbles and Gina of Nom News. In addition to sponsored posts, Michigan Asparagus participated in two social events including #BrunchWeek and #BBQWeek as a sponsor. During these events more than 40 bloggers posted daily recipes and mentions of Michigan Asparagus along with a rafflecopter giveaway to drive additional social traffic. Results of each activity are listed in the project activities section but the program greatly exceeded our target of total impression reach of 300,000.

### Social Media Program

Social media played an important role in sharing the messages about Michigan Asparagus. A total of six additional bloggers were used to share Michigan Asparagus messages on their social media accounts to amplify the total reach. They shared coupon info, availability info, recipes and farm tour videos.

A highlight of the social program was the farm tour hosted on Facebook Live with field and packing house tours, as well as a live cooking demonstration. The videos generated thousands of additional impressions and became a valuable consumer education tool. The event was promoted to bloggers around the U.S. and advertised on social media. These segments received 35,531 impressions and had 11,043 video views.

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### Conclusions

USDA NASS reported that Michigan sold 429,799 cases (28 lb. equivalents) of fresh asparagus in 2017 up about 3% from the 417,250 cases sold in 2016.

Two weather events had a major impact on total asparagus volumes in 2017. A severe early May freeze took out much of the first two or three harvests. Then extreme heat in early June caused growers to divert product to the processing market because of tip quality and also shortened the season for many by about a week. A conservative estimate was that these two weather events shortened the total fresh production by 1 million lbs.

Michigan asparagus handlers are required to report lbs. sold but not to whom they are sold. Their customer lists are proprietary and carefully guarded so it is impossible to determine exactly where in the country that Michigan asparagus is available. However, many share information with MAAB in a general sense and it was widely reported to us that retail buyers were much more aware of Michigan's industry and were better informed on crop conditions. It was also reported that Michigan shippers gained new customers in 2017 and that our asparagus was sold in new geographic areas.

Thousands and thousands of consumers are now aware that Michigan produces asparagus. They know that it is produced by 120 family farms, they learned that they can identify it by checking the band tags, they know how quickly it can go from field to fork and they know that there is a lot of ways that it can be prepared.

This grant has enabled Michigan asparagus growers to lay a solid foundation for future marketing efforts.

### **BENEFICIARIES**

There are three major beneficiaries of this project:

- 120 family farms in Michigan that supplied the asparagus
- Seven facilities that packed the asparagus
- Six Shippers that sold the asparagus

The groups listed above make up the bulk of Michigan's fresh asparagus industry. Weather conditions limited the expected 5% + growth in fresh sales to around 3%. However, more important than the growth in fresh sales, is the foundation for future marketing efforts that was enabled by this grant. New retail buyers purchased Michigan asparagus in 2017. New consumers experienced asparagus that was fresher, less traveled, and tastier. New and existing customers learned new ways to prepare asparagus but more importantly, learned how to identify where the product originated from by checking the rubber bands that hold the bundles together.

#### LESSONS LEARNED

Food influencers (bloggers) have emerged as a significant component of a rounded marketing program aimed at consumer awareness and education. Engaging and compensating food bloggers is achieved through a number of methods. Federal Specialty Crop Block Grant funds have limits on how they can be used. By combining industry dollars with grant funds, we were able to achieve a well-rounded program that utilized this group of individuals.

#### CONTACT PERSON

John Bakker, Executive Director  
john@michiganasparagus.org  
Michigan Asparagus Advisory Board  
Phone: (517) 669-4250  
[www.michiganasparagus.org](http://www.michiganasparagus.org)

#### ADDITIONAL INFORMATION

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## MDARD Scope Change Projects

#### **PROJECT TITLE: International Marketing Program / Michigan Specialty Crop Booth at Gulfood Trade Show 2017**

Project partner:  
Cherry Marketing Institute

#### PROJECT SUMMARY

MDARD International Marketing Program worked collaboratively with the Cherry Marketing Institute to promote specialty crop products, specifically U.S. Montmorency tart cherries, at the Gulfood Show in Dubai, UAE. The Specialty Crops booth allowed for Michigan specialty crops to be showcased at this show, where booth space is extremely difficult to secure due to limited space in the US Pavilion.

The Middle East is a new market of interest for the Michigan specialty crop industry. The Middle East imports a majority of their food products due to the lack of arable land for food production and food produced in the U.S. is highly sought after due to the high quality and food safety.

Gulfood is the largest and most important food show for the region and takes place annually in Dubai, which is the trading hub of the Middle East. More than 95,000 professional visitors attended the 2017 show from 120+ countries. Exhibiting at Gulfood allowed Michigan specialty crops the ability to find new opportunities for export and introduced Michigan specialty crops to Middle East buyers.

#### PROJECT APPROACH

MDARD's International Marketing Program staff worked collaboratively with the Cherry Marketing Institute and other specialty crop commodity groups to organize and promote the booth space. An e-mail was sent to all Michigan commodity groups representing specialty crops and companies with specialty crop products.

Booth space was secured by MDARD staff for the Michigan Specialty crops booth. This approach provided a low cost opportunity for the Cherry Marketing Institute to be exposed to the Middle Eastern market for the first time. MDARD staff worked to oversee the budget and implementation of the trade show and kept partner groups updated on the progress of the trade show and exhibitor information. Staff also assisted with the implementation of the trade show including helping with the logistics relative to exhibiting.

MDARD staff as well as the Cherry Marketing Institute traveled to Dubai, UAE, from February 27-March 2, 2017 to promote Michigan Specialty Crops to the international audience at the Gulfood trade show. Show attendance was strong and literature and specialty crop value added products were available for tradeshow attendees to take and sample. Completion of an evaluation was required of the Cherry Marketing Institute.

#### GOALS AND OUTCOMES ACHIEVED

The goal of promoting Michigan Specialty Crops to buyers in the Middle East through increased sales and growth of awareness of what is available in Michigan was accomplished at Gulfood.

The 22<sup>nd</sup> edition of Gulfood was an excellent opportunity for Michigan Specialty Crops to gain exposure to world class buyers and distributors from across the Middle East and the world. The overall effectiveness of the show was excellent and there were many opportunities to take a deeper look into innovations and trends in the food industry through multiple events during the show. International buyers sought out the Michigan Specialty Crops booth to discuss specific products and sample specialty crop value added products. MDARD generated 26 quality leads due to participation in the show – each lead was sent to Michigan specialty crop companies that can supply the product requested.

- The Cherry Marketing Institute anticipates sales of \$200,000 over the next 6-12 months from leads that they generated and passed on to tart cherry processors.
- The Cherry Marketing Institute received a total of 49 leads as a result of participation, exceeding the goal that commodity groups would receive a minimum of five leads.
- Gulfood was the first step for the Cherry Marketing Institute (CMI) in the Middle Eastern Market. The show provided CMI with the opportunity to meet with quality buyers from the Middle East for the first time and showcase the uses and health benefits of Montmorency tart cherries.

## BENEFICIARIES

Participants included:

- Cherry Marketing Institute (Representing 540 Michigan tart cherry growers, 60 growers nationally, 470 sweet cherry growers)
- All Michigan specialty crops were represented by MDARD

## LESSONS LEARNED

Middle Eastern consumers were receptive of tart cherries as a “Superfruit” and were eager to learn about the health benefits. Many consumers had never sampled Montmorency tart cherries prior to visiting the Michigan Specialty Crops booth.

A lot of interest was shown in Michigan Specialty Crops, especially in dried and fresh fruits and vegetables including apples, beans, tart cherries and blueberries.

## PROBLEMS AND DELAYS

Booth space for the U.S. Pavilion was not made available until two months before the show due to reorganization of Gulfood into a sectorized show. Reserving booth space so close to the show significantly limited the specialty crop companies and commodities groups’ ability to participate in the Michigan Specialty Crops booth. In addition, show organizers limited the number of companies exhibiting in each booth to one. Since only one Michigan Specialty Crops booth was purchased, participation was limited to one company or commodity group.

## CONTACT PERSON

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## ADDITIONAL INFORMATION

### EVALUATION/FOLLOW-UP FOR INTERNATIONAL ACTIVITIES

**Gulfood Trade Show**  
**Michigan Specialty Crop Booth Evaluation Report**  
**Dubai, UAE**  
**Activity Date: February 27-March 2, 2017**

#### **Introduction**

The Cherry Marketing Institute participated in the Michigan Specialty Crop Booth at the Gulfood Show in Dubai, UAE, February 26-March 2.

No. of Participants: 1

No. of Returned Evaluations: 1

#### **Specialty Crop Participants:**

Cherry Marketing Institute



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

- *“Gulfood was one of the best international trade shows that CMI has participated in. There was a lot of interest in U.S. tart cherry products from all over the world. Jamie Zmitko-Somers and Allie Fox VanDriel always do a great job with all the details to make these shows so successful. We are very excited to see the new customers that transpire from attending Gulfood.”*

**PROJECT TITLE: MICHIGAN DEPARTMENT OF AGRICULTURE & RURAL DEVELOPMENT – AGRICULTURE DEVELOPMENT DIVISION / Michigan Impact Analysis of the Specialty Crop Block Grants Years 2012, 2013, 2014**

**PARTNER ORGANIZATION**

Michigan Department of Agriculture & Rural Development; work completed by Public Policy Associates

**PROJECT SUMMARY**

The Michigan Department of Agriculture & Rural Development (MDARD) worked with Public Policy Associates to complete an analysis of the impact of the 75 Michigan grant projects funded by the USDA Specialty Crop Block Grants for 2012, 2013, and 2014.

Over the course of three fiscal years, the Michigan SCBG program funded over \$3.6 million to the following types of projects: education, including food safety; marketing and promotion; pest and plant health, and production; and research. Overall the projects helped build grower capacity, improve production, build efficiencies, and expand markets.

**PROJECT PURPOSE**

An independent review of the impact of Michigan’s Specialty Crop Block Grant program provided valuable information and insight into the impact of the projects funded with Specialty Crop Block Grant funding, as well as review of other state’s SCBG programs. It analyzed recommendations on how improvements could be made to focus dollars on projects that provide the highest impact to benefit specialty crop growers and provide assurance to the public that the funding is being used to provide the greatest impact.

A grant analysis had never been done for the specialty crop block grant projects in Michigan. Having the analysis performed gives us a benchmark for future specialty crop grants and help us to see where we may improve on selection of projects or what may be important issues to address.

The SCBG impact analysis was informed by both qualitative and quantitative data from administrative and survey sources. Known direct economic impacts were extracted primarily from qualitative data. A series of IMPLAN economic models were developed—one for each project type, and a statewide model—to estimate economy-wide economic impacts based on project expenditures.

Brief profiles for each project type are provided in the appendix. Briefs include a model of estimated economic impacts of all awards of that type, combined over the fiscal years. As well as detailed profiles of each grant award also accompany this impact report. The impact project was completed by PPA over a four-month period.

**PROJECT ACTIVITIES**

<b>Specialty Crop Block Grant Analysis Work Plan</b>		
<b>Tasks</b>	<b>Responsible Individual</b>	<b>Completed by (date)</b>
Request for Proposals	Grant Administrator	January 2017
Meet with partners to review project plans and responsibilities.	Grant Administrator	February 2017
Plan to measure impact of program.	PPA	March 1, 2017
Analyze and evaluate funded projects and surveys	PPA	March-May 2017
Recommendations for changes to improve impact	PPA	June 5, 2017
Report delivered	PPA	June 29, 2017

The SCBG impact analysis was informed by both qualitative and quantitative data from administrative and survey sources. Known direct economic impacts were extracted primarily from qualitative data. A series of IMPLAN economic models were developed—one for each project type, and a statewide model—to estimate economy-wide economic impacts based on project expenditures.

Brief profiles for each project type are provided in the appendix. Briefs include a model of estimated economic impacts of all awards of that type, combined over the fiscal years. As well as detailed profiles of each grant award also accompany this impact report. The impact project was completed by PPA over a four-month period.

The technical features of the independent analysis conducted and supports the reporting of the analysis in the *Grant Impact Summary Report*, and the series of *Grantee Profiles*. The analysis resulted in a series of products that identified the work carried out by the grantees, created reliable estimates of the economic impact of that work, and shared what other high-value results were generated by the grantees.

The grant impact analysis was conducted for MDARD by a research team from Public Policy Associates Inc., and the Center for Economic Analysis, a unit of the Michigan State University Product Center, staffed by Steven R. Miller and John T. Mann.

**Grant Analysis Purpose**

The analytic objectives were:

- To quantitatively measure the economic impact of program expenditures from awards and any matched funding tied directly to those awards.
- To qualitatively assess the results of awarded programs through success in meeting stated programming goals.

- To identify the overall impact of the grant program and recommendations for maximizing the impact in the future.

The following data sources were used:

1. Administrative and extant data. This included reports and data on the use of SCBG in other states. For Michigan, essential data were MDARD administrative information about grant awards from fiscal years 2012-2014. This included grant award spreadsheets, grant applications, interim and final reports from grantees, and similar documentation held by MDARD. The information was reviewed, relevant data was abstracted according to a protocol, and the results populated the analysis and profiles.
2. Grantee online surveys. The survey gathered information from grantees to supplement data from MDARD. It included quantitative data on match funds and qualitative data. The online survey was fielded between April 5 and May 5, 2017. Each grantee was asked to complete the online survey. MDARD sent advance notice to each grantee explaining the purpose of the survey and encouraging timely responses. The research team sent invitations to complete the survey via e-mail. Follow-up telephone calls were made to prompt responses. A total of 64 responses were obtained on 75 awards, which was an 85% response rate.
3. Literature regarding the management of SCBG grants from other states.

**Qualitative results** were assessed by a review of administrative documents and survey results to extract economic indicators. The team interpreted grantees' survey responses regarding the utility of the grants, short-term outcomes, capacity-building impacts, and contributions to industry or economic activities. Grantees were asked to note new impacts that occurred since their final report to MDARD, and their thoughts on the potential of future grant funds to improve economic impact.

**Quantitative impacts** were estimated using IMPLAN Pro 3.1 economic modeling software for Michigan with inputs from administrative and survey data. This is a common tool for assessing economic impacts of direct expenditures. This model, and its underlying transactions data, is broadly used in regional economic analysis for understanding economic impacts and key industry linkages. It is based on inter-industry purchasing patterns, consumption patterns, and local production, retail, and service availability. The model uses data provided by the U.S. Bureau of Economic Analysis, the Bureau of Labor Statistics, and various other state and federal statistical reporting agencies. Expenditures are traced over 500 sectors of the Michigan economy to generate estimates of economic impacts at various economic levels and represent the full extent of upstream (secondary as the sum of indirect and induced impacts) transactions necessary to accommodate direct expenditures by sector. These transactions are traced out to employment, labor income, and gross state product values through fixed ratios to sales. Such models have been employed for over 50 years in research and economic analysis, and are well established in the academic literature.

Economic impact estimates were based on actual expenditures of SCBG funds and leveraged funds associated with the SCBG award. These included match funding that was contingent on the SCBG award, sales revenues generated, and additional grant and private funding generated that the survey respondents attributed to the SCBG funding. The leveraged funds were limited to those that would not have been received or expended by the grantee absent the grant award.

The values of actual expenditures and leveraged funds were mapped to expenditure categories based on industry sector spending patterns. These sectors were specific for each awardee based on their respective organization type, and are representative averages of all state expenditures of similar organizations. Direct expenditures may be made to parties that are outside of Michigan, and these expenditures are captured and removed from the impact based on sector average expenditures for state imports. Expenditures were then modeled for contribution to secondary transaction, or secondary effects including indirect (business-to-business transactions) and induced effects (household-to-business transactions) that arise through payments to labor. Model prices were adjusted to end of year 2013 prices.

For the MDARD analysis, one model was developed for each of the four project types. Because impacts are additive, statewide aggregate impacts were estimated by adding impacts of all four award types.

#### GOALS AND OUTCOMES ACHIEVED

The table below provides data per grantee award as to the award expenditures and other funds leveraged due to SCBG award. The "matching" column refers to the organization obtaining matching funds contingent on the Specialty Crop Block Grant award. The "other funds" refer to additional grant funding and additional private funding that was generated because of the SCBG award.

Types of Grants and Grantee Names	Amount Awarded	Match Award	Other Funds	Total Funds
<b>Education</b>	<b>\$556,633</b>	<b>\$13,776</b>	<b>\$2,597,908</b>	<b>\$3,168,317</b>
Cherry Marketing Institute	\$11,081	\$5,776	\$0	\$16,857
Food Bank Council of Michigan	\$47,779	\$0	\$0	\$47,779
MDARD - Food & Dairy	\$7,065	\$0	\$0	\$7,065
MDARD Food and Dairy	\$4,200	\$0	\$0	\$4,200
Michigan Bean Commission	\$75,000	\$0	\$0	\$75,000
Michigan Farmers Market Association	\$63,325	\$0	\$15,000	\$78,325
Michigan Food & Farming System	\$53,496	\$0	\$1,270,954	\$1,324,450
Michigan Food and Farming Systems	\$51,390	\$0	\$15,000	\$66,390
Michigan Food and Farming Systems MIFFS	\$74,510	\$8,000	\$1,240,954	\$1,323,464
Michigan Plum Advisory Board	\$13,600	\$0	\$0	\$13,600
Michigan Potato Industry Commission	\$41,196	\$0	\$0	\$41,196
Morse Marketing Connections	\$28,741	\$0	\$56,000	\$84,741
National Grape Cooperative	\$13,500	\$0	\$0	\$13,500
National Grape Cooperative Association	\$71,750	\$0	\$0	\$71,750
<b>Marketing and Promotion</b>	<b>\$946,957</b>	<b>\$75,000</b>	<b>\$2,000</b>	<b>\$1,023,957</b>
Cherry Marketing Institute	\$75,000	\$75,000	\$0	\$150,000
Cherry Marketing Institute	\$75,000	\$0	\$0	\$75,000
Commercial Maple Syrup	\$9,000	\$0	\$0	\$9,000
MDARD International and Domestic Projects	\$39,631	\$0	\$0	\$39,631
MDARD Projects Export Promotion of Michigan	\$121,808	\$0	\$0	\$121,808

Specialty Crops:				
Michigan Apple Committee	\$40,000	\$0	\$0	\$40,000
Michigan Apple Committee	\$75,000	\$0	\$0	\$75,000
Michigan Apple Committee	\$75,000	\$0	\$0	\$75,000
Michigan Apple Committee	\$10,000	\$0	\$0	\$10,000
Michigan Apple Committee	\$75,000	\$0	\$0	\$75,000
Michigan Bean Commission	\$64,112	\$0	\$0	\$64,112
Michigan Christmas Tree Association	\$75,000	\$0	\$0	\$75,000
Michigan Christmas Tree Association	\$75,000	\$0	\$0	\$75,000
Michigan Grape and Wine Industry Council	\$15,554	\$0	\$0	\$15,554
Michigan Nursery and Landscape Association	\$10,000	\$0	\$0	\$10,000
Northwest Michigan Council of Governments	\$39,152	\$0	\$2,000	\$41,152
West Michigan Tourism Association	\$72,700	\$0	\$0	\$72,700
<b>Pest and Plant Health</b>	<b>\$1,178,898</b>	<b>\$149,495</b>	<b>\$1,465,000</b>	<b>\$2,793,393</b>
Chestnut Growers, Inc.	\$14,526	\$5,000	\$0	\$19,526
Michigan Asparagus Advisory Board	\$59,975	\$0	\$0	\$59,975
Michigan Asparagus Advisory Board	\$62,449	\$0	\$0	\$62,449
Michigan Asparagus Industry Development Program	\$29,975	\$0	\$0	\$29,975
Michigan Blueberry Advisory Committee	\$74,545	\$0	\$0	\$74,545
Michigan Carrot Industry Development Program	\$19,000	\$0	\$0	\$19,000
Michigan Cherry Committee	\$10,196	\$1,675	\$0	\$11,871
Michigan Nursery and Landscape Association	\$75,000	\$0	\$0	\$75,000
Michigan Nursery and Landscape Association	\$52,260	\$0	\$0	\$52,260
Michigan Onion Committee	\$54,638	\$0	\$0	\$54,638
Michigan Onion Committee	\$18,796	\$0	\$0	\$18,796
Michigan Onion Committee	\$22,032	\$0	\$0	\$22,032
Michigan Organic Food and Farm Alliance	\$39,158	\$0	\$0	\$39,158
Michigan Potato Industry Commission	\$31,798	\$0	\$0	\$31,798
Michigan Potato Industry Commission	\$40,000	\$0	\$0	\$40,000
Michigan State Horticultural Society	\$75,000	\$0	\$0	\$75,000
Michigan State University	\$75,000	\$0	\$1,000,000	\$1,075,000
Michigan State University	\$59,897	\$17,410	\$225,000	\$302,307
Michigan State University, Crop and Soil Sciences	\$40,000	\$38,000	\$30,000	\$108,000
Michigan State University, Department of Horticulture	\$19,412	\$35,000	\$0	\$54,412
Michigan State University, Department of Entomology	\$64,096	\$17,410	\$210,000	\$291,506
Michigan State University, Department of Horticulture	\$63,089	\$35,000	\$0	\$98,089
Michigan State University, Plant Pathology	\$39,631	\$0	\$0	\$39,631
Michigan State University,	\$19,806	\$0	\$0	\$19,806

Plant Pathology				
Michigan State University, Plant Pathology	\$19,687	\$0	\$0	\$19,687
Michigan Vegetable Council	\$45,939	\$0	\$0	\$45,939
Michigan Vegetable Council, Inc.	\$52,993	\$0	\$0	\$52,993
<b>Research</b>	<b>\$933,806</b>	<b>\$127,450</b>	<b>\$62,000</b>	<b>\$1,123,256</b>
Lakeshore Environmental Inc.	\$60,095	\$0	\$0	\$60,095
Lakeshore Environmental, Inc.	\$56,555	\$0	\$0	\$56,555
Lakeshore Environmental, Inc.-Peterson Farms	\$61,290	\$0	\$0	\$61,290
Michigan Bean Commission	\$75,000	\$15,000	\$0	\$90,000
Michigan Bean Commission	\$75,000	\$22,500	\$0	\$97,500
Michigan Carrot Committee	\$62,263	\$0	\$0	\$62,263
Michigan Christmas Tree Association	\$20,000	\$0	\$0	\$20,000
Michigan Christmas Tree Association	\$69,241	\$10,000	\$0	\$79,241
Michigan Farm Bureau	\$45,500	\$0	\$0	\$45,500
Michigan Farm Bureau	\$75,000	\$0	\$0	\$75,000
Michigan Floriculture Growers Council	\$24,576	\$0	\$0	\$24,576
Michigan Maple Syrup Association	\$27,807	\$0	\$0	\$27,807
Michigan State University	\$66,660	\$70,000	\$0	\$136,660
Michigan State University, Department of Bio-systems and Agricultural Engineering	\$40,156	\$0	\$62,000	\$102,156
Michigan Vegetable Council	\$54,005	\$0	\$0	\$54,005
Western Michigan University	\$75,000	\$0	\$0	\$75,000
Western Michigan University	\$45,658	\$9,950	\$0	\$55,608
<b>Grand Total</b>	<b>\$3,616,294</b>	<b>\$365,721</b>	<b>\$4,126,908</b>	<b>\$8,108,923</b>

### Multiplier Effects

Overall, the implied multiplier for all 75 grants combined was 8.09. The following table shows the implied multiplier for each of the four project types. The multiplier is calculated as the ratio of total sales impacts divided by total awarded funding, and represents the leveraging of the total value of transactions for a given level of award allocation. The award expenditures may be lower than the award allocated, but the associated total sales impacts reflect the return on that award commitment.

For education projects, the implied multiplier is 21.03. The multiplier is the ratio of total sales (greater than \$11 million) divided by the total combined awards of \$556,633. It should be noted that the total value of transactions, however, is based on awards as well as leveraged funds. In the case of education projects, MDARD awards were about 18% of the total education funds expended, meaning that MDARD dollars were heavily leveraged.

A higher implied multiplier may not be indicative of future benefits. In the case of education, just a few exceptional projects generated substantial leveraged funding tied to their grants. Such leveraging is not guaranteed in future awards. Additionally, a higher implied multiplier does not necessarily correlate with largest impacts, as many projects are capable of generating substantial yet unmeasurable impacts to third parties well into the future. For example, successful pest and plant health projects may result in improved financial performance of growers that was not captured in the survey of project administrators.

### Multiplier by Project Type

	Award	Total Sales Impact	Implied Multiplier
Education	\$556,633	\$11,704,815	21.03
Marketing and promotion	\$946,957	\$3,361,051	3.55
Pest and plant Health	\$1,178,898	\$10,442,498	8.86
Research	\$933,806	\$3,758,950	4.03
Grand Total	\$3,616,294	\$29,267,315	8.09

In the following table the capacity-building findings are reported in more detail than was shown in the summary report. This provides outcomes using two alternate denominators: one based on whether that capacity was a specific goal of an award (“Percentage Yes, of Applicable”), and the other considering all grants, regardless of whether grantees intended to build capacity in that manner.

	Yes	No	NA/Not an Objective	Percentage Yes, of Applicable	Percentage Yes, of All
As a result of the award, we increased the competitiveness of the industry sector that we were focused on.	53	3	7	95%	84%
We have enhanced our marketing of innovation/product/service as a result of this award.	36	4	24	90%	56%
We have accelerated our partnerships/collaboration due to this award.	40	5	18	89%	63%
This award had improved my organization’s ability to generate grant funding.	13	11	40	54%	20%
This award has improved my organization’s ability to generate private investment.	6	12	45	33%	10%

### BENEFICIARIES

The analysis of the grants created a benefit for USDA to have a third-party review of Michigan's SCBG process and projects. Also, it allowed MDARD to have an independent review,

implements any noted changes, streamlining and finding efficiencies in our process and impact of our awarded projects.

The analysis and one-page project reviews give the SCBG grant recipients and SCBG growers the opportunity to see and review each grant project. The will help growers, commodity stakeholders, and future grant recipients to review successful proposals and lessons learned.

Our overall state economy benefited from the grant projects. The total impact, or approximate dollar value put into circulation in the local economy, from all project grants and associated match funding was \$29,267,315. This is based on estimated direct impacts generated (sales) of \$15,337,657. Based on sector-specific spending patterns we anticipate that 194 year-equivalent jobs were generated with \$11,128,398 in total labor income. Additionally, the funding and associated leveraged funds contributed an expected \$17,002,651 to gross state product over three years. (Implied in these estimates is a calculated employment multiplier of 2.26—indicating for each job directly created, an additional 1.26 jobs are created in the economy through secondary transactions. Similarly, for every estimated dollar of direct impact (see sales in table below), an additional \$0.91 is created through secondary transactions (sales multiplier of 1.91).)

<b>Impact Type</b>	<b>Persons Employed</b>	<b>Labor Income</b>	<b>Gross State Product</b>	<b>Sales</b>
<b>Direct Impact</b>	86	\$6,382,688	\$8,794,530	\$15,337,657
<b>Secondary Impact</b>	108	\$4,745,710	\$8,208,121	\$13,929,658
<b>Total Impact</b>	194	\$11,128,398	\$17,002,651	\$29,267,315

As noted above, several grantees realized immediate economic impacts as a result of their projects. However, most project outcomes were of a capacity-building nature, providing grantees and their stakeholders with tools, resources, and knowledge that they are actively using to improve farming practices, make crops more productive, engage potential customers, and make the industry more resilient and sustainable. Although nearly all projects generated short-term outputs such as the successful completion of tasks and the practical application of project results by growers and other industry stakeholders, most were designed to pay dividends over the long term rather than generating immediate gains. This was especially true of grants involving research of potential solutions for pest control and plant health.

#### LESSONS LEARNED

- If goals or outcome measures were not achieved, identify and share the lessons learned to help others expedite problem-solving.
- Describe any lessons you learned in the administration of the project that might be helpful for others who would want to implement a similar project.
- Lessons learned should draw on positive experiences (i.e., good ideas that improve project efficiency or save money) and negative experiences (i.e., lessons learned about what did not go well and what needs to be changed).

MDARD's investment successfully improved the competitiveness of the Michigan specialty crop industry.

- Virtually all grantees completed their projects as promised. Their projects were well planned, well executed, and resulted in an array of important outputs and outcomes.
- The grant investment was extremely effective in building the capacity of the Michigan specialty crop industry. Grantees were nearly unanimous in agreeing that the program

had made the industry more competitive. Projects in every grant category generated outputs that saw immediate application in the industry.

- In spite of the fact that job creation and retention was not a performance requirement and that sales were not a direct focus of most grantees, many projects reported immediate economic impacts, including improved sales as well as demand for Michigan specialty crops. Comments by grantees were corroborated by the economic impact model, which revealed notable multiplier effects from program investments. The economic model estimated a total impact of more than \$29 million over the course of the three grant years. Given the program's strong focus on capacity-building, further economic impacts can be expected to emerge over time.
- MDARD funds were leveraged by grantees—as a match for other funds, and to generate additional public grant and private investment—resulting in additional resources valued at 125% of SCBG funds. In this way, grantees essentially more than doubled the MDARD investment. The opportunity for leverage is most notable in generating additional public grant and private investment, more so than in providing a match.
- MDARD was highly effective in setting parameters and providing guidance for the RFP process and the grant awards. It may prove fruitful to reassess the application itself with an eye toward which features one-fifth of the grantees may not have found easy to complete.
- MDARD's grant management has been effective in the selection process given the strong alignment between the stated purpose of the SCBG funds and the grantee project objectives. As part of the review process, it would be helpful to ensure selection criteria include appropriate plans for measuring and documenting impacts. A match requirement would likely be an obstacle for the types of projects appropriate for SCBG awards, and accordingly MDARD is encouraged to continue that practice of not requiring a match.

#### The Future

- Given the positive program results as well as the overall high level of grantee satisfaction regarding program operation, MDARD should continue to run the program along the same broad lines as it did during the 2012-2014 fiscal grant cycles.
- Several grantees requested that funding cycles continue for longer periods in order to allow for improved tracking of impacts over time. However, it is not clear to what extent this is necessary given that grantees are allowed to pursue funding for the continuation of past grant projects. On the other hand, short-term awards put MDARD at a disadvantage in assessing new applications prior to fully assessing closing grants.
- MDARD may wish to consider providing technical assistance or other supports to help grantees gather accurate data regarding the outcomes and impacts of their programs. For example, MDARD's support of marketing campaigns generated positive results, particularly for specialty crops affected by the 2012 crop disaster. However, many grantees in this category had difficulty gathering concrete evidence of the extent to which their campaigns translated to increased sales.

MDARD's 2012-2014 SCBG grantmaking was successful in building capacity across the Michigan specialty crop industry. It has already contributed to notable economic impacts and appears likely to generate further impacts in the years to come. Given the strong performance of grantees as well as their satisfaction with MDARD's administration, this important program is being carried out effectively and in keeping with the intent of the USDA's guidelines.

#### CONTACT PERSON

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#### ADDITIONAL INFORMATION

Appendix – See [http://www.michigan.gov/documents/mdard/2014\\_SCBG\\_MDARD -  
\\_Impact\\_Analysis\\_for\\_web\\_607590\\_7.pdf](http://www.michigan.gov/documents/mdard/2014_SCBG_MDARD_-_Impact_Analysis_for_web_607590_7.pdf) for reports listed below.

- MDARD SCBG Final Report
- Compiled Project Type Reports – 4 category reporting areas
- Compiled Profile Reports – 75 SCBG projects