Northern Michigan FruitNet 2018
Northwest Michigan Horticultural Research Center
Weekly Update

FruitNet Report – June 15, 2018

CALENDAR OF EVENTS

5/8 – 6/27	**IPM Updates**
6/22	**Farmer Field Day - SOIL, STEWARDSHIP & FARM LONGEVITY *Tickets are still available – RSVP here:** https://www.eventbrite.com/e/farmer-field-day-tickets-45485784205?aff=eac2

What's new?

- **2018 Agriculture Container Recycling Program**

New articles

2018 Agriculture Container Recycling Program

A FREE service for agricultural producers in NW MI

Where are the collection sites?

- Wilbur-Ellis Co 8075 US-31 Williamsburg, MI 49690

- Ellsworth Farmer's Exchange (Co-op) 11900 Byers Rd. Ellsworth, MI 49729

- CHS Inc 6766 E Traverse Hwy Traverse City, MI 49684

- Crop Production Services (CPS) 13343 Pleasanton Hwy, Bear Lake, MI 49614

When can I drop off my ag containers?

- June 11- June 18 You can drop off your materials during regular business hours at any collection site listed above during these dates. G. Phillips & Sons (the ACRC contractor) will pick up containers on Tuesday, June 19.

- NOTE: CPS in Bear Lake will accept containers anytime throughout the growing season, not just during the above dates. All other collection sites will ONLY accept containers between June 11-June 18.

One Additional Site: Drop off ONLY on June 19th

- Cherry Bay Orchards 2801 N. Jacobson Rd. Suttons Bay, MI 49682 This will be a ONE-DAY collection. You may drop off your containers between **8:00 am and 3:00 pm on June 19th**.

What do I do to prepare the containers for recycling?

- Triple rinse, remove caps, remove loose leaf labels (if possible), put in large/clear plastic bags OR string together 20-30 containers with twine – if the containers are not up to these standards, they will not be accepted.

- All non-refillable, high-density polyethylene (HDPE) plastic crop protection and specialty pesticide product containers in sizes up to and including 55 gallons are accepted.

***We will have 2 additional recycling collection dates in 2018: August 29 and October 30. Keep an eye out for future fliers about when you can drop off your containers for these collection dates!

- **Questions? Contact Lauren Silver (lsilver@gtcd.org) or Lizzy Freed (lfreed@gtcd.org) at the Grand Traverse Conservation District. Ph: 231-941-0960**

Non-bearing Ulster Sweet Cherries

Nikki Rothwell and Emily Pochubay, Northwest Michigan Horticultural Research Center, Michigan State University Extension and AgBioResearch

In the past two years, Michigan growers have had blocks of sweet cherries, var. Ulster that are not bearing, despite that they are of bearing age. We have looked at many orchards across northwest Michigan, and in all cases, the trees look healthy and grow vigorously. The non-bearing trees also look different than Ulsters that are bearing; the growth habit is much more upright than typical Ulster trees and the leaves are much more rounded rather than elongated as is typical of most sweet cherries. In some situations, the trees have extensive bloom while other trees bloom very little. Because the trees themselves appear healthy, growers have been hesitant to remove them in hopes that they will eventually bear fruit. We have looked into this issue for growers, but we have yet to find a solution or a reason why particular Ulster orchards are not bearing fruit.

The Michigan State University (MSU) horticulture team and colleagues have tried to find a common denominator among farms that have non-bearing Ulsters. However, similarities across farms have been limited. We ruled out obvious potential solutions, such as orchards were planted with pollinizer trees that do not pollinate Ulsters. We also eliminated the possibility of frost or other weather events because these orchards have not produced typical yields over multiple years. Pruning, training, fertilization regimes were examined, but we did not find any physiological reason that the trees do not bear fruit.

Originally, we hypothesized that the trees came from one nursery, but upon further examination, we discovered that the trees were purchased from six different nurseries (Table 1). The trees on various farms are also on a variety of different rootstocks: Mahaleb, Gisela 5, MxM60, MxM2, Mazzard, and Gisela 6. Most of the non-bearing Ulsters are located in northern Michigan, but there are Ulster trees on the Ridge that are not bearing. The only common factor is the age of the trees; all trees that are not bearing are 6-12 years old. Summit Tree Sales staff helped us communicate with all nurseries that sold Ulster trees that ultimately did not bear fruit. Nursery representatives confirmed that they had certified budwood and that budwood was not shared between nurseries.

In 2016, we sent samples to Dr. Amy Iezzoni to determine whether trees from five orchards have the *S*-allele genotype of 'Ulster'. Branches from trees from five orchards were shipped from northern Michigan. After receiving the branches, leaves were collected and dried using silica beads and DNA was isolated using the protocol by Edge-Garza *et al*. (2014). DNAs from five other cherry selections were used as controls as their *S*-allele genotypes are known: Chelan (*S3S9*), Gold (*S3S6*), Lapins (*S3S4*), Sam (*S2S4*), and Ulster (*S3S4*) (Iezzoni et al. 2005). Each selection was

S-allele genotyped using the *S-RNase* consensus primer pair PruC2/PCE-R (Tao et al. 1999) followed by the use of *S3*-allele and *S4*-allele specific primer pairs for the stylar-*S-RNase* (Sonneveld et al. 2001).

The first PCR analysis using the *S*-RNase consensus primer pair amplified fragments from the trees that had the sizes expected for the *S3* and *S4* alleles. To further confirm these alleles, primer pairs specific for *S3* and *S4* were used and the analyses confirmed that the trees have the *S3* and *S4* alleles. We found that trees from four of the five orchards match the control Ulster's alleles. Trees from fifth orchard were unable to be confirmed due to poor quality DNA. This information confirms that four of the five samples have alleles that are those of Ulsters, but it does not prove that the trees are indeed Ulsters.

To further investigate possible causes of these non-bearing Ulster orchards, we sent six samples to Washington State University virus testing. They used enzyme-linked immunosorbent assay (ELISA) to test for cherry leaf role virus, prunus necrotic ringspot virus, and prune dwarf virus. All of the samples came back negative for all three viruses.

Earlier this week, we contacted Phytelligence, Inc., a company that specializes in genotyping. They can use genetics to determine if these non-bearing trees are Ulsters. We are currently working with Phytelligence scientists to collect and send in samples from of bearing and non-bearing Ulsters from the region. We anticipate that samples will be collected early next week.

Unfortunately, at this time, we have no further evidence as to why these trees are not bearing, but we are committed to working toward identifying solutions.

Table 1. Collection of orchard information for non-bearing Ulsters

Orchard	**Nursery**	**Tree Age**	**Other Varieties in Block**	**Rootstock(s)**	**Location**
A	Willow Drive	9 years old (2011)		mxm60, mahaleb	Traverse City, MI
B	C&O	8 years old (2009)		mxm60	Suttons Bay, MI
C	Vanwell, C&O	7-9 yr range		mxm60, mxm2, mahaleb	Old Mission peninsula
D	Vanwell	2 groups, 6 years (2012) 10 years (2008)	black york, black gold, idlefingins	mazzard	Very good location, Old Mission peninsula
E	C&O, Hilltop	7-8 years old (2010 - 2011)		mxm60	N. overlook between Northport/Omena
F	C&O	7-9 year (mahaleb) (mxm60)	Golds, SAMs in 2 blocks and SAMs and BlackGolds in 2 blocks	mxm60	
G	Willow Drive	9 years old (2009)	Older Ulsters, Cavalier, a few others	gisela 5	Old Mission peninsula
H	Stark Bros	12 years old (2006)		mazzard	Section 3, Peninsula Township

I	C&O	10 years old (2008)	Regina/GI6, Rainier/GI6, and Blackgold	Gisela 6	Green Tree Orchards, on the ridge
J	Adams County	9 years old (2009)	Hudson, Gold, and a few Emperor Francis as pollinizers.	Mahaleb	Kent City, MI

Literature cited

Edge-Garza D, Rowland T, Haendiges S, Peace, C. 2014. A high-throughput and cost-efficient DNA extraction protocol for the tree fruit crops apple, sweet cherry, and peach relying on silica beads during tissue sampling. Molecular Breeding 34:2225-2228.

Iezzoni, A.F., R.L. Andersen, H. Schmidt, R. Tao, K.R. Tobutt, and P.A. Wiersma. 2005. Proceedings of the S-allele workshop at the 2001 international cherry symposium. Acta Hort No. 667: 25-35.

Ikeda K, Ushijima K, Yamane H, Tao R, Hauck NR, Sebolt AM and AF Iezzoni. 2005**.** Linkage and physical distances between the *S*-haplotype *S-RNase* and *SFB* genes in sweet cherry. Sexual Plant Reproduction 17: 289-296.

Sonneveld, T., T.P. Robbins, R. Bošković, R. and K.R. Tobutt. 2001. Cloning of six cherry self-incompatibility alleles and development of allele-specific PCR detection. Theor. Appl. Genet. 102:1046-1055.

Tao, R., H. Yamane, A. Sugiura, H. Murayama, H. Sassa, and H. Mori. 1999. Molecular typing of *S*-alleles through identification, characterization and cDNA cloning for *S*-RNases in sweet cherry. J. Amer. Soc. Hort Sci. 124: 224-233.

Articles featured in past FruitNet Reports

Farmer Field Day - SOIL, STEWARDSHIP & FARM LONGEVITY - Update

* GTCD is still accepting registrations and the sale has not ended! RSVP at the link below.

Learn About:
Soil Fertility, Nutrient Utilization, and Conservation Tools

Qualifies for a MAEAP phase 1 credit

Date: June 22, 2018

Time: 8:45AM - 4PM

Location: MAPLE BAY FARM **10875 US-31, Williamsburg MI**

Reception & bluegrass performance to follow featuring **CARTER CREEK**

FREE OF CHARGE

A locally-sourced lunch is included with pre-registration

TO REGISTER:
Contact the *Grand Traverse Conservation District* via phone or email: **231.941.0960 ext. 22** // **lfreed@gtcd.org**

https://www.eventbrite.com/e/farmer-field-day-tickets-45485784205?aff=eac2

New 24 © for Mustang Max in Cherries

Label attached to this email or available here for download:
https://www.dropbox.com/s/073x6bb99f5qewe/2018-06-06%20Mustang%20Maxx%20SLN%20-%20MI%20-%20final%20label.pdf?dl=0

Understanding Thinning and the Carbohydrate Model

Fruitlets need energy to grow, survive, and set. The carbohydrate model predicts the grams of carbon/tree unit that are available to the tree for fruitlets and vegetative growth. A deficit of energy (carbohydrates) causes stress in the tree. When apple trees are under stress they are more sensitive to naturally drop fruitlets. In the same sense, stressed trees also respond more to chemical thinning applications. We have been using the carbohydrate model as a thinning guide for many years in Michigan with good success. The model is now on Enviroweather. Growers should click on the Apple Section of Enviroweather and go to the Apple Carbohydrate Thinning tab. The user will be directed to the Cornell site that houses the model (http://newa.cornell.edu/index.php?page=apple-thin). Growers should select Michigan and the Enviroweather station closest to them, then click continue. Next, enter the green tip and bloom dates and click on 'calculate.' The results will be presented in chart and

graph form and will provide thinning recommendations. We have also included Phil Schwallier's 2018 thinning recommendations in this FruitNet.

At the time of thinning, which with precision thinning can begin as soon as bloom, we like to see 2-3 days in a row that have stress to optimize thinner applications. A single day of deficit is not important as the trees can probably buffer that deficit. We need 2 or 3 days of deficits of carbohydrates to obtain the stress effects, and thinners will work when we have a deficit of carbohydrates, which is -10 to -40g carbon/day. The more of a deficit in carbohydrates, the more thinning activity growers will obtain from their thinning applications. A surplus of energy (carbohydrates) will strengthen fruitlets, and they will resist thinning. Traditionally, our region has hard-to-thin situations in most years because we have cold, sunny conditions, which creates a surplus of energy, and the trees resist thinning.

The Honeycrisp is at full bloom at the NWMHRC today, 25 May. If we were to apply thinner now, we have a -30 level of stress, and we would have moderate thinning. However, bloom time is not the optimum time for thinning apples. If we were at a more sensitive thinning window, 8-10mm fruit, thinners should work well during this time but because the trees are in a deficit, the thinners will probably work too well and we would recommend reducing the rates of the thinners by 15% according to the model. Since we are at bloom, the thinners will have a mild affect on thinning fruit (see bottom chart for a guide to thinning at different times in apple tree phenology), but many growers are starting to take advantage of the 'nibble' approach to thinning and are starting their thinning programs earlier than in the past. Starting to thin at bloom or petal fall increases both fruit size and return bloom.

Apple Carbohydrate Thinning Model Results

Date	Max Temp (°F)	Min Temp (°F)	Solar Rad (MJ/m2)	Tree Carbohydrate Status (g/day)				Thinning Recommendation
				Production	Demand	Balance	4-Day Ave Balance	
5/1	79	62	21.8	0.00	18.37	-18.37	-14.8	-
5/2	70	49	13.6	0.00	15.62	-15.62	-15.49	-
5/3	59	44	18.4	0.00	11.91	-11.91	-15.84	-
5/4	62	42	14.6	0.00	13.28	-13.28	-16.33	-
5/5	70	50	24.0	0.32	21.48	-21.16	-21.06	-
5/6	63	47	20.6	1.36	18.38	-17.02	-22.02	-
5/7	70	37	26.8	3.49	17.34	-13.85	-19.05	-
5/8	82	55	24.9	1.33	33.53	-32.20	-16.48	-
5/9	73	47	7.5	0.00	25.00	-25.00	-10.3	-
5/10	56	38	22.8	7.23	12.39	-5.16	-6.68	-
5/11	50	34	13.0	4.77	8.33	-3.56	-10.55	-
5/12	62	40	24.2	8.73	16.22	-7.49	-12.47	-
5/13	67	44	26.7	10.24	20.73	-10.49	-13.38	-
5/14	74	51	19.6	6.94	27.62	-20.68	-11.08	-
5/15	68	52	26.2	12.56	23.77	-11.21	-6.68	-
5/16	78	48	27.3	14.51	25.64	-11.13	-6.92	-
5/17	68	47	26.4	17.64	18.95	-1.31	-0.71	-
5/18	75	49	27.1	18.51	21.59	-3.08	-0.43	-
5/19	63	48	7.5	2.88	15.03	-12.15	2.13	-
5/20	62	39	26.1	24.60	10.93	13.68	5.28	-
5/21	67	43	14.2	13.34	13.52	-0.17	-0.87	-
5/22	67	51	25.7	24.42	17.27	7.15	-10.73	Apply standard chemical thinner rate
5/23	77	51	27.1	25.69	25.22	0.47	-20.63	Decrease chemical thinner rate by 15%
5/24	81	56	26.8	24.69	35.62	-10.94	-27.43	Decrease chemical thinner rate by 15%
5/25	82	66	18.3	12.18	51.79	-39.60	-30.75	Decrease chemical thinner rate by 15%
5/26	77	61	19.5	20.28	52.75	-32.47	-26.45	Decrease chemical thinner rate by 15%
5/27	75	57	21.1	27.64	54.37	-26.73	-25.99	Decrease chemical thinner rate by 15%
5/28	75	55	23.3	34.70	58.92	-24.22	-	-
5/29	75	54	24.3	39.65	62.05	-22.40		
5/30	79	56	24.3	39.94	70.55	-30.61		
5/31	-	-	-	-	-	-		

This model can help us understand what will happen if we have 2-3 day deficit and the different timings when thinners are applied. We need to be careful at 10 to 15mm when a deficit of -60 or lower occurs. Our choices are to back off rates or delay thinning. However, if a -80 g carbon/day occurs at petal fall and you thin, you may get the job done perfectly.

Here is a rule of thumb guide based on Phil Schwallier's work with the carbohydrate model:

If we have 3 days of stress, then the following natural drop may happen at the 10-15 mm stage:

Stress Level	Amt. of Thinning
-20	2%
-40	15%
-60	25%
-80	40%
-100	80%

Guide for time of thinning application of aggressive combinations (i.e. Sevin+NAA or Sevin+MaxCel): Thinning Percent at Different Time During Season and Stress Levels:

	0	-20	-40	-60	-80	-100
Petal Fall	0%	10%	15%	25%	35%	50%
6 mm	5%	20%	30%	40%	50%	60%
10mm	15%	30%	40%	50%	60%	80%
15 mm	15%	30%	40%	50%	60%	80%
20 mm	10%	20%	30%	40%	45%	50%
25 mm	3%	10%	15%	20%	30%	35%
30 mm	0%	0%	2%	5%	10%	15%

MaluSim Carb Model Thinning Decision Guide.

Stress Level	4 Day Ave Carb Balance	Thinning Rate Recommendation	Example for Gala
No	> 0	Increase Rate by 30%	S+M 150 ppm
Slight	-20 to 0	Use Standard Rate	S+M 100 ppm
Mild	-40 to -20	Reduce Rate by 15%	S+M 100 ppm
Moderate	-60 to -40	Reduce Rate by 30%	S+M 50 ppm
Severe	-80 to -60	Reduce Rate by 50%	S or M 150 ppm
Extreme	<-80	Do not thin, many fruits will fall off	

To conclude, this model is a tool that can help guide thinning strategies and thinner applications. Based on the upcoming forecasts, the weather looks like it will be excellent for thinning with the warm temperatures. We encourage growers to be diligent about thinning this season as the Michigan apple crop looks sizable and there is an abundance of bloom on apple trees this year.

PGR's and Thinning Strategies 2018

Phil Schwallier and Amy Irish-Brown, MSU Extension

Here is a link to the article:

https://www.dropbox.com/s/b6piqdomcj36glr/PGR%27s%20and%20Thinning%20Strategies%202018.pdf?dl=0

WEB SITES OF INTEREST:

Farmer to Farmer – Connecting farmers, cultivating community
http://www.f2fmi.com

Insect and disease predictive information is available at:
http://enviroweather.msu.edu/homeMap.php

This issue and past issues of the weekly FruitNet report are posted on our website:
http://www.canr.msu.edu/nwmihort/nwmihort_northern_michigan_fruit_net

60-Hour Forecast:
http://www.agweather.geo.msu.edu/agwx/forecasts/fcst.asp?fileid=fous46ktvc

Information on cherries:
http://www.cherries.msu.edu/

Information on apples:
http://apples.msu.edu/

Information on grapes:
http://grapes.msu.edu