Northern Michigan FruitNet 2015
Northwest Michigan Horticultural Research Center

Weekly Update

FruitNet Report - June 9, 2015

CALENDAR OF EVENTS

2015

5/5 - 6/30 **Leelanau County IPM Updates**
Bardenhagen Farm

5/5 - 6/30 **Grand Traverse County IPM Updates**
Wunsch Farm

5/6 - 7/1 **Antrim County IPM Updates**
Jack White Farms

5/6 - 7/1 **Benzie County IPM Updates**
Blaine Christian Church

GROWING DEGREE DAY ACCUMULATIONS AS OF June 8, 2015 AT THE NWMHRC

Year	2015	2014	2013	2012	2011	2010	25 Yr. Avg.
GDD42	783	709	730	1098	742	1065	791.2
GDD50	418	387	414	609	402	586	417.8

Growth Stages at NWMHRC (June 8, 2015, 11 a.m.)

Apple: Red Delicious – 11 mm fruit
Gala – 10 mm fruit
Yellow Delicious – 9 mm fruit
Pear: Bartlett: 14 mm fruit
Sweet Cherry: Hedelfingen – 14 mm fruit

Napoleon – 12 mm fruit
Gold – 12 mm fruit

Tart Cherry: 12 mm fruit
Balaton: 12 mm fruit
Apricot: 25 mm fruit
Grapes: Chardonay – 4" – 8" shoots

Northwest Michigan Fruit Regional Report – June 9, 2015

Northwest Michigan Fruit Regional Report – June 9, 2015

Predicted stormy and wet conditions will be challenging for preventing disease infections this week.

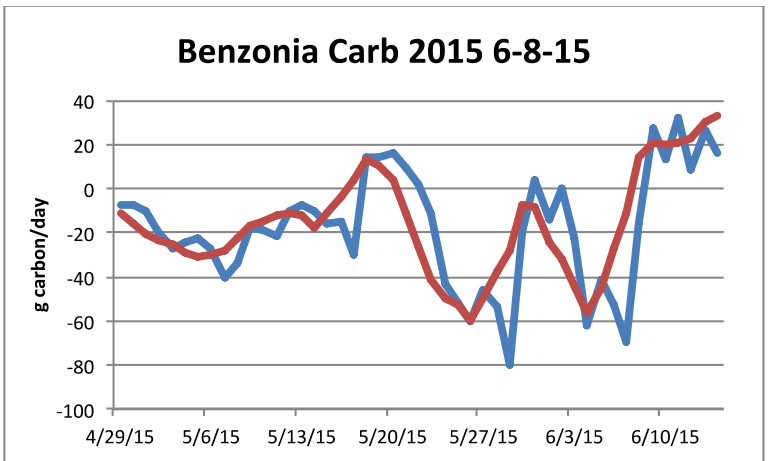
Emily Pochubay and Nikki Rothwell

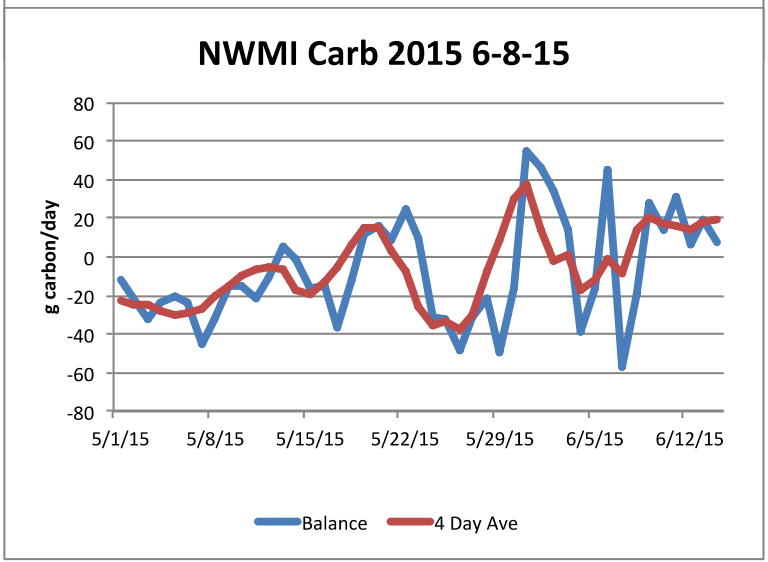
Weather Report

Overall, daytime temperatures feel seasonable if we look back at the weeklong summary: high 60s and into the low 70s. However, it feels more like the conditions have been cool and wet. On Sunday (7 June), we had 0.54" of rainfall; the rains moved out on Sunday evening and then moved back in again for a short period on Monday afternoon, when we received <0.1" of rain. Rains cleared again on Monday evening and were replaced by a fog that is still sitting over the region today (9 June). These wet conditions are concerning for disease development. We have accumulated 783 GDD base 42 and 418 GDD base 50. As in past weeks, these degree-day accumulations are spot-on with our 25-year average.

Crop Report

Growers are primarily concentrating on disease control with these long wetting periods. They are still assessing their crop from the 20 May freeze event. The sweet cherry crop is variable throughout the region, but the current estimate remains between 40-60% of a full crop. Unfortunately, we have seen frost scars on some of our sweet cherries here at the station; growers should be sure to keep these developing fruit covered, particularly with warm and wet weather in the forecaset as these conditions are conducive for American brown rot development. The tart cherry is also variable, but growers have been pleasantly surprised to see more cherries coming out of the shuck in the past week. At this time, growers are still estimating that the region has about 50% of a crop. Young blocks appear to have a heavier set than older trees.





As a result of the 20 May frost, growers are concerned about thinning apples. Both the Benzonia and the NWMHRC carbohydrate models are showing moderate to high stress today, but the model indicates we will be moving out of time of stress soon. Growers that plan to thin in the next day should use moderate to reduced amounts of thinners. In the next few days (past 10 June), growers will need to increase the rates of thinners as we will move into a period of no stress. Additionally, at the NWMHRC, we are at the optimal time for thinning as our fruit is between 9-11mm.

There is tremendous variability of a crop between trees within an orchard, which has been a big challenge for making thinning decisions. For example, some trees still have 35+ fruit while adjacent trees have only six fruits, and many growers are wondering if they should thin these types of blocks to be sure to maximize yields. Phil Schwallier recommends that in most cases, all growers will need to thin their apples, even if they just thin the tops of the trees. The trees that have only a few fruits on them will be very difficult to thin. From past experience, trees with a light crop will have little competition between the few fruits left on the tree, and most likely, and even at higher rates, thinners will not thin these fruits. Phil Schwallier recommends using Sevn + NAA (10ppm) unless growers have young trees or varieties that thin easily, then he recommends 5ppm NAA with the Sevin. Even if growers are nervous about thinning due to variable crop size, we recommend thinning the tops of trees and if needed, come through later in the season with hand thinning on the bottoms of trees. Hand thinning whole trees will be a huge labor expense, plus it is much easier to thin just the bottoms of the trees. If a grower concerned about return bloom, particularly in blocks that will be hand thinned, we recommend NAA sprays later in the season. We recommend that these sprays go on at 5 weeks, 7 weeks, and 9 weeks after full bloom; growers should use a rate of 5ppm of NAA, and these applications should not be used if the temperatures are hot (80+ degrees F).

Pest Report

Conditions were relatively dry for most of last week, but wet, humid weather returned and has been consistent since Sunday 7 June. Most of the northwest region has been in a long wetting period since Sunday and infection periods began for many diseases following Sunday's rain. Recent wet conditions have been particularly challenging for growers to keep green tissue and developing fruit covered and protected from pests and diseases. Thunderstorms are predicted for this evening (9 June), and an additional storm system is forecasted to arrive on Friday with the potential for a long wetting period intermixed with heavy rainfall. Trauma blight could be a concern if we have severe conditions with heavy winds that accompany these storms; damage to leaves from hail or wind allows for fire blight bacteria to enter damaged tissue. Several other wetting events are also predicted for the week, and it will be challenging to keep tissue protected from diseases, particularly if windy conditions preclude applications. Disease levels remain low in most orchards, and we encourage growers to continue to be diligent with their disease programs to prevent disease infections in the coming week.

Last week, we reported that cherry leaf spot lesions had been observed on oldest true leaves. This week, new cherry leaf spot lesions have appeared on newer leaves indicating that this new infection likely occurred during one of the more recent wetting events – likely during the long wet spell at the end of May. Overall, the level of cherry leaf spot infection in orchards remains low, but growers will need to keep green tissue protected during this week's wet conditions. Many growers are at first cover in their tart cherry programs, and powdery mildew is a concern at this timing. Previous research at the NWMRHC has shown that the optimal timing for powdery mildew control is at the first cover timing—well before the pathogen's mycelium are visible on leaves. Control measures against powdery mildew are not effective once this fungus is established/visible on leaves.

The American brown rot fungus has been observed sporulating on this season's tart cherries that may have been damaged by freezing conditions in May or from bacterial canker. Signs of bacterial canker are showing up on leaves of tart cherry and are evident in tart cherry blocks at the station at this time.

According to the apple scab model on Enviro-weather, 100% of spores at mature and 86% have discharged at this time; therefore, primary apple scab is ongoing. We did not detect apple scab spores at the monitoring site (i.e. a small block of Jonamac in Leelanau) following Sunday's rain. However, as mentioned previously, spore discharge has been low at this site and we cannot be certain that these spore numbers are representative of other apple orchards throughout the region. Preventing infection during primary is key for minimizing the need for control of secondary scab infection, even in blocks with little or no fruit this season. Keeping scab infection low will help ensure that trees maintain a healthy canopy through the summer/early fall and store sufficient nutrients for the winter as well as help to keep scab inoculum low for the 2016 season. Apple powdery mildew is also a concern at this time.

Sweet cherries are out of the shuck, small green fruit are visible in tart cherry blocks, and apples are sizing up in the region, and as a result of this fruit development, many growers are protecting these fruits from plum curculio. The neonicotinoid insecticides, Actara and Assail, have excellent efficacy on plum curculio, and because these materials are systemic, they will also deter PC feeding and egglaying, and provide curative action against eggs and young larvae that are present in fruit. Many growers applied trunk sprays for American plum borer (APB) and lesser peach tree borer (LPTB) last week and borer activity is ongoing at the station (3 APB/trap and 9 LPTB/trap). Lorsban is still the material of choice for borer trunk sprays. We have not detected greater peachtree borer activity at the station at this time. We found the first codling moths of the season at the station this week (1 CM/trap), but have not set a biofix for CM at this time. Some growers in the Benzie-Manistee area set CM biofix last week. Obliquebanded leafroller traps and spotted wing drosophila traps were deployed at the station this week. We will also begin monitoring for cherry fruit fly soon.

Grapes

Duke Elsner

Many vinifera vineyards still look very bad, with only a few live shoots arising from the base of the vines. More fortunate sites are in the 6-8 inch shoot stage, with a small crop showing now. I've seen a few sites that were left un-pruned that have 6-8 inch shoots at the base and just bud swell to 2 inch shoots higher in the vine. I suspect that these late shoots will not survive long into the growing season, as the cambium tissues in the canes are too damaged to keep up with their needs once the stress of fruit development starts.

Earlier hybrid varieties are approaching the 12 inch shoot stage, with a fair crop showing where there was not damage from the May freeze.

Adult potato leafhoppers and rose chafers are now present in the Grand Traverse region.

The first wine grape variety trial at the Northwest Michigan Horticultural Research Center, planted in 1995-1998, was pulled out today. Many thanks to all of the NWMHRC staff, industry people, students and volunteers who helped to maintain, harvest and gather research data from this block of vines over the years!

Saskatoons

Duke Elsner

Fruits are sizing a bit now, and fruit-infesting insect activity continues. Apple curculio adults are still laying eggs. The first hollowed-out berries have turned deep blue-black and are beginning to fall. Leafroller larvae are approaching full size, their feeding injury should stop soon. Rose chafer adults are now active—their feeding can be very damaging to the leaves of saskatoons, so it is highly recommended to scout for the presence of rose chafers and apply treatments for them when the numbers start to climb. Do not use insecticides with carbaryl as the active ingredient, on bearing plants, as this chemical will act as a fruit thinner on saskatoons. Carbaryl is a good choice for treating rose chafers on young plantings where growers do not wish to bear fruit on the bushes.

I have noticed an upswing in the populations of lecanium scale on woodland trees in NW Michigan. These may become an issue on saskatoons in the next couple of years.

I have seen more saskatoon-juniper rust this week, but relatively little Entomosporium leaf-spot disease.

Hollowed Saskatoon Berry

Controlling Powdery Mildew in Tart Cherry Orchards with Reduced Crop

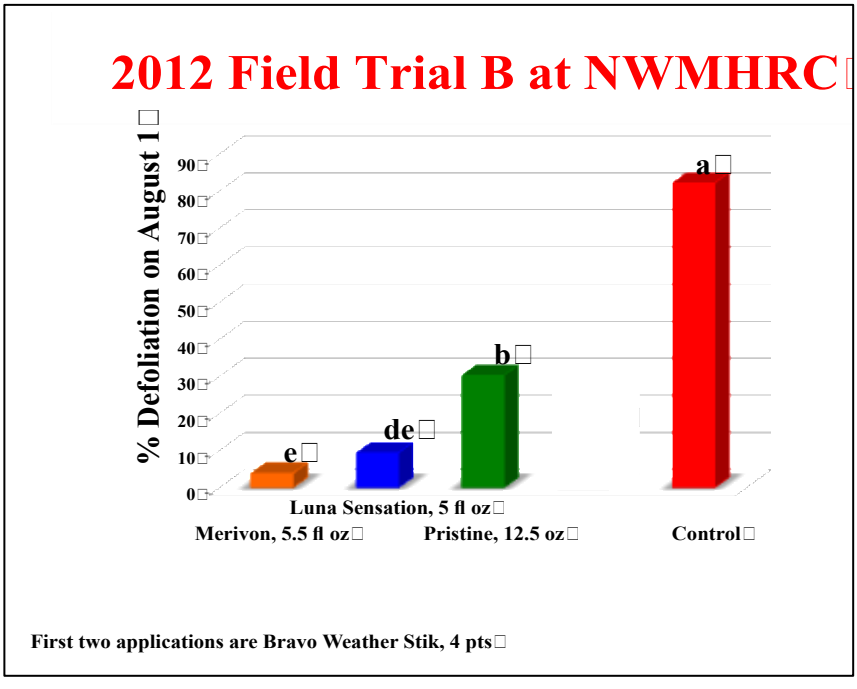
Growers can minimize powdery mildew infections with early, well-timed applications

Nikki Rothwell, Emily Pochubay, and George Sundin

Powdery mildew (PM) can be problematic in tart cherry orchards, and because this disease rarely infects fruit, it still needs to be controlled in years with a light crop. The biggest issue for PM control is the prevention of initial fungal infection. We currently do not have fungicides that will eradicate a PM infection, so growers need to control this disease *before* they see it by using protectant fungicides. If growers observe the white mycelium on the leaves, it is too late to apply a control spray.

The most important spray timing for PM control is the first cover timing (the first spray application after shuck split). Prior to shuck split, chlorothalonil (Bravo and other generics) is the fungicide of choice in tart cherry orchards due to its excellent activity in cherry leaf spot (CLS) control. At these early timings and in most years, the PM fungus is generally not active at this time. The first cover timing represents the first and optimal chance to protect the orchard from initial PM infection. This spray is critically important. We have shown in our previous research that if this timing is missed, the amount of PM-infected leaves can increase by at least three-fold at harvest. We have also found that if fungicides targeting PM are only applied later in the season, PM infection can become seriously problematic by mid-August (~ 70% incidence of leaf infection). *This year, there could be tart cherry blocks that will not be harvested and in this scenario, this first cover timing is even more important as a cost saving measure*--essentially, if a grower applies a fungicide targeting PM at first cover timing, he/she will minimize the need to apply fungicides targeting PM later in the season. This one well-timed spray will also reduce PM inoculum for the 2016 season in addition to saving money.

At this time, both PM and CLS are a concern and these diseases can cause early defoliation if they are not managed effectively. CLS infections have started in several orchards in the region and preventing the spread of conidia is critical for keeping this disease under control for the duration of this season. Hence, fungicide sprays at the first cover timing should target PM and CLS. The SDHI fungicides are an excellent choice for targeting both CLS and PM at the first cover timing. Research at the NWMHRC has show that a well-timed first cover application of these newer materials will provide ideal control of CLS and PM (see figures, pg 1 and 2). 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. Pristine and Gem are also good fungicides for PM control. While Pristine is not recommended for CLS due to reduced sensitivity and/or resistance to the boscalid (SDHI) component of Pristine (see figure, pg 1), Gem at a rate of 3-3.8 fl oz/ac still does provide 'good' control of CLS and PM. However, 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. In Michigan apples, we saw the strobulurins move from good control to field failure overnight, and as a result, we advise growers to use caution when using Gem, particularly if they are relying on this product quite reliably. Several growers have recently used the combination of Syllit + Captan during this wet period, and these materials provide excellent for control of CLS, but this combination is weak against PM. Growers should add a material for PM to ensure both CLS and PM control at first cover.

Fungicide Timing Trial/Cherry at the NWMHRC

Treatment	Timing	% leaves infected (29 June)
Pristine 12oz	1,2,3,4,5,6	1.1d
Pristine 12oz	2,3,4,5,6 only	2.6d
Pristine 12oz	3,4,5,6 only	3.7cd
Pristine 12oz	4,5,6 only	7.1c
Pristine 12oz	5,6 only	19.5a
Pristine 12oz	6 only	15.2b
Gem 3.8oz	1,2,3,4,5,6	2.2d
Untreated		22.3a

Timings: 1=late bloom/petal fall, 2=shuck split 3=1st cover, 4=2nd cover, 5=3rd cover, 6=4th cover

Finally, the fungicide Quintec (quinoxyfen) has a mode of action that is different from the strobilurin active ingredient in Gem. Quintec at 7 fl oz per acre has performed very well in PM trials on cherry in Washington state. However, Quintec has no activity against cherry leaf spot, and growers must add another product to the tank for leaf spot. The strobilurin + boscalid in Pristine works well against PM, so this fungicide combination is a good choice for resistance management against PM, but again, Pristine is not recommended for CLS control.

Rainfast characteristics of insecticides on fruit

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

Posted on **June 9, 2015** by MSUE News, **John Wise**, Michigan State University Extension, Department of Entomology

The rainfall events experienced in Michigan have prompted questions about the relative "rainfastness" of 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 Project GREEEN and 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 results from 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 "2015 Michigan Fruit Management Guide," E0154). 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	Low	Moderate	Low	Moderate	Low	Low
Pyrethroids	Moderate/High	Moderate/Hi	Moderate	Moderate	Low	Low

		gh				
Carbamates	Moderate	Moderate/High	Moderate	Moderate	Low	Low
IGRs	Moderate	Moderate/High	Moderate	Moderate	Low	Low
Oxadiazines	Moderate	Moderate/High	Moderate	Moderate	Low	Low
Neonicotinoids	Moderate,Systemic	High,Systemic	Low,Systemic	Low,Systemic	Low,Systemic	Low,Systemic
Spinosyns	High	High	High	Moderate	Moderate	Low
Diamides	High	High	High	Moderate	Moderate	Low
Avermectins	Moderate,Systemic	High,Systemic	Low,Systemic	Moderate,Systemic	Low	Low

Highly rainfast = ≤ 30% residue wash-off
Moderately rainfast = ≤ 50% residue wash-off
Low rainfast = ≤ 70% residue wash-off
Systemic = Systemic residues remain within plant tissue

Apple insecticide precipitation wash-off re-application decision chart - codling moth						
Insecticides	**Rainfall = 0.5 inch**		**Rainfall = 1 inch**		**Rainfall = 2 inches**	
	***1 day**	***7 days**	***1 day**	***7 days**	***1 day**	***7 days**
Imidan	Sufficient insecticide residue	Insufficient insecticide residue	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Asana	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Calypso	Sufficient insecticide residue	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Assail	Sufficient insecticide residue	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Proclaim	Sufficient insecticide residue	Insufficient insecticide residue	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Rimon	Sufficient insecticide residue	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue

Delegate	Sufficient insecticide residue	Sufficient insecticide residue	Sufficient insecticide residue	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Altacor	Sufficient insecticide residue	Sufficient insecticide residue	Sufficient insecticide residue	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Belt	Sufficient insecticide residue	Sufficient insecticide residue	Sufficient insecticide residue	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue

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.

* Number of days after insecticide application that the precipitation event occurred.
Insufficient insecticide residue = Insufficient insecticide residue remains to provide significant activity on the target pest, and thus re-application is recommended.

Sufficient insecticide residue = 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 - Japanese beetles

Insecticides	**Rainfall = 0.5 inch**		**Rainfall = 1 inch**		**Rainfall = 2 inches**	
	***1 day**	***7 days**	***1 day**	***7 days**	***1 day**	***7 days**
Imidan	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Sevin	Sufficient insecticide residue	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Brigade	Sufficient insecticide residue	Insufficient insecticide residue	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Actara	Sufficient insecticide residue	Insufficient insecticide residue	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Avaunt	Sufficient insecticide residue	Insufficient insecticide residue	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue

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.

* Number of days after insecticide application that the precipitation event occurred.
Insufficient insecticide residue = Insufficient insecticide residue remains to provide significant activity on

the target pest, and thus re-application is recommended.

Sufficient insecticide residue = 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 - cranberry fruitworm						
Insecticides	**Rainfall = 0.5 inch**		**Rainfall = 1 inch**		**Rainfall = 2 inches**	
	***1 day**	***7 days**	***1 day**	***7 days**	***1 day**	***7 days**
Asana	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Intrepid	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Assail	Sufficient insecticide residue	Insufficient insecticide residue	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Delegate	Sufficient insecticide residue	Insufficient insecticide residue	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue

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.

* Number of days after insecticide application that the precipitation event occurred.
Insufficient insecticide residue = Insufficient insecticide residue remains to provide significant activity on the target pest, and thus re-application is recommended.

Sufficient insecticide residue = 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 - Japanese beetles						
Insecticides	**Rainfall = 0.5 inch**		**Rainfall = 1 inch**		**Rainfall = 2 inches**	
	***1 day**	***7 days**	***1 day**	***7 days**	***1 day**	***7 days**
Imidan	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Mustang Max	Sufficient insecticide residue	Insufficient insecticide residue	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue

Sevin	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Provado	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue

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.

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

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

Sufficient insecticide residue = 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 - spotted wing Drosophila						
Insecticides	**Rainfall = 0.5 inch**		**Rainfall = 1.0 inch**		**Rainfall = 2.0 inches**	
	***1 day**	***7 days**	***1 day**	***7 days**	***1 day**	***7 days**
Imidan	Sufficient insecticide residue	Insufficient insecticide residue	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Mustang Max	Sufficient insecticide residue	Insufficient insecticide residue	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Lannate	Sufficient insecticide residue	Insufficient insecticide residue	Sufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Malathion	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Delegate	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue
Assail	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue	Insufficient insecticide residue

Expected spotted wing Drosophila control in blueberries, based on each compound's inherent toxicity to SWD, maximum residual, and wash-off potential from rainfall.

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

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

Sufficient insecticide residue = 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 have a digest of information delivered straight to your email inbox, visit http://bit.ly/MSUENews. To contact an expert in your area, visit http://expert.msue.msu.edu, or call 888-MSUE4MI (888-678-3464).

Help reduce pesticide risk to bees and other pollinators

A new guide from Michigan State University contains practical advice for fruit growers for reducing pesticide risk to bees and other pollinators.

Posted on **June 8, 2015** by MSUE News, **Rufus Isaacs**, and Julianna Wilson, Michigan State University Extension, Department of Entomology

Extension Bulletin E3245 • New • May 2015

Minimizing Pesticide Risk to Bees in Fruit Crops

Emily May, Julianna Wilson and Rufus Isaacs
Department of Entomology, Michigan State University

SUMMARY

1. Bees are essential for pollination of many fruit crops.
2. Bees and other pollinators can be harmed by some pesticides used to manage insects, mites and diseases in fruit crops.
3. Growers can reduce pesticide risk to bees through these approaches:
   - Develop and implement a pollination contract with your beekeeper.
   - Use integrated pest management (IPM) to reduce the need for sprays.
   - Avoid pesticide sprays during crop bloom.
   - Apply pesticides after sunset or before sunrise, or when air temperature is below 50°F.
   - Select the least toxic pesticides and formulations when possible.
   - Reduce drift onto areas outside crop fields.
   - Remove flowering weeds from crops.
   - Provide bee-friendly habitat away from crops.

INTRODUCTION

Pollinating insects, of which bees are the most important, contribute significantly to the yield and quality of fruit crops in the United States. Pollination services provided by bees are worth billions of dollars annually to fruit crop industries across the nation. Fruit crops vary in their need for bees to deliver pollen for pollination, but most — including apples, blueberries, cherries, strawberries and raspberries — will produce larger and more even fruit if their flowers are well visited by bees. For all these crops, having healthy bees to provide pollination is essential for their production, so protecting bees from pesticide risk is an important part of growing fruit crops.

This document provides information to help growers make informed decisions about how to minimize the risk of pesticides to bees. A list of insecticides and fungicides that are registered for use in the north central region of the United States is provided in the back of the document.

Types of bees that provide pollination

Fruit plantings are typically pollinated by a combination of wild and managed bees (Figure 1). More than 500 species of bees are present in the Midwest, and about 30 to 50 species are important contributors to the pollination of fruit crops.

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Pesticides and bees are increasingly in the news, with heightened awareness of the hazards bees may encounter in agricultural landscapes. In fruit farms, growers need bees for pollinating their crops during bloom and most rent honey bee hives from beekeepers to supplement pollination by wild bees and other insects. Because healthy bees are critical for the long-term sustainability of fruit production, it is important growers make bee health a priority and take care when using pesticides for insect and disease control to do the least harm to bees and other pollinating insects on these farms.

A new publication, "Minimizing Pesticide Risk to Bees in Fruit Crops," number E3245 from Michigan State University Extension, identifies potential pesticide risks to bees on fruit farms and suggests specific strategies that would minimize these risks. It draws on knowledge of bee biology, pesticide action and farming practices to provide advice on a series of common-sense practices growers can follow to reduce pesticide risk to bees. A list of insecticides and fungicides registered for use on fruit crops in the Midwest region provides a risk ranking for each product to allow growers, extension educators and crop consultants to make informed decisions to support bee populations on farms. With clear photographs and illustrations to highlight key points, this new document will be useful for extension programs, pesticide safety training and to inform grower practices during crop bloom.

There are some key take-home messages from the document. First, bees are essential for pollination of many fruit crops, but can be harmed by some pesticides used to manage insects, mites and diseases in fruit crops. Second, growers can reduce pesticide risk to bees through these eight approaches:

1. Develop and implement a pollination contract with your beekeeper.
2. Use integrated pest management (IPM) to reduce the need for sprays.
3. Avoid pesticide sprays during crop bloom.
4. Apply pesticides after sunset or before sunrise, or when air temperature is below 50 degrees Fahrenheit.
5. Select the least toxic pesticides and formulations when possible (tables with rankings for insecticides and fungicides are included).
6. Reduce drift onto areas outside crop fields.
7. Remove flowering weeds from crops before spraying.
8. Provide bee-friendly habitat away from crops.

The guide is available from MSU Extension either as a free PDF file from the Resources section of MSU Extension's Pollinators and Pollination page, or as a printed copy for $5 per copy from the MSU Extension Bookstore (search for publication number 3245). Discounts for bulk purchases are available.

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

When using bird deterrents in sweet cherries makes sense

In early varieties, small blocks and in years when sweet cherry yields are expected to be low, losses by birds are expected to be higher and protecting fruit from birds may make good economic sense.

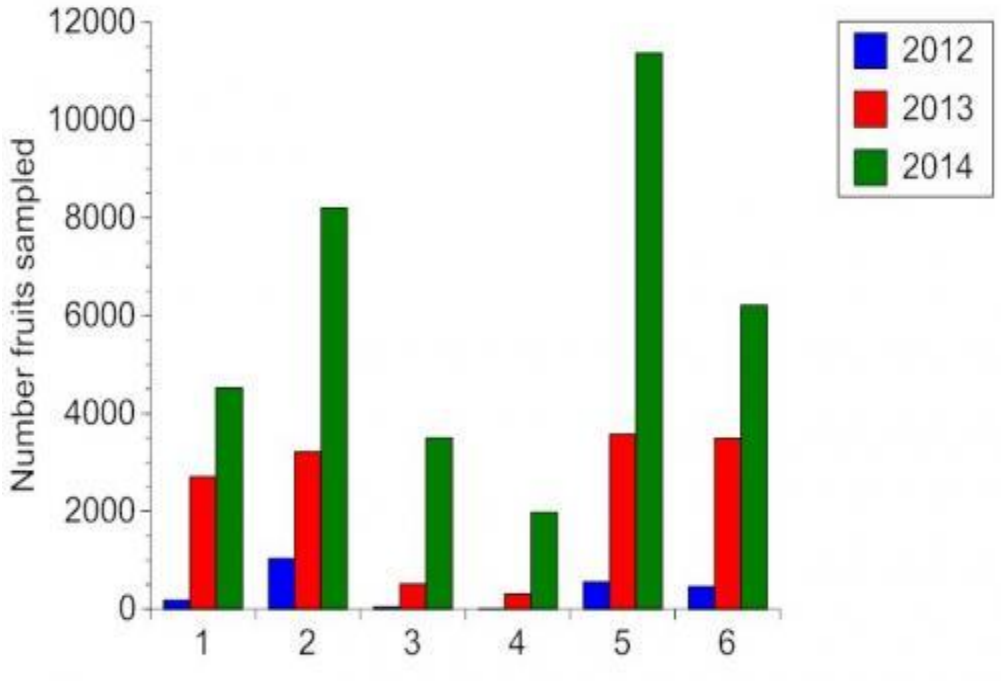
Posted on **June 9, 2015** by MSUE News, **Catherine Lindell**, Michigan State University, Department of Zoology

Shayna Wieferich, a field technician, counting sweet cherries. Photo credit: George Linz, 2013.

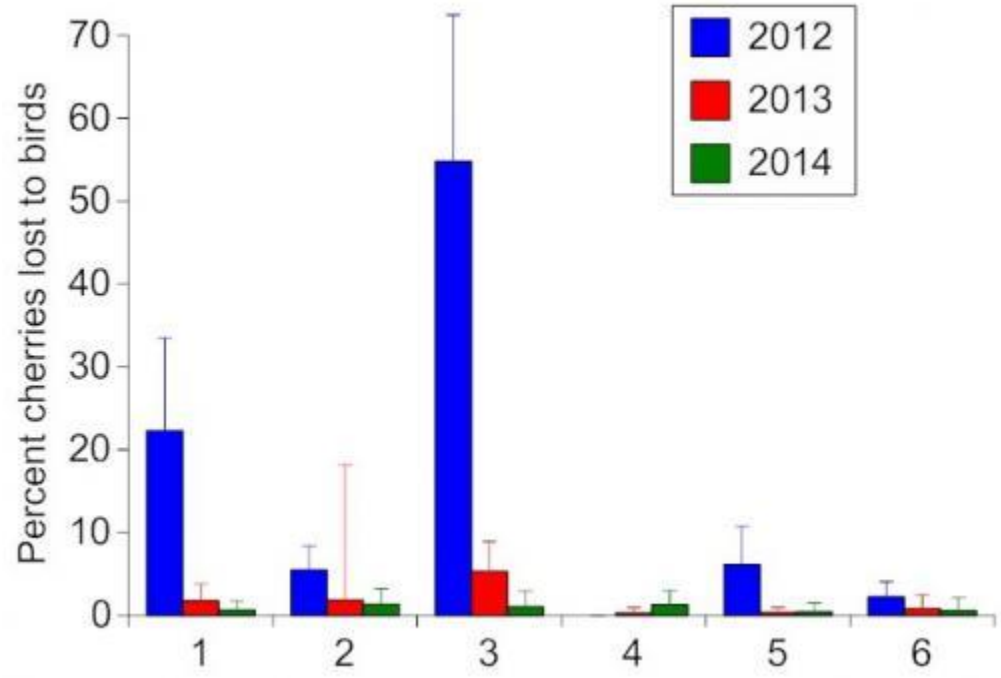
Whether and how much to invest in bird management in a given year will depend on the costs of bird management versus anticipated fruit losses. Michigan tree fruit growers are not likely to forget the 2012 season when weather conditions caused extensive fruit losses and very low yields. These very low yields in 2012 followed by two seasons of normal to high yields in 2013 and 2014 provided an unexpected opportunity to learn about how fruit losses to birds change with the amount of fruit present in a given orchard.

Our research group conducted bird damage assessments in sweet cherry orchards in northwestern Michigan in all three years. We counted the number of cherries per 1 meter of branch length from 60 trees per block at six sites each year. Cherries along each branch were categorized as intact, bird-damaged or missing (fresh pedicel present, but fruit missing). We were careful to distinguish bird damage from mammal damage. Because we sampled the same number of branches each year, the total number of fruit sampled provides an index of fruit abundance for each block each year.

We found that the highest percent bird losses occurred in 2012, when fruit abundance was very low. Conversely, when fruit abundance was much higher in 2013 and 2014, percent fruit loss to birds was much lower (see figures).



Michigan sweet cherries lost to birds 2012-2014



These findings along with some of our previous work suggest there are two main principles to successful bird management:

1. When there is less fruit in a given area, there will be a higher percent loss compared to areas with more fruit. Thus, expect a higher proportion of damage in low-yield years, early-ripening varieties (birds will have few alternatives) and small blocks.

2. Blocks near resources important to birds are at higher risk for damage. For example, bird damage is expected to be higher in blocks under wires, at the edges of blocks, near night roosting sites and in isolated blocks with little human activity.

It is also important to note our results suggest bird deterrent techniques like various types of scare devices may have little impact in large blocks when yields are high, as they were in 2013 and 2014.

When planning a bird management strategy, consider the following:

- Each year and farm is unique and should be assessed for potential risk factors (see "Sample Bird Management Plan", pages 211-218).
- Using multiple types of deterrents, deploying them early in the growing season and moving them frequently should enhance their effectiveness in deterring birds.

Thanks to the Specialty Crop Research Initiative of the U.S.D.A., the Cherry Marketing Institute, the Michigan Grape and Wine Industry Council and the Michigan Apple Committee for funding and support. We are very grateful to the many Michigan fruit growers who have spent their time with us and provided access to their fields.

2015 Tree Fruit IPM Update Series

Emily Pochubay and Nikki Rothwell
Michigan State University Extension

Tree Fruit IPM Updates beginning the first week of May through mid-July (as needed) 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. Workshops will be held weekly in Leelanau and Grand Traverse counties and bi-weekly in Antrim and Benzie Counties. Tree fruit growers 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. Certified crop advisor continued education credits (two per meeting) and pesticide recertification credits (two per meeting) 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.

IPM Update Dates, Times, and Locations

Leelanau County
Location: Jim and Jan Bardenhagen, 7881 Pertner Rd, Suttons Bay

Dates: June: 9, 16, 23, 30
Time: 12PM – 2PM

Grand Traverse County
Location: Wunsch Farms, Phelps Road Packing Shed, Old Mission
Dates: June: 9, 16, 23, 30
Time: 3PM – 5PM

Antrim County
Location: Jack White Farms, 10877 US-31, Williamsburg (is not correct in Google Maps) *North of Camelot Inn and South of Elk Rapids on the southeast side of US-31*
Dates: June: 17; July: 1
Time: 10AM – 12PM

Benzie County
Location: Blaine Christian Church, 7018 Putney Rd, Arcadia, MI 49613
Date: June: 17; July: 1
Time: 2PM – 4PM

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