Northern Michigan FruitNet 2017
Northwest Michigan Horticultural Research Center

Weekly Update

FruitNet Report – May 30, 2017

CALENDAR OF EVENTS

6/2	**Wine Grapes – First June Friday Meeting** NWMHRC, 3 – 5PM
5/9 – 6/27	**Leelanau IPM Updates** Jim and Jan Bardenhagen's Farm, 12PM – 2PM
5/9 – 6/27	**Grand Traverse IPM Updates** Wunsch Farms Packing Shed, 3PM – 5PM
5/10 – 6/28	**Antrim IPM Updates** Jack White Farms, 10AM – 12PM
5/10 – 6/28	**Benzie IPM Updates** Blaine Christian Church, 2PM – 4PM

What's New?

- **Northwest Michigan Fruit Regional Report – May 30, 2017**

Northwest Michigan Fruit Regional Report – May 30, 2017

GROWING DEGREE DAY ACCUMULATIONS AS OF MAY 30, 2017 AT THE NWMHRC

Year	2017	2016	2015	2014	2013	2012	27 Yr. Avg.
GDD42	589	626	626	460	548	948	599.7
GDD50	276	325	333	217	303	531	300.4

2017 Growth Stages as of 5/30/17

Bartlett Pear – 9mm fruit
Potomac Pear – 7 mm fruit
Mac – 7 mm fruit
Gala – 6 mm fruit
Red Delicious – 6 mm fruit
HoneyCrisp – 7mm fruit
Montmorency – 8 mm fruit
Balaton – 8mm fruit
Hedelfingen – 11 mm fruit
Gold – 10 mm fruit
Napoleon – 11 mm fruit
Riesling – 1" – 3" shoots

Wine Grapes

Riesling vines at the Northwest Michigan Horticultural Research Center are showing variable growth, with anywhere from 1 to 6 inches of shoot growth. Recent rains in the Grand Traverse region were sufficient to trigger the release of powdery mildew spores. The First Friday Meeting for June will he held this Friday, June 2, 3 - 5 p.m. at the Northwest Michigan Horticultural Research Center, 6686 S. Center Highway Traverse City, MI 49684.

The topic will be "Dealing with Sour Rot in Grapes", presented via ZOOM by Wendy McFadden-Smith, PhD. Wendy is the Tender Fruit and Grape Integrated Pest Management Extension Specialist with Ontario Ministry of Agriculture, Food & Rural Affairs in Vineland, Ontario. She has a PhD in plant pathology from U of Saskatchewan and MSc and BSc (Agr) from U of Guelph, and has been involved in pest management in tree fruit, grapes and small fruit for the past 27 years. As an adjunct professor, she lectures in the Department of Biological Sciences and a professional affiliate of the Cool Climate Oenology and Viticulture Institute at Brock University. Her research projects deal with sour rot and its vectors, grapevine viruses and their vectors, grape berry moth, black

knot in plums, fire blight in pome fruit, bacterial spot in nectarines & anything else that wreaks havoc and destruction on tree fruit or grapes.

Saskatoons
The egg laying activity of apple curculio and saskatoon sawfly continued during the last week. Foliar symptoms of woolly aphids are now showing. The injury from these insects is not usually severe enough to be a concern. Recent rains likely resulted in infection periods for Entomosporium leafspot and saskatoon-juniper rust.

Note from Nikki and Emily – Off to Japan

We (Nikki and Emily) will be out of the office from 30 May until 9 June, 2017 to attend the VIII International Cherry Symposium in Yamagata, Japan. We know that this time of year is extremely busy, and we will do our best to maintain contact with all of you while we are away. We will likely have access to the internet, although we do not know how readily available it will be. The best method of contact will be through email (rothwel3@msu.edu) (pochubay@msu.edu) while texting is the second-best option if we have access to WIFI: (Nikki: 231-342-4094) (Emily: 810-241-2481). Although we will be half way around the world, we will try to make sure your questions and concerns are addressed as quickly as possible.

First SWD detected in Northwest Michigan

The NWMHRC has started to trap for spotted wing drosophila (SWD) for the 2017 season. We have 201 SWD traps out across northwest Michigan. Traps are placed in all five counties, and we tried to make sure all regions will have adequate information throughout the season. We will plan to check traps weekly and provide updates at least twice a week early in the season and increasing our communications as we approach harvest. In addition to the traps, we have over 15 SWD projects, so there will be no shortage of information about SWD this season. Please look for the updated SWD chart for the latest information—Jenn will send it out in FruitNet in table format. On a unfortunate note, we did detect SWD in Benzie County and on Old Mission this week; all flies were captured in wild host traps.

Location	wk of 5/15	wk of 5/22
North Manistee	trap set	0
Benzie	trap set	3
Yuba	trap set	0
Central Lake	trap set	0

Old Mission	trap set	1
Bingham	trap set	0
Cedar	trap set	0
East Leland	trap set	0
Northport	trap set	0

Wine Grapes – First June Friday Meeting

June 2, 2017, 3 - 5 p.m.

N.W. Michigan Horticultural Research Center

6686 S. Center Highway Traverse City, MI 49684

"Dealing with Sour Rot in Grapes"

Presentation via ZOOM by Wendy McFadden-Smith, PhD.

Wendy is the Tender Fruit and Grape Integrated Pest Management Extension Specialist with Ontario Ministry of Agriculture, Food & Rural Affairs in Vineland, Ontario. She has a PhD in plant pathology from U of Saskatchewan and MSc and BSc (Agr) from U of Guelph, and has been involved in pest management in tree fruit, grapes and small fruit for the past 27 years. As an adjunct professor, she lectures in the Department of Biological Sciences and a professional affiliate of the Cool Climate Oenology and Viticulture Institute at Brock University. Her research projects deal with sour rot and its vectors, grapevine viruses and their vectors, grape berry moth, black knot in plums, fire blight in pome fruit, bacterial spot in nectarines & anything else that wreaks havoc and destruction on tree fruit or grapes.

Benzie-Leelanau District Health Department scheduling respirator fit tests at the NWMHRC

The Leelanau County Health Department will be available June 5th from 9am - 2:00p at the Northwest Michigan Horticultural Research Center. Each fit test will be 20 minutes long. If all the time slots on June 6th are filled, the Leelanau County Health Department will also be available June 6th and 9th as available options.

Cost for the fit test is $35/person.

If you are interested in signing up to receive the fit test, please contact Jenn at the research center, at goodr100@msu.edu or 231-946-1510, and she will send over paperwork to be filled out before the fit test. People will be given a time slot for the June 5, 2017 fit tests on a first come, first serve basis.

Thinning Materials and Recommendations

P. Schwallier, MSU Extension

Introduction

Thinning is the most difficult, most important, yet necessary practice a grower must perform each year. Making a mistake will compromise both this year's crop and next year's crop. Over-cropping and under-cropping will reduce income for a block for multiple years. But today with a more scientific approach to thinning we can achieve successful consistent annual croploads.

Thinning Materials

Apples can be chemically thinned in all the thinning windows starting with bloom and continuing up to about 30 DAFB (days after full bloom). The major materials that could be considered include: LimeH Sulfur+Oil, ATS (ammonium thiosulfate), NAD (Naphthaleneaceatimide), NAA, 6HBA, Carbaryl, and Ethrel.

Thinning

Thinning can be done during every growing stage starting at Full Bloom up to about 30 mm. There is a natural background sensitivity to thinning (Figure 1). To measure timing sensitivity to thinning, a thinning timing trial in a mature Gala block at CRC (Clarksville Research Center) was conducted each year from 2004 thru 2011. Every 3.5 days, a treatment of either S+N (Sevin+NAA) or S+M (Sevin+MaxCel) at aggressive rates (NAA @ 15 ppm or MaxCel @ 150 ppm combined with Sevin @ 1 qt/100) was applied. All treatments data points are plotted in Figure 1. There are four things that can be learned from the results, 1) at the 8 to 12 mm stage, fruitlets are at maximum sensitivity, 2) at PF (Petal Fall), the fruitlets are not very sensitive and over-thinning is a low risk, 3) there is a lot of variation in thinning at the early and at the late timings, and not as much at 10 mm stage and 4) the thinning window closes rather quickly after 15 mm. Of course, the thinning response is driven by the weather at the time of thinning. Hot cloudy conditions at any of these stages will promote thinning and cold sunny weather will decrease thinning.

Natural Apple Background Sensitivity to Nibble Thinning

The concept of "Nibble Thinning" is to thin a little of the crop at every opportunity until the cropload has been reduce to the desired target level. This means to thin starting

early and planning multiple applications. Start thinning early at FB, then at PF, then again at 6 mm and 10 mm and more if needed (Figure 2 & 3). Nibble the crop down to the perfect cropload. Often, we let the early thinning windows (FB, PF, and 6 mm) pass by because we are unsure of bud health or fruit set. A frost event or some other early trauma makes us want to wait and see what fruitset will be before thinning. But, apple trees are resilient; they will set crops almost every year even when conditions look bleak. As time goes on, more information of frost injury, bee activity, pollination, fertilization becomes known and this allows a better judgment of fruitset and thinning needs. However, delaying first thinning action until late in the thinning window may allow only one chance to thin and then results may be unsatisfactory. Start early when over-thinning risk is low.

Initial flower load is the best early indicator of cropload. The initial flower numbers on a tree follows with corresponding number of fruit on the tree following fruitset. Heavy bloom or "Snowball" bloom will set heavy crops. Get started with early thinning during "Snowball" years. The natural background sensitivity to thinning predicts typical success in thinning. The sensitivity is low at PF and greatest at 10 mm and then quickly becomes insensitive as 25 mm stage is approached.

Nibble and Precision thinning is to thin at every time there is an opportunity such as FB, PF, 6 mm, 10 mm, etc.

Figure 2. Nibble or Precision Cropload Flow Chart.

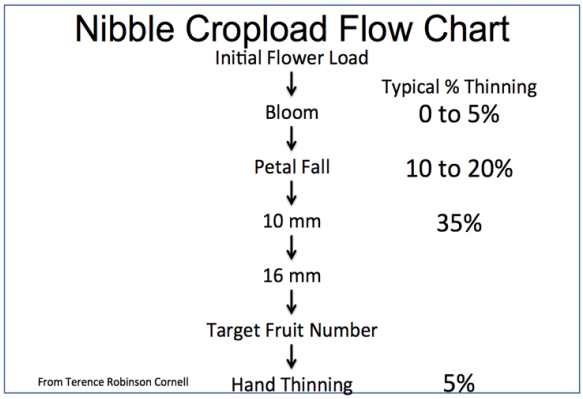
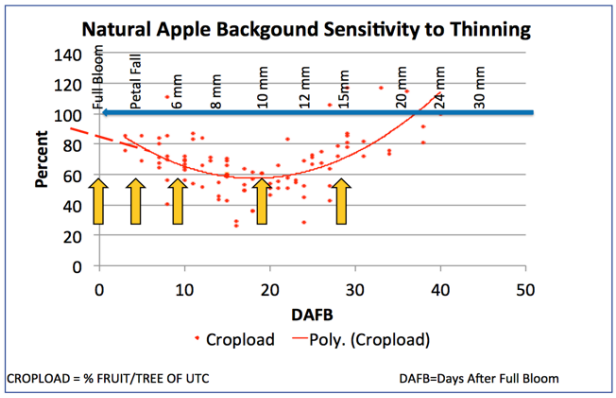


Figure 3. Precision Multiple Thinning Timing.



until the target cropload is reached. This method achieves success yet reduces risk of over and under thinning. Figure 2 indicate the typical percent thinning expected if thinning is performed at the corresponding stage

Table 1. Chemical Apple Thinning Materials and Comments.

Material	Description	Comment
Lime Sulfur & Oil	Depresses Photosynthesis. Burns Pistils. Reduces Fertilization. Good for Organic Growers.	Use LS @ 2.5 gal/100 + Oil @ 2 gal/100. Apply @ 100/acre. Target 80% FB (just after KB). Follow every 3 to 4 days as needed.
ATS **(Ammonium Thiosulfate)** **Fertilizer**	Burns Pistils. Nitrogen and Sulfur fertilizer.	Use ATS @ 2 to 3 gal/100. Apply @ 100/acre. Target 80% FB (just after KB). Follow 2 days later if needed.
NAD **(Naphthaleneaceatimide)** **Amid-Thin**	Mild to little thinning. Use only at Petal Fall. NAD treated trees should be more difficult to thin at the 10 mm stage.	Use @ 50 ppm. Mostly on early summer varieties (Spy, Mac, Empire).
NAA **(Naphthaleneacetic Acid)** **Fruitone N** **Fruitone L** **PoMaxa**	Workhorse thinner. Moderate harsh thinner. Dose dependent. Use throughout thinning window. Can be damaging (defoliation). Promotes return bloom. Stunts fruit growth temporarily, but fewer fruits then grow larger. Aggressive with Sevin.	Use @ 5 to 20 ppm. Red Delicious and Fuji are sensitive to NAA. Stunted leaves and pygmy fruits can result if applied with or close to Promalin or 6-BA applications.
6-BA (6 Benzyadenine) **MaxCel** **Exilis**	Mild to moderate, gentle, thinning. Dose dependent. Improves fruit size, increases cell division. Not compatible with NAA. (needs more research) Aggressive with Sevin.	Use @ 50 to 150 ppm. Standard rate = 100 ppm (64 oz/100 or /acre). Labeled up to 200 ppm.
Carbaryl **Sevin**	Workhorse thinner. Mild to moderate thinning. Relatively safe gentle thinner. Tends to promote large fruit size. Not dose dependent. Use throughout window, but generally used late. Can be damaging (russet). Selective, thins weak laterals, leaving one fruit/cluster (singulates fruit). Will also thin out whole clusters. Can be used from PF to 30 mm. Harsh on beneficials and bees.	Use at 1# to 2#/acre (1 pt to 1 qt/100 or /acre). Combinations with NAA or 6-BA are aggressive thinners.
Ethrel	Mild to excessive thinning. Dose dependent. Will thin very late (20mm +). Generally used late for emergency thinning. Somewhat unpredictable. Can over-thin.	
Other Thinners	ACC ABA Metamitron	

with moderate thinning rates. Aggressive rates will have a greater response. Typically about 50% thinning is the target level in the vast majority of years on most blocks.

Table 2. Apple Thinning Windows Considerations.

Stage	Description	Choices and Comments
Bloom	Set unknown. Early timing, start of "Nibble" or "Precision" thinning. Generally, too early for growers to feel comfortable. Helps difficult to thin varieties. Helps small fruited varieties. Fruits drop early. Maximizes fruit size & return bloom. Allows additional steps in reducing a heavy crop. Generally, weather is not best.	Lime Sulfur & Oil (not preferred). ATS (possible with experience). MaxCel (preferred choice). NAA (good choice).
Petal Fall	Generally early time to thin. Best 1st thinning for return bloom. 1st thinning which allows 2nd and 3rd chance. Fruitset is unknown, generally under-thins. Bloom climate and bee activity is known.	NAD on early summer varieties. Sevin alone on all varieties across the board. NAA alone. Sevin+NAA or Sevin+MaxCel for more aggressive thinning.
6 mm	Get started early. Can get some thinning, but generally under-thins. Moderate risk thinning. Excellent return bloom. Still will have more chances to thin. Good for "Nibble" or "Precision" thinning.	Dose/rate dependent for thinners, choose rates to get target thinning: 6-BA or NAA or combinations of: Sevin+NAA or Sevin+6-BA.
10 mm	8 mm to 12 mm diameter fruit. **Traditional best timing and results for one-time application thinning.** Choose thinning level. Fruitset somewhat unknown, but fruitlets showing strength. Good return bloom. Still will have a last chance in 7 days.	Dose/rate dependent for thinners, choose rates to get target thinning: 6-BA or NAA or combinations of: Sevin+NAA or Sevin+6-BA.
15 mm	12 mm to 18 mm diameter fruit. Still receptive to thinning. Should use full or higher rates. Combinations best. **Last chance** thinning. Thinning window closing fast.	Dose/rate dependent for thinners, choose rates to get target thinning: Probably need combinations of: Sevin+NAA or Sevin+6-BA.
25+	Very late, probably no or low response. Use aggressive combinations. Perhaps **Ethrel** is only good choice. Dangerous and unpredictable. Ethrel at 300 to 600 ppm (1 pt-1 qt). Can use **Ethrel + other thinners and oil.**	Use: Ethrel +Sevin +Oil All @ 1 qt/100 or /acre.

Table 3. Precision Thinning, Timing, Materials and Predicted Percent Thinning Most Years.

Stage	Material Choices (red = preferred choice)	Predicted % Thinning (red = expected result)			
Bloom	Lime & Sulfur Oil	0 to 20%			
	ATS (2 to 3 gal/100)	0 to 20%			
	MaxCel (100 ppm, 64 oz/100)	5 to 10%			
	NAA (10 to 15 ppm, 8 to 16 oz/acre)	5 to 10%			
Petal Fall	Sevin (1 qt/100 or /acre)	10 to 20%			
	NAA (10-15 ppm, 8-16 oz/acre)	10 to 20%			
6 to 20 mm		6 mm	10 mm	15 mm	20 mm
	Sevin (1# to 2#, 1 pt to 1 qt /acre) NAA (10-20 ppm, 8-20 oz/acre)	10 to 25% 15%	15 to 30% 20%	15 to 30% 20%	10 to 25% 15%
	Sevin+NAA (standard rates) Sevin+MaxCel (standard rates)	15 to 35% 30%	25 to 50% 40%	25 to 50% 40%	15 to 35% 25%

Theory of Fruitset

Fruitlets are living respiring organs; they need energy (carbohydrates) to grow and set. When fruitlets demand for energy is greater than supply, fruitlets will be shorted energy, and the weakest ones will drop. When energy is abundant, fruitlets set and resist thinning. Fruitlet stress, both environmental and chemical stress, has a big impact on sensitivity and response to thinning actions. Temperature and sunlight affect the supply and demand of energy (carbon) available for the fruit and leaves. Energy is supplied to fruitlets from two sources, 1) last years overwintering reserves in the wood and 2) this years photosynthesis. It is thought that photosynthesis is the most important fruitlet energy source. A supply/demand crisis occurs after bloom when reserves are depleted and photosynthesis is picking up. This energy crisis on average occurs at the 10 mm stage, which is why fruit are so responsive to thinning at that time.

MaluSim Carbohydrate Model

Dr. Alan Lakso and Dr. Terence Robinson of Cornell University have developed a MaluSim Carbohydrate Model to predict in current real time the energy levels of a fully bearing mature moderately cropped Empire tree. This model is useful to assist thinning decisions. That is, it predicts the daily stress small young setting fruitlets might be experiencing and therefore, help growers adjust their chemical thinning applications. MaluSim predicts the daily carbohydrate balance of a tree. This assists growers in the prediction of fruitlets sensitivity to drop, set and thinning. A surplus of energy at thinning time will set fruitlets and growers will need to thin more aggressively. A serious energy deficit will drop fruitlets and growers may want to delay thinning or reduce rates. The model starts at green tip and will predict the tree daily supply and demand of carbon (energy) based on three daily inputs, 1) daily max, 2) min temperature and 3) daily solar radiation. It also adjusts predictions for the earth latitude of the weather station to estimate day length. Sparta is at latitude 43 degrees, Benton Harbor 42 degrees, and Suttons Bay 45 degrees. The four days following a thinning application is the most important carb model stress prediction to estimate thinning results. A four-day average carb balance of the predicted carb levels is used to help make a thinning decision. In real-time this four-day average is using the results of the weather forecast to predict the future. This is risky, in that rarely are the forecast predictions correct, but it is the best information in real time during the

thinning time. A decision guide has been developed by Cornell (Figure 3) and adjusted for Michigan conditions (Figure 4 & 5), which include a suggested rate at various stress levels for difficult to thin varieties (Table 4 and 5).

Figure 3. Cornell Carb Balance Predicted Thinning.

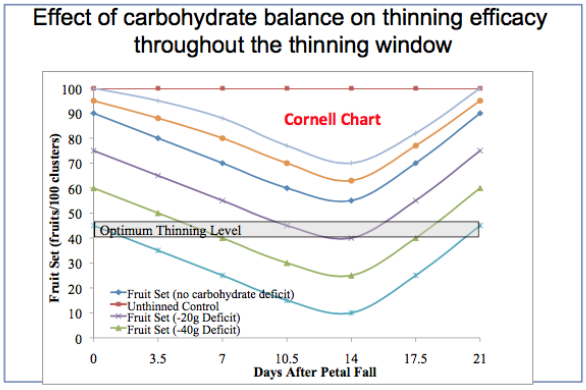


Figure 4. Michigan Carb Balance Predicted Thinning.

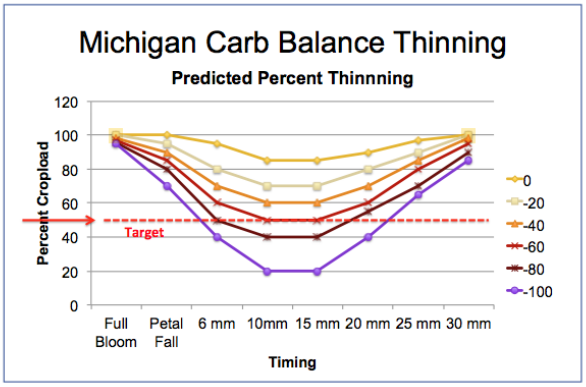


Figure 5. Michigan Predicted Percent Thinning.

Michigan Predicted % Thinning

Target

	4 Day Ave Carb. Balance					
	0	-20	-40	-60	-80	-100
Full Bloom	0	0	2	3	4	5
Petal Fall	0	5	10	20	30	40
6 mm	5	20	30	40	50	60
10 mm	15	30	40	50	60	80
15 mm	15	30	40	50	60	80
20 mm	10	20	30	40	45	60
25 mm	3	10	15	20	30	35
30 mm	0	0	2	5	10	15

Table 4. Carb Model Thinning Decision Guide.

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

Table 5. Thinning Combination Rates Levels, 100 gal/acre for difficult to thin varieties.

Level	Sevin + MaxCel (1 qt + ppm)	Sevin + NAA (1 qt + ppm)
30% Increase	1 + 150 + 1 qt Oil	1 + 15 + 1 qt Oil
Aggressive	1 + 150	1 + 15
Standard	1 + 100	1 + 10
10% Reduction	1 + 75	1 + 7
20% Reduction	1 + 50	1 + 5
30% Reduction	1 qt Sevin	1 qt Sevin
Sevin rate = 1 qt/100 = 1 qt/acre.		

Figure 6. Nibble or Precision Cropload Flow Chart.

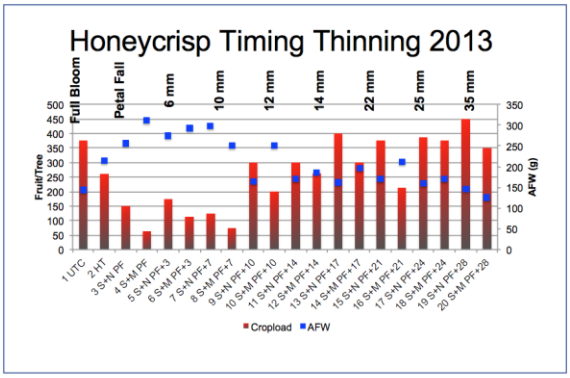
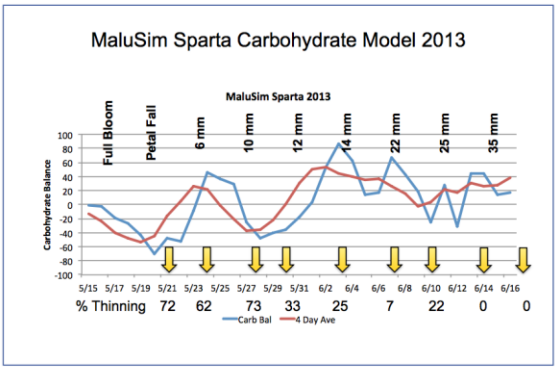


Figure 7. MaluSim Sparta Model 2013.



Brown marmorated stink bug clinic for tree fruit growers, consultants and scouts

Registration is now open for the June 22 Brown Marmorated Stink Bug Clinic to learn all about managing this important new pest in Michigan peach and apple orchards.

Posted by **Julianna Wilson**, Michigan State University Extension, Department of Entomology, and Amy Irish-Brown, MSU Extension, MSUE News

Three brown marmorated stink bugs feeding on an apple. Photo by Bill Shane, MSU Extension.

Join us for a half-day Brown Marmorated Stink Bug Clinic on June 22, 2017, to learn all about the brown marmorated stink bug in anticipation of increased activity by this pest in Michigan orchards in 2017.

Who

This clinic is for growers, crop consultants, spray representatives and anyone else scouting for brown marmorated stink bugs in tree fruit.

What

A half-day clinic (plus lunch) all about brown marmorated stink bugs, including:

- History of the pest in the U.S.
- How it moves in the landscape
- What plants it targets
- What fruit damage looks like
- How to distinguish it from other common stink bugs
- Status of the pest in Michigan
- Monitoring techniques
- Control strategies

When

Thursday, June 22, 2017 from 8 a.m. – 1 p.m. Lunch is included.

Where

English Hills Country Club, 1200 4 Mile Road NW, Walker, MI 49544.

How to register

The event is free due to generous sponsorship, but pre-registration is required to get a head count for printed hand-outs and lunch. Registration ends at 10 a.m. on Monday, June 19, 2017.

Register online at: Brown Marmorated Stink Bug Clinic

Widespread Detections of San Jose Scale in NW Michigan Tree Fruit Crops

Growers are reporting increased damage from San Jose scale this spring, and this article provides life cycle information and control strategies

Nikki Rothwell and Emily Pochubay, NW MI Horticultural Research Center
John Wise, Dept. of Entomology, MSU

In past seasons, we have observed large populations of San Jose scale (SJS) on sweet cherries in the northwest Michigan, and more recent reports show that this pest is increasing in tree fruit crops in the state. Ten years ago, we were not able to readily identify SJS damage in sweet cherry because sweet cherry branches and tree dieback were masked by ethephon damage due to hot and dry weather prior to harvest. Additionally, SJS had been deemed a key pest of apple trees and fruit and received little attention as a key pest of sweet cherry in Michigan as SJS we have not documented SJS damage to cherry fruit in this state. Prior to the 2007 documentation of SJS damage in sweet cherry trees, this type of SJS epidemic had not been seen in Michigan.

Scales are insects with a unique life cycle that makes them difficult to control. Immature female and male scale overwinter underneath a waxy, turtle-like covering. When sap begins to run in the spring, the overwintering scales grow, and reach maturity in mid- to late May. At this time of the year, male scales come out from under the scale to mate with females. Females give birth to live young rather than laying eggs—these nymphs are the crawler stage of the life cycle. Each female is capable of bearing 150-500 offspring. These crawlers start to suck sap with their needle-like mouthparts, and within three weeks, the crawlers molt and lose their old skins, legs, and antennae to become a flattened sac with waxy caps. They remain attached to the trees with their mouthparts and protective covering. Weather permitting, immature scales will continue to feed, develop, and mature, and depending on location can have two to five generations. In northwest Michigan, there are typically two generations of SJS.

San Jose scale feeds on sap of trees, and on healthy trees, large populations are needed to cause economic injury. Depending on the size of the population, SJS can kill young trees in two to three years. Older trees can also be killed by scale, but they do withstand more feeding damage than young trees. In many cases, we have observed damage in older sweet cherries, and there is considerable die back in the tops of the trees; in these situations, trees are not killed but the cropping potential is considerably reduced. In addition to feeding on bark, San Jose scales can also feed on the fruit and leaves. Feeding on fruit causes bright red spots and is most commonly seen on apple. As mentioned previously, we have not identified SJS feeding injury on sweet cherry fruit in Michigan.

Because these insects typically have two generations per year in our area, we have three optimal timings for control. An oil application during pre-bloom is highly effective for targeting adults by suffocating the overwintering scale. Insecticides applied mid-June and mid-August target crawlers before they produce their protective waxy covering.

Targeting the first generation crawlers will prevent mating and reproduction thereby minimizing the population of the second generation.

We conducted two SJS trials in apple at the MSU Trevor Nichols Research Center in Fennville, MI (Tables 1-2 and 3-4). The results of these trials will show the efficacy of the different scale materials, some of which are new insecticides. Growers can apply these results to sweet cherry as best they are able—unfortunately, we have not conducted replicated SJS efficacy trials in sweet cherries. We intend to initiate these trials in 2018.

All treatments except those with Sivanto-alone provided significant levels of control compared to the untreated check (Table 2). Lorsban, Movento and Centaur treatments provided the highest level of control, but only the Centaur delayed-dormant and pink timings resulted in 100% clean fruit. The EPA re-registered the product, Closer, but only post bloom applications are permitted. As a reminder, review all insecticide labels for additional information on restrictions for application, mixing, etc. From the 2016 data, he Sivanto (1/2 green), Sivanto/Movento and Lorsban treatments all significantly reduced the incidence of SJS injury to fruit (Table 4).

The results from both sets of data show that the tested materials provide good control of SJS in apple. However, results were based on percent damaged fruit and number of scales per fruit; the number of scales or levels of damage to woody tissue were not measured. It is possible that SJS may behave differently on apple and cherry. Hence, we encourage consultants, scouts, and\or growers to trap for males to better predict when crawlers will emerge to best time spray applications. Furthermore, growers should be mindful that these chemistries have different mechanisms for their efficacy against SJS. For example, products such as Lorsban (Note: phytotoxic on sweet cherry foliage and not to be used past petal fall in tart cherry) and those that were not tested but are recommended in the Michigan Fruit Management Guide (ex. Warrior, Assail) are contact poisons that will have the best efficacy against crawlers if the spray material comes in contact with the pest. The newer unique chemistries such as Sivanto and Movento are taken up by plant tissue and have different movement characteristics within the tree tissue. Sivanto displays translaminar movement and is xylem mobile meaning that the spray material will move in the foliage. On the other hand, Movento is phloem and xylem mobile meaning that this chemistry can move from foliage all the way to the tree's roots. Because the tree takes up these materials, they are most effective against scale when the material is present in the tree prior to substantial feeding. Therefore, these materials should be applied prior to crawler emergence (~roughly two weeks after peak male flight or petal fall timing). Sivanto is not labeled for stone fruits, and Movento is labeled for both pome and stone fruit. Lastly, Table 5 shows the speed of activity of the chemistries on the crawler stage and the potential for the insecticide to flare mites.

Table 1. San Jose scale treatments for the 2013 San Jose scale efficacy trial conducted at the Trevor Nichols Research Center

Treatments

Treatment/	Rate	Application

Legend

App.	Application	Spray

	Formulation	Product/Acre	Code
1	Untreated		
2	LORSBAN 75 WG	1 lb/a	A
	Damoil	1 % v/v	A
3	Closer SC	3 fl oz/a	B
	R-11	0.125 % v/v	B
4	Sivanto 200 SL	14 fl oz/a	B
	Damoil	1 % v/v	B
5	Sivanto 200 SL	10.5 fl oz/a	D
	R-11	0.125 % v/v	D
6	Sivanto 200 SL	10.5 fl oz/a	B
	Damoil	1 % v/v	B
	Movento 240 SC	6 fl oz/a	E
	R-11	0.25 % v/v	E
7	Movento 240 SC	9 fl oz/a	E
	R-11	0.25 % v/v	E
8	Centaur WDG	46 oz/a	A
	Damoil	1 % v/v	A
9	Centaur 40SC	71.5 fl oz/a	A
	Damoil	1 % v/v	A
10	Centaur WDG	46 oz/a	C
	Damoil	1 % v/v	C
11	Centaur 40SC	71.5 fl oz/a	C
	Damoil	1 % v/v	C

Code	Target	Date
A	Delayed Dormant	30-April
B	Tight Cluster	6-May
C	Pink	7-May
D	Bloom	13-May
E	Petal Fall	23-May

Table 2. 2013 San Jose scale efficacy results in apple from Trevor Nichols Research Center

	Treatment/ Formulation	Rate Product/acre	Application Timing	Average # Scales / Fruit 3 Oct[a]	% Fruit Infested 3 Oct [b]
1	Untreated			1.0 ab	16.5 a
2	LORSBAN 75 WG	1 lb/a	A	0.2 cd	2.5 bcd
	Damoil	1 % v/v	A		
3	Closer SC	3 fl oz/a	B	0.6 bcd	6.1 bc
	R-11	0.125 % v/v	B		
4	Sivanto 200 SL	14 fl oz/a	B	0.9 bc	9.0 ab
	Damoil	1 % v/v	B		
5	Sivanto 200 SL	10.5 fl oz/a	D	1.8 a	19.0 a
	R-11	0.125 % v/v	D		
6	Sivanto 200 SL	10.5 fl oz/a	B	0.2 cd	3.5 bcd
	Damoil	1 % v/v	B		
	Movento 240 SC	6 fl oz/a	E		
	R-11	0.25 % v/v	E		
7	Movento 240 SC	9 fl oz/a	E	0.1 cd	1.5 cd
	R-11	0.25 % v/v	E		
8	Centaur WDG	46 oz/a	A	0.0 d	0.0 d
	Damoil	1 % v/v	A		
9	Centaur 40 SC	71.5 fl oz/a	A	0.0 d	1.0 cd
	Damoil	1 % v/v	A		
10	Centaur WDG	46 oz/a	C	0.0 d	0.5 cd
	Damoil	1 % v/v	C		
11	Centaur 40 SC	71.5 fl oz/a	C	0.0 d	0.0 d
	Damoil	1 % v/v	C		

Means followed by same letter do not significantly differ (P=0.05, Duncan's New MRT)

[a] ANOVA performed on square-root transformed data; data presented are actual counts

[b] ANOVA performed on arcsine square-root transformed data; data presented are actual counts

Table 3. San Jose scale treatments for the 2016 San Jose scale efficacy trial conducted at the Trevor Nichols Research Center

Treatments

Treatment/ Formulation	Rate Product/ acre	Appl. Timing
1 Untreated Check		
2 Sivanto Prime SL	14 fl oz/a	A
Damoil 90 EC	1 % v/v	A
3 Sivanto Prime SL	14 fl oz/a	B
R-11 90 EC	0.125 % v/v	B
4 Movento 240 SC	9 fl oz/a	C
R-11 90 EC	0.250 % v/v	C
5 Sivanto Prime SL	14 fl oz/a	B
R-11 90 EC	0.125 % v/v	B
Movento 240 SC	9 fl oz/a	D
R-11 90 EC	0.250 % v/v	D
6 Lorsban Advanced EW	64 fl oz/a	A
Damoil 90 EC	1 % v/v	A

Legend

Appl. Code	Appl. Target	Appl. Date
A	Half inch green	19-Apr
B	pink	26-Apr
C	petal fall	19-May
D	1C(CM bio+250DD)	8-Jun

Table 4. 2013 San Jose scale efficacy results in apple from Trevor Nichols Research Center

Treatment/ Formulation	Rate Product/ acre	Appl. Timing	San Jose Scale % damaged fruit 6/20/2016
1 Untreated Check			7.3 a
2 Sivanto Prime SL	14 fl oz/a	A	1.3 b
Damoil 90 EC	1 % v/v	A	
3 Sivanto Prime SL	14 fl oz/a	B	3.3 ab
R-11 90 EC	0.125 % v/v	B	
4 Movento 240 SC	9 fl oz/a	C	2.5 ab
R-11 90 EC	0.250 % v/v	C	
5 Sivanto Prime SL	14 fl oz/a	B	1.5 b
R-11 90 EC	0.125 % v/v	B	
Movento 240 SC	9 fl oz/a	D	
R-11 90 EC	0.250 % v/v	D	
6 Lorsban Advanced EW	64 fl oz/a	A	1.8 b
Damoil 90 EC	1 % v/v	A	

Means followed by same letter do not significantly differ (*P*=0.05, Tukey's HSD)
ANOVA performed on square-root transformed data; data presented are actual counts

Table 5. Insecticidal Activity on crawler stage of Scale insects

Compound	Labeled Crops	Speed of Activity	Mite flaring

			potential
Esteem	All fruits	slow	low
Movento	Pome and stone fruits	slow	low
Warrior/Asana	Pome fruit (not on stone fruit label)	fast	high
Assail*	Pome and stone fruits (not on blueberry label)	moderate	moderate
Sivanto	Pome fruits (not on blueberry label)	moderate	low
Closer*	Pome and stone fruits	moderate	low
Centaur	Pome and stone fruits	slow	low

* suppression only.

Effectively controlling plum curculio in stone and pome fruits

Growers have many options for plum curculio control, but all have different modes of action.

Posted by **John Wise**, Michigan State University Extension, Department of Entomology; Nikki Rothwell, MSU Extension; and Mark Whalon, MSU Extension, Department of Entomology, MSUE News

With stone fruits at shuck-split and apples sizing, and the warm temperatures predicted for this week, plum curculio is likely to begin egglaying in fruit. There are many insecticides available for controlling plum curculio, but their performance characteristics vary greatly compared to our traditional broad-spectrum chemistries. These conventional insecticides, such as organophosphates and pyrethroids, work primarily as lethal contact

poisons on plum curculio adults in the tree canopy. Avaunt also works primarily by lethal activity, but ingestion is the important means for delivering the poison.

Neonicotinoids are highly lethal to plum curculio via contact for the first several days after application, but as these systemic compounds move into plant tissue, they protect fruit from plum curclio injury via their oviposition (egglaying) deterrence and anti-feedant modes of activity. Neonicotinoids and organophosphates can also be used as rescue treatments because they have a curative action that can kill eggs and larvae that are already present in the fruit.

Voliam flexi can be used for plum curculio control, but only the neonicotinoid (Actara) component will be effective against plum curculio. Also, 4.5 to 5.5 ounces of Actara is the recommended rate for plum curculio control, and Voliam flexi is labeled at 4-7 ounces; be sure to apply an adequate amount of Voliam flexi to meet these recommended rates. Leverage (imidacloprid plus cyfluthrin) and Voliam Xpress (Chlorantraniliprole plus Lamda-cyhalothrin) are other pre-mix materials labeled for plum curculio control. For organic growers, Venerate has been shown to provide good control.

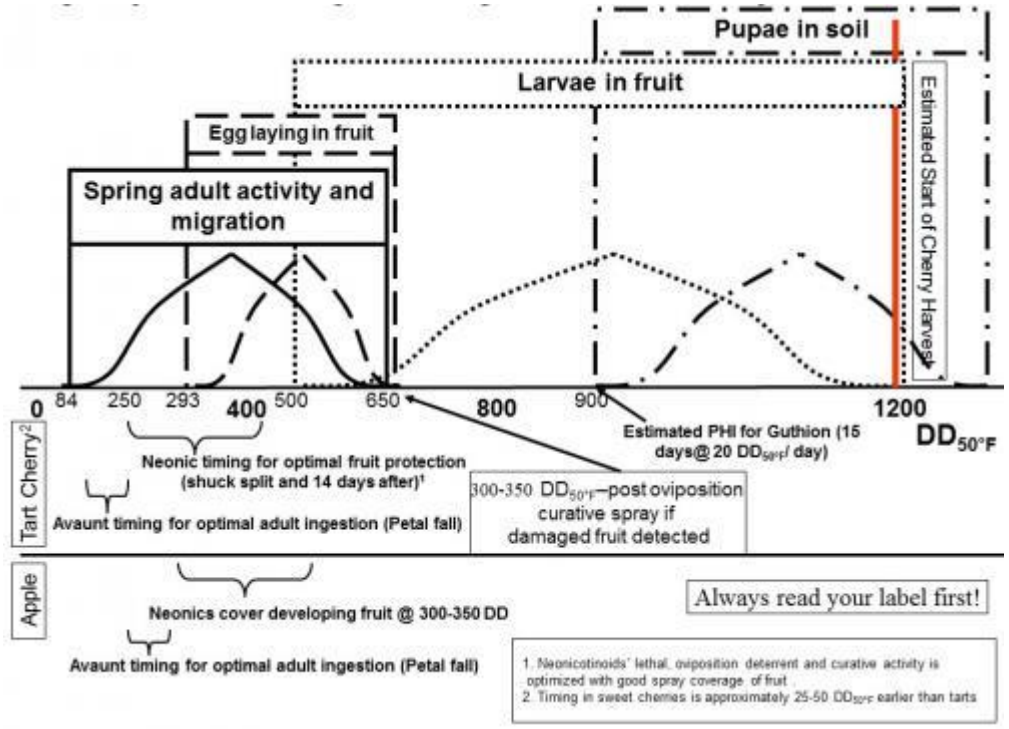
The table below is designed to summarize several key variables that can help growers determine how to optimize the performance of various insecticides for integrated pest management (IPM) programs. Several other compounds, like Exirel, Rimon, Esteem and Delegate, are commonly used in tree fruit pest management programs and have activity on plum curculio worth noting.

Rimon, when targeted to control obliquebanded leafroller or codling moth at petal fall, will effectively sterilize plum curculio eggs when adults are exposed to residues in the tree canopy. These sub-lethal effects will not prevent injury to fruit from adults, but will result in nonviable plum curculio eggs, thus no live larvae. Delegate and Exirel have been shown to provide fair to good activity, but ingestion by plum curculio adults is important for control. Esteem, when used approximately two weeks post-harvest in cherries (San Jose scale crawler timing) will reduce female plum curculio overwintering viability. However, Rimon, Esteem and Delegate are **not** labeled for stand-alone plum curculio control, but when used in pest management programs may contribute to overall plum curculio population management.

Optimal timing and order selection of insecticides for plum curculio management is based on matching the performance characteristics of each compound with plum curculio life-cycle development (see photo) and tree phenology (see table). Because organophosphates and pyrethroid insecticides are contact poisons, they can be used as early as petal fall to knock beetles out of the tree canopy. However, Michigan State University Extension cautions using pyrethroids as they are toxic to mite predators. Plum curculio adults feed on tree parts during bloom and petal fall, so Avaunt can be used at this petal fall timing.

The performance of neonicotinoids is optimized when sprays are made after fruit set (pome fruits) or shuck-split (stone fruits), so that fruit and foliage are both covered.

Surround will not work unless the tree and fruit are completely covered, so multiple sprays are needed on the tree prior to plum curculio oviposition activity. If plum curculio infestation occurs and a rescue treatment is needed, organophosphates and neonicotinoids can provide curative action up to two weeks after plum curculio infestation, although in some cases dead cadavers can still be found in fruit.



Plum curculio life stage control timing for reduced risk and OP-replacement insecticides.

Insecticidal modes of activity on plum curculio life stages				
Compounds[2]	**Chemical class / activity**	**Crop**	**Rate**	**Crop stage and initial control timing (DD_{50})**
Imidan 70W**	Organophosphate	Pome fruit	3 pounds	Petal fall (approx. 250 DD)
	Lethal via contact	Stone fruit	2.125 pounds	Petal fall (approx. 175 DD)
Actara 25WG**	Neonicotinoid	Pome fruit	4.5 ounces	Petal fall + 3-5 days (approx. 300 DD)
	Lethal, Antifeedant and Curative	Stone fruit	4.5 ounces	Shuck-off (approx. 250 DD)
Assail 30SG**	Neonicotinoid	Pome fruit	6 ounces	Petal fall + 3-5 days (approx. 300 DD)
	Lethal, Antifeedant and Curative	Stone fruit	—	Shuck-off (approx. 250 DD)
Belay 2.13SC**	Neonicotinoid	Pome fruit	6 ounces	Petal fall + 3-5 days (approx. 300 DD)
	Lethal, Antifeedant	Peach		Shuck-off (approx. 250 DD)

	and Curative			
Exirel 10SE	Diamide	Pome fruit	6 ounces	Petal fall (approx. 250 DD)
	Lethal via ingestion	Stone fruit		Petal fall (approx. 175 DD)
Delegate 25WG*	Spinosyn	Pome fruit	6 ounces	Petal fall (approx. 250 DD)
	Lethal via ingestion	Stone fruit[1]		Petal fall (approx. 175 DD)
Avaunt 30WG	Oxadiazine	Pome fruit	5 ounces	Petal fall (approx. 250 DD)
	Lethal via ingestion	Stone fruit		Petal fall (approx. 175 DD)
Venerate XC	Biopesticide	Pome & stone fruits	4-8 quarts	Petal fall (approx. 250 DD)
Pyrethroids	Asana, Warrior, Baythroid	Pome fruit Stone fruit	Variable	Petal fall (approx. 250 DD)
	Lethal, repellent			Petal fall (approx. 175 DD)
Rimon* (targeting codling moth, obliquebanded leafroller)	IGR	Pome fruit	20-40 ounces	Petal fall (approx. 250 DD)
	Egg sterilization	Stone fruit		
Esteem* (targeting scale)	IGR	Pome fruit	5 ounces	Post-harvest
	Adult sterilization	Stone fruit		
Leverage 2.7F	Pyrethroid + Neonicitinoid	Pome fruit	4.4-5.1 ounces	Petal fall (approx. 250 DD)
	Lethal, Repellent, Curative	Stone fruit	4.5-5.1 ounces	Shuck-off (approx. 250 DD)
Voliam Xpress	Pyrethroid + Diamide	Pome fruit	6-12 ounces	Petal fall (approx. 250 DD)
	Lethal, Repellent	Stone fruit	6-12 ounces	Petal fall (approx. 175 DD)
Voliam flexi	Neonicotinoid + Diamide	Pome fruit	6-7 ounces	Petal fall (approx. 250 DD)
	Lethal, Antifeedant, Curative	Stone fruit	6-7 ounces	Shuck-off (approx. 250 DD)

*Not labeled for plum curculio (or just for PC suppression)
**Have curative properties that can kill eggs and larvae that are already present in the fruit.
Modified from John Wise, Nikki Rothwell, David Epstein, Larry Gut, and Mark Whalon, 2009.

Drs. Wise and Rothwell's work is funded in part by MSU's AgBioResearch.

Black stem borer management in spring

The time to manage black stem borer is in spring when females are colonizing new trees. A few adults have been active since late April and we anticipate flight will surge as it warms up in May.

Posted by **Larry Gut**, and Mike Haas, Michigan State University Extension, Department of Entomology, MSUE News

Incidents of black stem borer injury to young apple orchards are on the rise in Michigan. Adults are attracted to stressed trees although they have been known to infest trees that do not appear to be stressed. Young trees near the perimeter of orchards, especially near woodlots, are at greatest risk of injury. Signs of infestation include 1 millimeter diameter entrance holes, sawdust "toothpicks" protruding from the holes, dark discoloration on the bark, oozing sap and dry, blistery bark.

The time to manage this insect is during the spring flight when females are searching for new trees to attack, wanting to establish brood chambers for egglaying and raising her young. Once they enter the tree, they are out of reach for pesticide applications, so timely control measures are essential.

We placed traps in several infested sites in late March and captured the first adults in southwest Michigan during a warm spell in late April. Catches have been low since that initial burst of activity. Peak catch in the past two years has occurred in mid- to late May. We anticipate the same timing this year with adult flight surging as it warms up in May. This will be the optimum time to apply an insecticide.

There are a limited number of insecticides available for borer control. During the past two years, we conducted chemical efficacy trials with several borer insecticides in search of information growers could use to make effective control decisions. Unfortunately, what studies like ours, and similar trials in other states, have shown is that the effectiveness of borer control in apple orchards is highly variable.

The materials we tested did not perform significantly different from each other, or an untreated water-only control, when compared statistically, but there were some general trends. In 2015, we made trunk drench applications to trees in two commercial orchards, comparing lambda-cyhalothrin (Warrior without Zeon Technology) at 5.12 ounces per acre and zeta-cypermethrin (Mustang Maxx) at 4 ounces per acre. The results from this trial showed that Warrior insecticide had fewer entry holes.

Last year in 2016 we used apple wood loglets treated with each material and baited with ethanol to attract beetles. Loglets were placed in woodlots on edges of infested orchards, and the number of entry holes created by black stem borer were counted over time. Also in 2016 we applied insecticides using two methods: as a trunk drench or as an airblast spray. The loglets treated with the two chemicals from the previous year along with 10 ounces acre of permethrin and 12.8 ounces acre of bifenture. The bifenture and permethrin-treated loglets had the fewest cumulative entry holes in the two runs of the test conducted in 2016.

In addition to chemical treatment, growers who remove black stem borer-infested trees should destroy them, preferably by burning, immediately.

Dr. Gut's work is funded in part by MSU's AgBioResearch.

IPM Updates and May 23rd and 24th IPM Updates

May 23rd and 24th:

The following week, Gillison' Variety Fabrication will be on hand during IPM Updates to demo their new GB-34R 500 Narrow Variable Air Orchard Sprayer. Below are the dates and locations of the demos.

May 23, 2017 – Jan and Jim Bardenhagen's Farm, 12PM – 2PM

May 24 – Jack Whites Farm, 10AM – 12PM

May 24 – Blaine Church, 2PM – 4PM

Clarifications on Worker Protection Standards: Central Posting for Pesticide Application Information versus Decontamination Station Requirements for Agricultural Workers

Eric McCumber, MDARD
Emily Pochubay and Nikki Rothwell, MSU Extension

Both MDARD and MSU have received recent questions about the requirements to display pesticide application information at a central posting area. Growers also have questions about what should be included at designated decontamination stations. This article is intended to clarify such questions because we have heard misinformation that pesticide application information should be posted within a ¼ mile of where agricultural workers are working in a treated block—this type of posting is *not* required to meet WPS regulations. This confusion may be related to regulations for decontamination stations; according to WPS, **decontamination stations** are required with ¼ mile from where agricultural workers will be working during the REI or for 30 days thereafter of the

application of a WPS-labeled pesticide. Although we will cover the key points for these two issues in this article, more detailed information can be found in the How To Comply Manual (HTCM) at www.pesticideresources.org. In the HTCM, central posting location information is on page 21 and decontamination station information can be found on page 48. The information presented below is relevant to agricultural employers of agricultural workers. Supplies needed for handlers' decontamination sites are different and we encourage employers and handlers to review this information as needed (page 74-75 of the HTCM).

Central Posting

Central posting locations serve as the hub for pesticide application information, and this central posting location is the *only* location on the farm that is required to contain the information outlined below. *According to MDARD, central posting locations* are areas where all farm employees can find any information related to pesticide applications. If a WPS-labeled pesticide has been applied, or if a restricted-entry interval (REI) has been in effect within the past 30 days, then the agricultural employer must display the required information (see below) at a central posting location whenever any agricultural worker is on the agricultural establishment. The location of the central posting is determined by the agricultural employer, but it should be placed in a location where employees congregate such as the workshop, office, break room, or an area where they check in for work. Agricultural workers must be informed where the designated central posting location is located and must be allowed unrestricted access to the posted information during employment hours.

Agricultural producers are required to display at the central posting area the following information. Again, agricultural workers must have unimpeded access to the information during work hours.

- **Pesticide application information including:**
    - ✓ Brand name of the pesticide(s) applied.
    - ✓ Active ingredient(s).
    - ✓ EPA Reg. No.
    - ✓ REI.
    - ✓ Crop/site treated.
    - ✓ Location and description of treated area(s).
    - ✓ Date(s) and time(s) application started and ended.
- **Safety Data Sheets** (SDS) for each pesticide product.
- **Pesticide Safety Information**. Prior to the updated WPS, this information was required to be displayed in a poster format (known as pesticide safety poster). Agricultural employers are no longer required to display a poster, but must

provide information about certain WPS safety concepts about preventing pesticides from entering the body. The required 7 safety concepts include:

- ✓ Avoid getting pesticides on your skin or into your body. Pesticides may be on plants, soil, irrigation water, equipment, or may drift from nearby applications.
- ✓ Wash before eating, drinking, using chewing gum or tobacco, or using the toilet.
- ✓ Wear work clothing that protects your body from pesticides, such as long-sleeved shirts, long pants, shoes, socks, and a hat or scarf.
- ✓ Wash or shower with soap and water, shampoo hair and put on clean clothes after work.
- ✓ Wash work clothes separately from other clothes before wearing them again.
- ✓ If your body is contaminated by pesticides wash immediately, and as soon as possible, wash or shower with soap and water and change into clean clothing.
- ✓ Follow directions about keeping out of treated or restricted areas.

In addition, the updated safety information that will be required in the future must include:

- ✓ Instructions for seeking medical attention as soon as possible after being poisoned, injured or made ill by pesticides.
- ✓ Name, address and telephone number of state or tribal pesticide regulatory authority. In Michigan, the agency is the Michigan Department of Agriculture and Rural Development, 525 West Allegan Street, P.O. Box 30017, Lansing, MI. The phone number is 800-292-3939.
- ✓ If pesticides are spilled or sprayed on the body use decontamination supplies to wash immediately, or rinse off in the nearest clean water, including springs, streams, lakes or other sources if more readily available than decontamination supplies, and as soon as possible, wash or shower with soap and water, shampoo hair, and change into clean clothes.
- ✓ Follow directions about keeping out of treated areas and application exclusion zones.
- ✓ The term “emergency medical facility” should be revised to “a nearby operating medical care facility.” Include name, address, and telephone number for the medical facility. This information should be clearly identified as emergency medical contact information on the display.
- ✓ The point that there are federal rules to protect workers and handlers is self-evident and is no longer required to be part of the safety information

NOTE: The updated pesticide safety information content is not required until 1/4/18, but employers can begin using the updated version immediately. Details are shown on page 23 of the How To Comply Manual. The EPA is in the process of developing a poster version of the pesticide safety information.

Agricultural producers are only required to have *one central posting area*, but must provide unrestricted access to agricultural workers during work hours. It can be impractical for farms that are many miles apart to give unrestricted access, so agricultural producers may set up different central posting areas for distinctly different farm locations at their discretion. Agricultural employers may also provide the central posting information electronically, as long as content, accessibility, display, legibility, location, and retention requirements are met. Employers would need to ensure that agricultural workers have access to the information, such as through a smart phone or dedicated computer, and are instructed in how to access the information.

Decontamination sites

Agricultural employers must make sure that decontamination supplies are provided to workers doing tasks that involved contact with anything that has been treated with the pesticide including soil, water, or plants in a pesticide-treated area where, within the last 30 days, a WPS-labeled pesticide product has been used or a REI for such pesticide has been in effect.

Decontamination supplies that must be provided include:

- ✓ Water – the employer must provide at least 1 gal of water per worker at the beginning of the work period and at a quality and temperature that will not cause injury or illness if it contacts skin or eyes, or is swallowed.
- ✓ An adequate supply of soap and single use towels. Hand sanitizers or wet towelettes *do not* meet the requirement for soap or towels.

Duration of the Decontamination Site

If the REI of an applied pesticide is greater than 4 hours, decontamination supplies must be provided until 30 days after the end of the REI expires. If the REI is less than 4 hours, decontamination supplies must be provided until 7 days after the REI expires.

Location of Decontamination Sites

All decontamination supplies for agricultural workers must be located together and be reasonably accessible to where the workers are working (generally within ¼ miles of the workers) and be outside of any treated area or an area under a REI. For worker tasks performed more than ¼ mile from the nearest point reachable by vehicles or more than ¼ mile from a non-treated area, the decontamination supplies may be at the nearest vehicular access point outside any treated area or area under REI (page 48 of the HTCM).

Remember that in addition, the Pesticide Safety Information (formerly referred to as the Pesticide Safety Poster) must be displayed at any permanent decontamination site, or any decontamination site that services 11 or more workers (page 21, HTCM).

In summary, central posting locations are the main hub for pesticide application information, and the information that must be displayed at the central posting locations is not required in other agricultural areas (i.e. ¼ mile from workers working in treated fields, or at decontamination stations). It is the responsibility of the employer to train employees on how and where to access the central posting information. Although not required, some growers may choose to provide additional pesticide application information to their workers by having additional posting sites or virtual access to this information. Potable water, and an adequate supply of soap and single use towels, and possibly pesticide safety information (if the decontamination site is a permanent location or services more than 11 workers) must be provided at decontamination

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2017 IPM Update Schedule

Emily Pochubay and Nikki Rothwell
Michigan State University Extension

Tree Fruit IPM Updates beginning the second week of May through June will highlight management of the seasons current potential pest challenges dictated by weather and pest biology. Attendees are encouraged to bring examples of pests and damage found on the farm to these workshops for identification and discussion. Additionally, we are planning to revisit some of the new Worker Protection Standards as well as host invited speakers from local organizations and MSU at this year's meetings. Workshops will be held weekly in Leelanau, Grand Traverse, Antrim, and Benzie counties. Tree fruit growers and consultants are welcome to attend meetings at any of the locations and times that are most convenient (see below). These workshops are free and do not require registration. Restricted use pesticide applicator recertification credits (2 credits per meeting) and Certified Crop Advisor credits will be available. We are looking forward to seeing you in a few weeks! For more information, please contact Emily Pochubay (pochubay@msu.edu), 231-946-1510.

Leelanau County

Location: Jim and Jan Bardenhagen, 7881 Pertner Road, Suttons Bay
Dates: May 9, 16, 23; June 6 (tentative), 13, 20, 27
Time: 12PM – 2PM

Grand Traverse County

Location: Wunsch Farms, Phelps Road Packing Shed, Old Mission
Dates: May 9, 16, 23; June 6 (tentative), 13, 20, 27
Time: 3PM – 5PM

Antrim County

Location: Jack White Farms, 10877 US-31, Williamsburg (south of Elk Rapids on the southeast side of US-31)
Dates: May 10, 17, 24; June 7 (tentative), 14, 21, 28
Time: 10AM – 12PM

Benzie County

Location: Blaine Christian Church, 7018 Putney Rd, Arcadia, MI 49613
Dates: May 10, 17, 24; June 7 (tentative), 14, 21, 28
Time: 2PM – 4PM

Respirator Guidelines to Meet New Worker Protection Standards

Growers will need a medical evaluation and respirator fit test to handle and apply some pesticides this season.

Emily Pochubay and Amy Irish-Brown, MSU Extension

Requirements for a medical evaluation, fit testing, and specific training for use of respirators and the associated record keeping became effective on January 2, 2017. At this time, most growers are aware of this revision to the Worker Protection Standard (WPS) regulation that requires pesticide handlers and applicators to wear a respirator during mixing/handling, spray applications, and potential other uses as outlined on pesticide labels. Additionally, those who use pesticides with respirator requirements must receive documentation from a physician or licensed health care professional (PLHCP) that has 'respirator evaluation' as part of his/her license to ensure that the pesticide handler is medically able to use a respirator. Not all PLHCPs are qualified to provide the respirator evaluation, but primary care physicians should be able to refer patients to appropriate medical personnel. Alternatively, growers can contact local occupation and environmental health professionals who are more likely to have the credentials needed to provide the appropriate respirator medical evaluation and documentation. Please review the following guidelines to help address some of the recent questions we have received from growers.

Who needs to receive a medical evaluation and how often?

Employees that could be exposed to hazardous airborne contaminants may be required to wear a respirator; respirators and respirator use requirements will be outlined on individual pesticide labels. Some pesticides may require respirators for employees that mix spray material and/or require applicators to wear a respirator during applications of certain pesticides. Employers are responsible for ensuring that employees receive the

appropriate equipment, evaluation, respirator fit test, training, and record keeping that conforms to OSHA standards.

According to the EPA, the medical evaluation is required one time per employee unless another evaluation is required due to one of the following reasons:

- The medical determination is only good for a specified length of time.
- The employee reports medical signs or symptoms related to respirator use.
- The PLHCP, supervisor, or program administrator recommends a re-evaluation.
- Fit-test or other program information indicates a need for re-evaluation.
- When changes in the workplace increase respirator stress on an employee.
- The initial medical examination demonstrates the need for a follow-up medical examination.

Who provides the evaluation? What kind of evaluation and documentation are needed?

A physician or licensed health care professional (PLHCP) with respirator evaluation as part of their license will provide the appropriate evaluation using a medical questionnaire or exam that conforms to the OSHA standard. Contact the PLHCP to determine whether a questionnaire or exam will be used and to receive appropriate paperwork. Prior to completing the questionnaire or exam, employers must provide employees with:

- The type and weight of the respirator that the handler will use.
- How long and how frequently the handler will use the respirator.
- How much physical work the handler will do while using the respirator.
- Other PPE the handler will use.
- The temperature and humidity extremes of the working environment.

Contact a primary care physician to receive a referral for a licensed professional, if necessary. Another low-cost (~$25) and fast alternative for a medical evaluation is OshaMedCert (http://www.oshamedcert.com/Default.aspx), an online service that involves filling out a form and sending it for approval or denial by a PLHCP; individual's health information remains confidential throughout the process. A respirator fit test (see below) will be needed after receiving the medical determination from OshaMedCert.

A written medical determination of the respirator evaluation for each employee is required before the employee can use the respirator. The employer must keep the medical determination documentation for two years. According to the EPA, the required written information to be provided by the PLCHP to the employer must only include:

- Whether or not the employee is medically able to use a respirator.
- Any limitations on respirator use in relation to the medical conditions (if any) of the employee or workplace conditions.
- Need for any follow-up medical evaluations.
- A statement that PLCHP provided the employee with written recommendation; in some cases, this recommendations may simply state that the applicator/person that will use the respirator is capable of wearing a respirator.

Again, the information outlined above is the *only* information that should be provided in the PLHCP's recommendation to the employer to protect the employee's private medical information and avoid violation of HIPAA laws.

What's Next? Respirator Fit Tests.

After receiving a medical evaluation, a fit test is needed to ensure that the respirator forms an adequate seal with an employee's face to provide appropriate inhalation exposure protection. A new fit test is required annually or whenever there is a change to the respirator or a physiological change to the employee that could affect the seal between the respirator and the user's face. Furthermore, fit tests are required for each type of respirator that will be used as indicated by pesticide labels. Finally, employees must undergo the fit test using a respirator with the exact specifications of the respirator that will be used on the job.

Fit tests must follow OSHA protocols, and there are two methods for fit testing. The quantitative fit test (QNFT) requires special equipment and a trained person to conduct the testing. Fit test kits are also available to perform qualitative fit tests (QLFT) by a person that can accurately prepare test solutions, calibrate equipment, perform the test properly, recognize invalid tests and ensure test equipment is working properly. Sources for fit tests include pesticide suppliers or companies such as Gempler's or Grainger.

A primary care physician may be able to provide additional options and referrals for fit test providers in the area. We confirmed that Munson Medical Center's Occupational Health and Medicine Clinic (550 Munson Ave. Traverse City, MI 49686; Ph: 231-935-8590) is equipped to perform the appropriate respirator exam (~$80.00) and the fit test (~$25.00) in one visit by appointment only. Spectrum Health Services in other areas of Michigan provide similar services. Patients that wish to only receive a fit test need to provide appropriate respirator exam result documentation prior to the test.

Additional information regarding respirator requirements and other WPS revisions can be found in the EPA's *How to Comply with the 2015 Revised Worker Protection Standards for Agricultural Pesticides* (https://www.epa.gov/sites/production/files/2016-10/documents/htcmanual-oct16.pdf).

WEB SITES OF INTEREST:

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://agbioresearch.msu.edu/nwmihort/faxnet.htm

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

Fruit CAT Alert Reports:
http://news.msue.msu.edu