

Northern Michigan FruitNet 2014

Northwest Michigan Horticultural Research Center

Weekly Update

June 17, 2014

CALENDAR OF EVENTS

6/17	IPM Update Leelanau Co.– Bardenhagen Farm
6/17	IPM Update Grand Traverse Co. – Wunsch Farm
6/18	IPM Update Antrim Co. – Jack White's Farm
6/18	IPM Update Benzie Co. – Blaine Christian Church
7/1	CIAB Grower Meeting Peninsula Township Hall 9:00 – 11:00 a.m.
7/1	CIAB Grower Meeting Milton Township Hall Kewadin, MI 1:00 – 3:00 p.m.
7/1	CIAB Grower Meeting NWMHRC 7:00 – 9:00 p.m.
7/2	IPM Updates End
7/3	RidgeFest 2014
7/10	MSU Clarksville Research Center Annual Tree Fruit Research Showcase Field Day
7/12	Household Hazardous Waste Leelanau County Government Center
7/22-24	35TH Annual Ag Expo Michigan State University
9/4	NWMHRC Open House – 35th Anniversary Please note change in date from 8/21 to 9/4

GROWING DEGREE DAY ACCUMULATIONS AS OF June 16 AT THE NWMHRC

Year	2014	2013	2012	2011	2010	2009	24 Yr. Avg.
GDD42	871	905	1324	872	1235	812	983.8
GDD50	487	526	773	471	693	389	544.3

Growth Stages at NWMHRC (June 16, 2014, 9:30 a.m.)

Apple: Red Delicious – 15 mm fruit

Gala – No fruit

Yellow Delicious – 10 mm fruit

Pear: Bartlett: 10 mm fruit

Sweet Cherry: Hedelfingen: 13 mm fruit

Napoleon: 14 mm fruit

Gold: 12 mm fruit

Tart Cherry: 11 mm fruit

Balaton: 12 mm fruit

Apricot: 27 mm fruit

Grapes: 10-16" shoots

NORTHWEST MICHIGAN REGIONAL REPORT

E. Pochubay, N. Rothwell, Extension Educators

Conditions are dry across the north, but rains are expected this week—rain will help size fruit and add moisture to the soil.

Weather Report. Northwest Michigan had a mixed bag for weather last week. We started off the week with warm daytime temperatures in the mid- to high-70s, but by Friday, we dropped off to a high of 60 degrees F. Warm weather returned into the weekend, which was coupled with windy conditions on Saturday, Sunday, and into Monday. We have accumulated 871GDD base 42 and 487GDD base 50. We are still slightly behind our 24-year average: 984GDD base 42 and 544GDD base 50. The region is quite dry for this early in the season although rain is predicted for many days this week. The last substantial rainfall was on 6 June when we received just over an inch of rain. At the NWMHRC, we had 0.12" of rain on 13 June and another 0.07" of rain on 15 June. These wetting events triggered infection periods but did little to add significant moisture to our dry soils.

Crop Report. Crops seem to be sizing well despite the lack of rain. Growers that have a sizeable sweet cherry crop are somewhat concerned about rainfall and sizing a big load of fruit. In general, the sweet cherry crop is looking good. In early sweet cherry varieties here at the NWMHRC, cherries are taking on a red hue and birds have been noted feeding on these ripening fruits. Tart cherries are sizing, and the

crop is quite variable. Some orchards that had a big crop last year have a smaller crop this season. There is considerable variability in the number of fruit from tree to tree within an orchard. We also expect the crop to vary in size by geographic area, and we will know more in the coming weeks. Apples are also looking good, and most growers did a nice job thinning the fruit this season. We had some warm temperatures for thinning. Strawberry season will likely begin at the end of June rather than the first of July as we reported last week. Irrigation will be helpful for strawberry growers to size the fruit.

Initial estimates of the tart cherry crop are out for the three regions of Michigan as well as the other tart cherry growing areas of the country. We expect these estimates to change somewhat with time, but as of last week, the following numbers were estimated for the **tart cherry crop of 2014** (numbers are reported in millions of pounds):

NW MI: 110
WC MI: 50
SW MI: 18-20
MI Total: 180

Other tart cherry growing states

PA: 2
NY: 8.5
WA: 19
OR: 2
WI: 8-9
UT: 27

Total U.S.: ~247.5

Pest Report. Cherry leaf spot infection was possible on Sunday 15 June following rain that much of the region received. Cherry leaf spot conidia have been developing on the undersides of bract leaves and first true leaves in both Balaton and Montmorency tart cherries and sweet cherries. Conidia on infected leaves likely moved to nearby leaves during the recent rain and could have caused infection on those leaves if they were not protected prior to Sunday's rain. Most cherries are past shuck-split and growers planning to use the 24(c) Bravo Weather Stik past shuck-split label should check re-application intervals for fungicides and also check with processors for restrictions on fungicide use. **Powdery mildew** is a concern at this time and Michigan State University Extension recommends using one of the SDHI fungicides such as Luna Sensation (5 fl oz per acre) or Merivon (5.5 fl oz per acre) plus Captan (2.5 lb per acre) at the first cover timing; these fungicides are excellent for both cherry leaf spot and powdery mildew.

Apple scab infection was also possible on Sunday in the region if tissue was not protected prior to rain. According to the apple scab model for the NWMHRC, apple scab spores are 100% mature and 90% discharged at this time. We are still in the primary infection of apple scab and during rain on Sunday, spores were discharged at our monitoring field site in Leelanau County. If we received a good amount of rainfall which is predicted for this week, we may see the end of primary apple scab soon. However, good amounts of precipitation are needed for the remaining apple scab spores to discharge. In southeast Michigan, primary scab is ongoing whereas southwest and west Michigan have called the end to primary scab.

We have received more, but still just a few isolated reports of **American brown rot** sporulation on green sweet cherry fruit as well as on last year's mummies. Insect feeding, **bacterial canker** on green fruits,

and other damage to developing sweet cherry fruit make those damaged fruit more susceptible to American brown rot infection. Spores developing now on green fruit and mummies have the potential to infect neighboring fruit. We have also seen blossom blight and canker symptoms in sweet cherries.

Currently, it is raining throughout the region and we are likely in the midst of disease infection periods even though the Enviro-weather models are not yet reporting infection periods. There is a possible threat of rain for almost every day in the coming week; therefore, maintaining good coverage to protect tissue from infection will be critical and challenging.

Codling moth (CM) are active throughout the region and CM numbers are on the rise; several farms have set biofix dates. At the station, we caught CM for the second consecutive week and CM numbers are low (1 moth/trap), which is not uncommon at the NWMHRC where few CM have been observed historically. Farms that set CM biofix dates last week may be at the optimal timing for targeting CM eggs (100 GDD post-biofix).

Plum curculio (PC) are still active and growers should continue to protect fruit from PC damage. Most cherries are out of the shuck and vulnerable to PC feeding and oviposition. Growers should check their 'hot spots' for oviposition scars as PC stings are evident in most cherry blocks at this time.

Black cherry aphids were observed on new growth/terminal ends last week in sweet cherry at very low levels.

American plum borer (7.6 moths/ trap) and lesser peach tree borer (17 moths/trap) are still flying and although greater peach tree borer (GPTB) were active last week, we did not catch GPTB this week. The control period for borers is still open and some growers are trunk spraying with Lorsban for borer control.

We have received reports that **rose chafers** are flying in Benzie County.

Spotted tentiform leafminer numbers are down this week (12.5 moths/trap) and the optimal time for managing this pest has passed for most of the region. **Oriental fruit moth** adults continue to be active (2.5 moth/trap).

Spotted wing *Drosophila* and cherry fruit fly traps are up across the region; we have not detected this pest yet this season.

Growers should check with processors for restrictions on insecticide and fungicide use to avoid possible issues with maximum residue limits.

MATERIALS FOR CHERRY LEAF SPOT AND POWDERY MILDEW CONTROL

Emily Pochubay and Nikki Rothwell, MSU Extension

Many cherry orchards are at first to second cover timing for disease management and cherry leaf spot (CLS) and powdery mildew (PM) are the main diseases of concern at this time. Several orchards in our region already have a CLS infection started on bract leaves and first true leaves; preventing the spread of conidia is critical for keeping this disease under control for the duration of this season. PM can be a problem in tart cherry orchards, particularly in young orchards and infection tends to occur on the most actively growing tissue. Both CLS and PM can cause early defoliation if these diseases are not managed

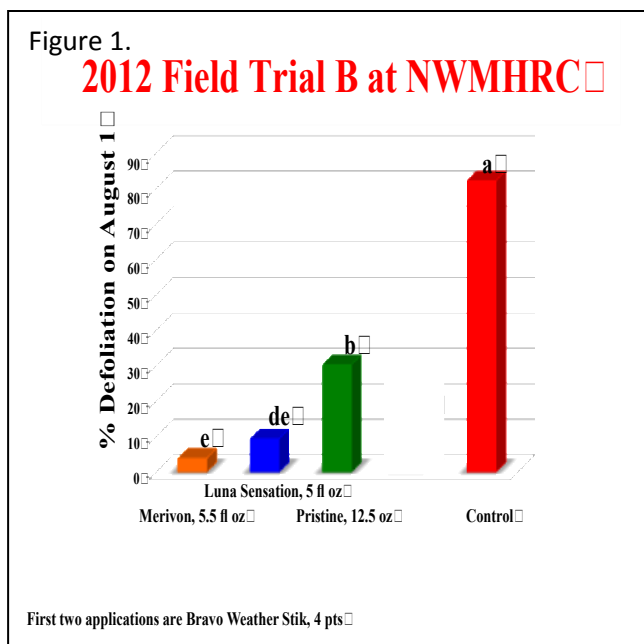
effectively. If PM infection is severe, infected leaves will fall from trees during mechanical harvesting. The biggest issue for PM control is the prevention of initial fungal infection. There are no fungicides that will eradicate powdery mildew, so growers need to control this disease before it appears by using protectant fungicides. By the time white mycelium is apparent on leaves, it is too late for control.

The most important spray timing for PM control is the first cover timing, i.e. the first spray application after shuck split. *This spray is critically important.* Previous research has shown that if this timing is missed, the amount of PM-infected leaves can increase by at least threefold at harvest. NWMHRC research has also found that if fungicides targeting PM are only applied closer to harvest, PM infection can get completely out of hand by mid-August (~ 70% incidence of leaf infection).

Michigan State University Extension is recommending an SDHI fungicide such as Luna Sensation or Merivon plus Captan for CLS and PM control at the first cover timing; these fungicides provide ‘excellent’ control of both CLS and PM. While the SDHI fungicides are the best option for targeting both CLS and PM at the first cover timing, growers have been concerned that these materials are expensive, but they are the optimal products for this time: a well-timed first cover application of these newer materials will provide ideal control of CLS and PM (please see research results below comparing new SDHI fungicides to some of the older materials). Growers who are planning to use an SDHI should keep in mind that there is high risk for the development of resistance to SDHI fungicides so rotating materials, adding a protectant such as Captan, and using high rates are essential for preventing the development of CLS resistance to SDHIs. The forecast is showing the potential for several rain events this week and growers should be diligent about re-applying fungicides after rain to keep leaves protected from possible infection.

Pristine – Not recommended for cherry leaf spot

Pristine was first registered in 2004 and is a pre-mix fungicide containing boscalid (SDHI) and pyraclostrobin (strobilurin). Previous research at the NWMHRC, has shown that the CLS pathogen has reduced sensitivity and/or resistance to Pristine, specifically the boscalid component which had been the workhorse of Pristine for CLS prior to the development of reduced sensitivity to the fungicide. In NWMHRC research trials, there was a significantly higher percentage of defoliation in trees treated with Pristine compared with an SDHI fungicide (Figure 1). Therefore, Michigan State University Extension is not recommending Pristine for CLS management. In the Michigan Fruit Management Guide 2014, the fungicide Pristine is rated ‘fair/good’ for CLS control and ‘excellent’ for PM.



Gem – Rated ‘good/excellent’ for cherry leaf spot and ‘excellent’ for powdery mildew

Although not as effective as the SDHIs, Gem is rated ‘good’ to ‘excellent’ for CLS and ‘excellent’ for PM and is a decent option for preventing these diseases at the first cover timing. The label rate for Gem is 1.9 – 3.8 fl oz per acre, however, Michigan State University Extension is recommending a higher rate (3.0-3.8 fl oz per acre) for effective CLS control and resistance management. Gem is a strobilurin fungicide, which is a site-specific or single-site fungicide meaning that only one mutation of the pathogen’s target site is needed for development of resistant strains of the CLS fungus.

Copper – Rated ‘excellent’ for cherry leaf spot

Copper does not provide control of powdery mildew and is best for targeting CLS at second cover. Growers who are planning to spray copper for CLS should use caution as this material can be phytotoxic in hot conditions.

WATERING FRUIT TREES WITH MICRO-IRRIGATION SYSTEMS

Drying conditions in much of the fruit growing region sparks need to begin watering using micro-irrigation systems. Growers need to review the MSU Enviro-Weather website to collect valuable data for your area to determine irrigation scheduling.

Posted on **June 12, 2014**, MSUE News, by [Ron Perry](#), Michigan State University Extension, Department of Horticulture

A large area of Michigan is experiencing a below normal amount of precipitation that is supposed to last for a few weeks. Combined with low humidity, high winds and the beginning of canopy development, trees will be experiencing high stress. Fruit growers in Northern and Mid-Michigan are advised by [Michigan State University Extension](#) to begin irrigation due to the soil moisture status. The coarse droughty soils of many fruit growing sites are very dry. We are in the beginning stages of fruit development of apples and stone fruit. Moisture stress experienced at this time period can affect fruit thinning effectiveness and fruit set.

Fruits are in the cell division stage, which is critical to final fruit size. Moisture stress during cell division stage will limit numbers of cells and eventual fruit size, no matter how much water is given to trees later in the season. Also, moisture stress in this early period has an adverse effect on fruit set and drop (increases), which limits yield and tree vigor.

Determining when to irrigate

A grower can depend on determining when to water based on the feel of the hand method. Simply dig down to a depth of 12-16 inches. If the soil is still moist and you can readily ball soil up in the hand, there is probably adequate moisture.

There are many new electronic sensors which can be used to monitor soil moisture. Still, many folks like to use a combination of the soil feel method and soil tensiometer. Tensiometers, such as those sold by [Irrrometer Company](#) and others, measure the amount of soil tension registered by the instrument; more tension – up to 1 atmosphere – would indicate more dryness. The tensiometer is used worldwide and works well for many soils. Not so reliable readings are experienced in soils that are extremely coarse or those that are extremely heavy, i.e., cracks in clay soil.

Generally, you can set up stations of tensiometers at different locations in your orchards at preferably 12 and 18 inches in depth to monitor soil moisture on a daily or weekly basis. The tensiometers should be set half-way between the outer edge of the wetting zone of an emitter or sprinkler pattern, and the emitter. Many growers will begin watering and consider it critical when the tensiometer reads 0.30-0.40 atms. The type of irrigation system, soil conditions such as heavy versus light, and the crop will dictate the best point at which to initiate irrigation.

How much water to apply

How much water should you be applying to trees? If growers are using trickle irrigation, you can rely on a formula that is very useful in determining irrigation. Remember that trickle irrigation is a slow methodical means to supplying water and is not built for catch up. A useful formula for growers to use in combination with tensiometers and hand feel (soil moisture) is:

Water use per acre = Evapotranspiration x crop coefficient x area covered x 1 acre inch (gallons; 27,154)

There are different formulas used which all have their benefits and their faults. Two components of the formula are used in all; **Evapotranspiration (PET)** and **1 acre inch (27,154 gallons)**. Evapotranspiration is the most critical value. The traditional method is to make daily measurements of a “Class A” pan and the amount of water that actually evaporates each day.

Peak ET during the growing season can be used to design irrigation systems. The values are estimated using an the modified Penman equation which considers sun, wind, temperature and humidity, according to Kincaid and Heermann, 1974. These values are known as Potential ET (PET) and are made available on the [MSU Enviro-weather website](#) for many of our fruit growing areas. The values are reported in PET in inches daily and cumulative. As a grower, your goal is to replace what is being lost via evapotranspiration.

The second component of the formula is **crop coefficient (CC)**. Each plant species differs in water uptake and also according to time of season. Values for each of the plant species are [published by the Food and Agriculture Organization](#). Deciduous orchards are 0.70 early season, 0.90 mid-season and 0.30 late season. Grapes are 0.40 early season, 1.20 mid-season and 0.60 late season. These values can be adjusted according to fruit stage development. For example, stone fruit need relatively little water during pit hardening (stage II). Providing excess water has little effect on fruit size, but encourages excessive shoot growth. Therefore, replace ET only at a 50-70 percent level, rather than 100 percent, during this period. Resume near 100 percent with stone fruit in the start of final fruit swell (stage III).

Orchards and vineyards in Michigan often maintain a sod alleyway of grass. This formula takes into account the age of the trees and the amount of grass and other plant materials that cover the surface. The other plant materials are transpiring and using soil moisture. The formula then asks how much of the surface area is covered by plant material and identified as **area covered (AC)**. The values are presented as per cent of area covered with plant material:

Young orchard completely tilled: 0.30-0.50
Young orchard with grass alleyway: 0.50-0.60
Orchard with only four to five wide herbicide strip over five years of age: 0.70-0.80
Mature orchard with minimal herbicide strip: 1.00

To show how this formula works, we can plug in some figures for an example orchard:

We have a young tall spindle apple orchard three to four years of age near Sparta, Michigan. Our current or predicted PET values according MSU Enviro-weather for June 12-17, 2014, are 0.18, 0.19, 0.15, 0.23, and 0.19 each day. So if we use 0.23 (highest ET) then:

$0.23 \text{ (PET)} \times 0.80 \text{ (CC)} \times 0.50 \text{ (AC)} \times 27,154 = 2,498 \text{ gallons needed per acre}$

To calculate need per tree, divide by numbers of trees per acre at 1,210 trees per acre = 2.06 gallons per tree per day. You can calculate then how long to run your emitters to satisfy 100 percent of ET based on output of water per tree or emitter. If this were a case of cherries or peaches in pit hardening, such as in Southwest Michigan today, June 12, then we supply 50 percent of the this amount over the next couple weeks until stage III begins.

Comments

The daily evaporation rate can fluctuate. Many growers underestimate evapotranspiration rates in Michigan, likely due to windy conditions which can drive the system even under cool temperatures, in comparison to the West. Check irrigation systems to determine their actual output. Don't rely on literature or past collections for scheduling, regardless of the delivery system. Collect water in a container for a sample emitter or sprinkler over a predetermined time period and then extrapolate to gallons of water produced over a period of one hour. Do this for different parts of the system to determine variability. It is especially important to know exactly how much water is being delivered during this critical time.

Drought stress and its critical impact are accentuated for stone fruit and apple high density orchards. Trees on dwarfing stocks such as M.9 have concentrated (non-extensive) root systems that don't fully explore the soil profile for water. Secondly, we have found that these root systems are inefficient in absorbing soil moisture.

Dr. Perry's work is funded in part by [MSU's AgBioResearch](#).

This article was published by [Michigan State University Extension](#). For more information, visit <http://www.msue.msu.edu>. To contact an expert in your area, visit <http://expert.msue.msu.edu>, or call 888-MSUE4MI (888-678-3464).

NEW PROJECT LOOKING FOR BEE KEEPERS AND GROWERS WITH COVER CROPS IN MICHIGAN

This project will document benefits of cover crops as habitat and nutritional sources for pollinators. Respond to the project manager if interested.

Posted on **June 9, 2014**, MSUE News, by [Rufus Isaacs](#), Michigan State University Extension, Department of Entomology

Bees are one focus of a new project from the [Conservation Technology Information Center](#) (CTIC) based in Indiana, and they are looking for cooperators in Michigan. This project will document the benefits of cover crops as habitat and nutritional sources for pollinators.

The “[Economic, Agronomic and Environmental Benefits of Cover Crops](#)” project will examine Midwestern farm’s ability to support bee colonies and help producers to understand their farm’s role in pollinator health.

CTIC is looking for beekeepers in Minnesota, South Dakota, Michigan, Indiana, Illinois, Iowa and Ohio who are willing to contribute their expertise to the project. These beekeepers will be paired with farmers who produce bee-nourishing plants, particularly cover crops. Apiaries will then be established on the farm proportionate to its estimated carrying capacity. Hive health and productivity will be monitored and used to shape the producer’s management plan.

This three-year project is part of a [Conservation Innovation Grant](#) (CIG) and is funded by the [U.S. Department of Agriculture’s Natural Resources Conservation Service](#) and members of CTIC. The project also will examine nutrient cycling, improvements in soil health and other benefits of cover crops.

To become involved in or learn more about the “Economic, Agronomic and Environmental Benefits of Cover Crops” project, visit www.ctic.org/CoverCropMath, or contact Sara Hagmann at 765-494-9555 or hagmann@ctic.org.

CTIC is a national not-for-profit organization that champions, promotes and provides information on technologies and sustainable agricultural systems that conserve and enhance soil, water, air and wildlife resources that are productive and profitable. For more information about CTIC, visit www.ctic.org.

Dr. Isaacs’ work is funded in part by [MSU’s AgBioResearch](#)

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RAINFEST CHARACTERISTICS OF INSECTICIDES ON FRUIT FOR 2014

Precipitation can impact the performance of insecticides on fruit crops, but some compounds resist wash-off.

Posted on **June 10, 2014, MSUE News**, by [John Wise](#), Michigan State University Extension, Department of Entomology

The rainfall events experienced in Michigan have prompted questions about the relative “rainfastness” of the insecticides used in fruit production. In 2006, [AgBioResearch](#) provided funds to purchase and install a state-of-the-art rainfall simulation chamber at the [Trevor Nichols Research Center](#) (TNRC), after which [Michigan State University Extension](#) has conducted trials, with generous funding support from Michigan fruit commodity groups, on fruit crops for a range of insecticides.

There are several critical factors that influence impact of precipitation on a pesticide’s performance. First is the plant-penetrative attributes of the various compounds. Some pesticide chemistries, like organophosphates, have limited penetrative potential in plant tissue, and thus are considered primarily as surface materials. Some compounds, such as carbamates, oxadiazines and pyrethroids penetrate plant cuticles, providing some resistance to wash-off. Many newer compounds, such as spinosyns, diamides, avermectins and some Insect Growth Regulators (IGR) readily penetrate plant cuticles and have translaminar movement in leaf tissue. Others, like the neonicotinoid insecticides, are systemic and can have translaminar (moves from top surface to bottom of leaf) as well as acropetal movement in the plant’s vascular system (moves from center to growing tips of leaves). Penetration into plant tissue is generally expected to enhance rainfastness of pesticides.

The second factor is the inherent toxicity of an insecticide to the target pest and the persistence of the compound in the environment. In some cases, a compound may be susceptible to wash-off, but its environmental persistence and inherent toxicity to the target pest compensates for the loss of residue, thus delaying the need for immediate re-application.

The third factor is the amount of precipitation. In general organophosphate insecticides have the highest susceptibility to wash-off from precipitation, but their high field-rate toxicity to most target pests overcomes the necessity for an immediate re-application. Neonicotinoid insecticides are moderately susceptible to wash-off with residues that have moved systemically into plant tissue being highly rainfast, and surface residues less so. Carbamate, IGR and oxadiazine insecticides are moderately susceptible to wash-off, and vary widely in their toxicity to the range of relevant fruit pests. Diamide, spinosyn, avermectin and pyrethroid insecticides have proven to be moderate to highly rainfast on most fruit crops.

For most insecticides, a drying time of two to six hours is sufficient to “set” the compound in or on the plant. With neonicotinoids, for which plant penetration is important, drying time can significantly influence rainfastness. For neonicotinoids, up to 24 hours is needed for optimal plant penetration, thus the time proximity of precipitation after application should be considered carefully. Spray adjuvants, materials intended to aid the retention, penetration or spread on the plant, can also improve the performance of insecticides.

Based on the results from the current studies, the following charts have been developed to serve as a guide for general rainfastness characteristics and re-application recommendations for certain insect pests, also printed in the [2014 Michigan Fruit Management Guide](#) (E-154). Note that these recommendations should not supersede insecticide label restrictions or farm-level knowledge based on

site-specific pest scouting, but rather are meant to compliment a comprehensive pest management decision-making process.

Rainfastness rating chart: General characteristics for insecticide chemical classes

Insecticide Class	Rainfastness ≤ 0.5 inch		Rainfastness ≤ 1 inch		Rainfastness ≤ 2 inch	
	Fruit	Leaves	Fruit	Leaves	Fruit	Leaves
Organophosphates	L	M	L	M	L	L
Pyrethroids	M/H	M/H	M	M	L	L
Carbamates	M	M/H	M	M	L	L
IGRs	M	M/H	M	M		
Oxadiazines	M	M/H	M	M	L	L
Neonicotinoids	M,S	H,S	L,S	L,S	L,S	L,S
Spinosyns	H	H	H	M	M	L
Diamides	H	H	H	M	M	L
Avermectins	M,S	H,S	L,S	M,S	L	L

* H – highly rainfast (≤ 30% residue wash-off), M – moderately rainfast (≤ 50% residue wash-off), L – low rainfast (≤ 70% residue wash-off), S-systemic residues remain within plant tissue

Apple insecticide precipitation wash-off re-application decision chart: Expected codling moth control in apples, based on each compound's inherent toxicity to codling moth larvae, maximum residual, and wash-off potential from rainfall.

Insecticides	Rainfall = 0.5 inch		Rainfall = 1 inch		Rainfall = 2 inches	
	*1 day	*7 days	*1 day	*7 days	*1 day	*7 days
Imidan		X		X	X	X
Asana		X	X	X	X	X
Calypso			X	X	X	X
Assail			X	X	X	X
Proclaim		X		X	X	X
Rimon			X	X	X	X
Delegate					X	X
Altacor					X	X
Belt					X	X

* Number of days after insecticide application that the precipitation event occurred.

X – Insufficient insecticide residue remains to provide significant activity on the target pest, and thus re-application is recommended.

- An un-marked cell suggests that there is sufficient insecticide residue remaining to provide significant activity on the target pest, although residual activity may be reduced.

Grape insecticide precipitation wash-off re-application decision chart: Expected Japanese beetle control in juice grapes, based on each compound's inherent toxicity to Japanese beetle adults, maximum residual, and wash-off potential from rainfall.

Insecticides	Rainfall = 0.5 inch		Rainfall = 1 inch		Rainfall = 2 inches	
	*1 day	*7 days	*1 day	*7 days	*1 day	*7 days
Imidan		X	X	X	X	X
Sevin			X	X	X	X
Brigade		X		X	X	X
Actara		X		X	X	X
Avaunt		X		X	X	X

* Number of days after insecticide application that the precipitation event occurred.

X – Insufficient insecticide residue remains to provide significant activity on the target pest, and thus re-application is recommended.

- An un-marked cell suggests that there is sufficient insecticide residue remaining to provide significant activity on the target pest, although residual activity may be reduced.

Blueberry insecticide precipitation wash-off re-application decision chart: Expected cranberry fruitworm control in blueberries, based on each compound's inherent toxicity to cranberry fruitworm larvae, maximum residual and wash-off potential from rainfall.

Insecticides	Rainfall = 0.5 inch		Rainfall = 1 inch		Rainfall = 2 inches	
	*1 day	*7 days	*1 day	*7 days	*1 day	*7 days
Asana		X	X	X	X	X
Intrepid		X	X	X	X	X
Assail		X		X	X	X
Delegate		X		X	X	X

* Number of days after insecticide application that the precipitation event occurred.

X – Insufficient insecticide residue remains to provide significant activity on the target pest, and thus re-application is recommended.

- An un-marked cell suggests that there is sufficient insecticide residue remaining to provide significant activity on the target pest, although residual activity may be reduced.

Blueberry insecticide precipitation wash-off re-application decision chart: Expected Japanese beetle control in blueberries, based on each compound's inherent toxicity to Japanese beetle adults, maximum residual and wash-off potential from rainfall.

Insecticides	Rainfall = 0.5 inch		Rainfall = 1 inch		Rainfall = 2 inches	
	*1 day	*7 days	*1 day	*7 days	*1 day	*7 days
Imidan	X	X	X	X	X	X
Mustang Max		X		X	X	X
Sevin		X	X	X	X	X

Provado		X	X	X	X	X
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* Number of days after insecticide application that the precipitation event occurred.

X – Insufficient insecticide residue remains to provide significant activity on the target pest, and thus re-application is recommended.

- An un-marked cell suggests that there is sufficient insecticide residue remaining to provide significant activity on the target pest, although residual activity may be reduced.

Insecticide persistence, plant penetration, and rainfastness rating

Compound class	Persistence (residual on plant)	Plant penetration characteristics	Rainfast rating
Organophosphates	Medium - Long	Surface	Low
Carbamates	Short	Cuticle Penetration	Moderate
Pyrethroids	Short	Cuticle Penetration	Moderate - High
Neonicotinoids	Medium	Translaminar & Acropetal	Moderate
Oxadiazines	Medium	Cuticle Penetration	Moderate
Avermectins	Medium	Translaminar	Moderate
IGRs	Medium - Long	Translaminar	Moderate
Spinosyns	Short - Medium	Translaminar	Moderate - High
Diamides	Medium - Long	Translaminar	Moderate - High

Dr. Wise's work is funded in part by [MSU's AgBioResearch](#).

This article was published by [Michigan State University Extension](#). For more information, visit <http://www.msue.msu.edu>. To contact an expert in your area, visit <http://expert.msue.msu.edu>, or call 888-MSUE4MI (888-678-3464).

MSU CLARKSVILLE RESEARCH CENTER (CRC) WILL BE HOLDING ITS 2014 TREE FRUIT RESEARCH SHOWCASE

The MSU Clarksville Research Center (CRC) will be holding its 2014 tree fruit research showcase and field day on **July 10** from **9AM to 5PM**. Come join us to see the latest, cutting edge research from the MSU tree fruit team. Phil Schwallier and Dr. Ron Perry will discuss and demonstrate hedging systems for high density fruit and discuss new thinners. Dr. Amy Iezzoni will show and discuss some of the latest tart cherry selections being developed and tested at CRC including selections resistant to leaf spot and the

strategy for breeding for Armillaria resistance. Dr. Greg Lang will showcase high density training systems for sweet cherry and other stone fruits and the use of protective covering systems, such as high tunnels, for fruit production. Drs. Ron Perry, Matt Grieshop and others will demonstrate Solid Set Canopy Delivery Systems in apples and cherries and highlight the innovative applications of these systems for pest management and microclimate modification. Lunch will be provided and the event is free to the public. More information, an event flyer and a (free) registration form will be released in mid-June.

[Movie at the State Theater](#)

Monday, June 30, 2014 • 6:00pm



Oryana is sponsoring a film at 6 p.m. at the State Theater by Swiss filmmaker Marcus Imhoof, “More Than Honey.” This film is about the relationship between humans and honeybees, about nature and our future and was nominated for an Oscar for Best Foreign Language Film at the 86th Academy Awards.

(Note: This film is showing at the State Theater, 233 E Front Street, Traverse City. Tickets are \$8.50 for Adults, \$7.50 for Seniors 65 and Over, and \$6.50 Students and Kids 12 and Under.)

MICHIGAN CHESTNUT UPDATE—June 10, 2014

Rose chafer has arrived in orchards and are easily visible feeding on foliage. Growers should carefully weigh the pros and cons of treatment. Caterpillars are feeding on leaves and potato leafhopper has been reported, though not yet observed on chestnut.

Posted on **June 12, 2014**, MSUE News, by [Erin Lizotte](#), Michigan State University Extension



Chestnut development in Northwest Michigan as of June 9, 2014. Photo credit: Erin Lizotte, MSU Extension

So far this season, the [Benton Harbor Enviro-weather station](#) has accumulated 567 growing degree days (GDD) 50 with 0.8 inches of rain over the past week, the [Clarksville Enviro-weather station](#) has recorded 518 GDD50 and 0.67 inches of rain this past week, and the [Northwest Michigan Horticultural Research Center](#) accumulated 394 GDD50 with no rain over the last week. [Chestnuts](#) in northern Michigan have catkins just beginning to emerge and most production areas could use some substantial rainfall in the coming week.

Rose chafers have been reported in the southern portion of the state. Rose chafers are considered a generalist pest and affect many crops, particularly those found on or near sandy soils or grassy areas. The adult beetles feed heavily on foliage and blossom parts of numerous horticultural crops in Michigan and can cause significant damage to chestnut orchards. Rose chafers can be particularly damaging on young trees with limited leaf area. Like Japanese beetles, rose chafers skeletonize the chestnut leaves, but tend to consume larger pockets of tissue with damage similar to caterpillar feeding than the fine lace-like leaf that results from Japanese beetle feeding.



Left, Rose chafer feeding on chestnut. Right, Rose chafer mating on chestnut catkin. Photo credits: Mario Manujano, MSU (left) and Erin Lizotte, MSU Extension (right)

The rose chafer is a light tan beetle with a darker brown head and long legs, and is about 12 millimeters long. There is one generation per year. Adults emerge from the ground during late May or June and live for three to four weeks. Females lay groups of eggs just below the surface in grassy areas of sandy, well-drained soils. The larvae, or grubs, spend the winter underground, move up in the soil to feed on grass

roots and then pupate in the spring. A few weeks later, they emerge from the soil and disperse by flight. Male beetles are attracted to females and congregate on plants to mate and feed.

They are often found in mating pairs and fly during daylight hours. Visual observation while walking a transect is the best method for locating them. Because of their aggregating behavior, they tend to be found in larger groups and are typically relatively easy to spot. There are no established treatment thresholds or data on how much damage a healthy chestnut tree can sustain from rose chafer, but growers should consider that well-established and vigorous orchards will likely not require complete control. Younger orchards with limited leaf area will need to be managed more aggressively.

Managing rose chafers can be a frustrating endeavor as they can reinfest from surrounding areas quickly. This reinfestation is often misinterpreted as an insecticide failure, but efficacy trials have shown that a number of insecticides remain effective treatment options. Carbamate, organophosphate, pyrethroid and neonicotinoid insecticides all have good activity against rose chafers and can provide some control. Organic options including azadirachtin products and surround are marginally effective. Growers choosing to use kaolin clay should remember that good coverage is key and those considering pyrethroids or neonicotinoids should be aware that these products may potentially increase pest mite populations. For a list of the chemicals containing these active ingredients, refer to the [Pesticides Registered for Edible Chestnuts, 2014](#) reference.

Growers should be on the lookout for potato leafhoppers as we can expect them to arrive in orchards any time. Like many plants, chestnuts are sensitive to the saliva of potato leafhoppers that is injected by the insect while feeding. Damage to leaf tissue can cause reduced photosynthesis, which can impact production and quality and damage the tree.



Left, Leaf cupping on chestnut caused by potato leafhopper damage. Right, Various nymphal stages of potato leafhopper along the mid-vein on the underside of a chestnut leaf. Photo credits: Erin Lizotte, MSU Extension (left) and Mario Mandujano (right), MSU

At this point in the season, potato leafhopper scouting should be performed following storm systems originating in the southern United States. Early detection is important to prevent injury. For every acre of orchard, growers should select five trees to examine and inspect the leaves on three shoots per tree, a total of 15 shoots per acre. The easiest way to observe potato leafhoppers is by flipping the shoots or leaves over and looking for adults and nymphs on the underside of leaves. Pay special attention to succulent new leaves on the terminals of branches. Growers may also hang yellow sticky traps in the orchard to catch potato leafhopper. Be sure to hang traps on both the edge and interior of the block. For more information on how to identify potato leafhoppers and symptoms of damage, as well as management recommendations, please refer to the [Michigan State University Extension](#) article, "[Potato leafhopper management in chestnuts](#)".

Additionally, obliquebanded leafroller larvae (0.25-1 inches in length) and hornworms were also observed feeding on leaves in area orchards. These pests are not considered to be of economic significance.



Left, Chestnut leaf tip rolled under by an obliquebanded leafroller. Middle, Obliquebanded leafroller larvae. Right, Hornworm feeding on chestnut leaves. Photo credits: Erin Lizotte, MSU Extension

This article was published by [Michigan State University Extension](http://www.msue.msu.edu). For more information, visit <http://www.msue.msu.edu>. To contact an expert in your area, visit <http://expert.msue.msu.edu>, or call 888-MSUE4MI (888-678-3464).

TREE FRUIT IPM UPDATE SERIES – 2014

Emily Pochubay and Nikki Rothwell
Michigan State University Extension

After a one-year break, Michigan State University is back to offering on-farm IPM workshops in Leelanau, Grand Traverse, Antrim, and Benzie counties in northwest Michigan for the 2014 season. Workshops begin the first week of May in hopes of providing commercial tree fruit growers with a review of good practices for developing sustainable pest management programs as well as key information on early season disease protection. Workshops through the first week of July will highlight management of the season's 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. These IPM workshops are free and do not require registration. Certified crop advisor continued education credits and pesticide recertification credits will be available. Tree fruit growers are welcome to attend meetings at any location and time that is most convenient. We are looking forward to interacting with you all at these meetings. For more information, please contact Emily Pochubay at pochubay@msu.edu or (231) 946-1510.

IPM Update Locations

Leelanau County

Location: Jim and Jan Bardenhagen, 7881 Pertner Rd, Suttons Bay
Dates: May: 6, 13, 20, 27; June: 3, 10, 17, 24; July: 1
Time: 12PM – 2PM

Grand Traverse County

Location: Wunsch Farms, Phelps Road Packing Shed, Old Mission
Dates: May: 6, 13, 20, 27; June: 3, 10, 17, 24; July: 1
Time: 3PM – 5PM

Antrim County

Location: Jack White Farms, 10877 US-31, Williamsburg
(south of Elk Rapids on the southeast side of US-31)
May: 7, 21; June: 4, 18; July: 2
Time: 10AM – 12PM

Benzie County

Location: Blaine Christian Church
May: 7, 21; June: 4, 18; July: 2
Time: 2PM – 4PM

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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 is available at the new cherry website:

<http://www.cherries.msu.edu/>

Information on apples:

<http://apples.msu.edu/>

Fruit CAT Alert Reports has moved to MSU News

<http://news.msue.msu.edu>