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Northern Michigan FruitNet 2011 *Weekly Update* NW Michigan Horticultural Research Station

[Nikki Rothwell](#) District Horticulturist
[Erin Lizotte](#) District Fruit IPM/IFP Agent
[Bill Klein](#) Farm Mgr, NWMHRS
[Duke Elsner](#) Agricultural & Regional Viticulture Agent

May 3, 2011

GROWING DEGREE DAY ACCUMULATIONS through May 2nd at the NWMHRS

Year	2011	2010	2009	2008	2007	2006	21 yr. Avg.
GDD42	134	418	202	248	269	347	237.7
GDD50	40	189	75	117	106	158	101.2

Growth Stages at NWMHRS (5/2/11 – 4:00 p.m.)

Apple: Red Delicious – ¼" green
Gala – ¼" green
Yellow Delicious – Green tip
Pear: Bartlett: Bud burst
Sweet Cherry: Hedelfingen: Green tip
Napoleon: Late green tip
Gold: Late green tip
Tart Cherry: Green tip
Balaton: Late green tip
Apricot: Bud burst
Plum: Bud burst
Grapes: Scale crack

Weather Report

Nothing much has changed in the past week here in NW Michigan—we are still cool and wet. We are considerably behind our degree-day accumulations from our 'normal' average: so far this season, we have accumulated 134GDD base 42 and 40GDD base 50, which are 100 and 60GDD, respectively, behind the average. Weather forecasts predicted a hard frost last evening (2 May), but for most of the evening and into the morning, temperatures remained above freezing in the region. Forecasts are predicting similar weather for the next ten days with daytime temperatures in the 40s and 50s—based on these predictions, we will only be at 202GDD base 42 by 11 May. We had rain on Tuesday, Wednesday, and Thursday last week, but we have recorded no rainfall for the past four days. However, humidity levels have been relatively high, and we have had significant cloud cover for the last two days. Sunday brought high winds to the area.

Crop Report

Plant development remains slow across the region. A bit more green has started to show in apples and cherries, and plums and apricots are at bud burst. As ground has begun to dry out with the recent dry days, growers have been planting trees. Brush removal is also underway as tractors can move more easily throughout the orchards.

Pest Report

Apples

With the cool weather, it seems that things have ground to a halt in northwest Michigan orchards. Rain is in the forecast for the end of the week, bringing with it the potential for apple scab infections. Early season control with copper application may still be an option for some area growers (copper should not be applied past ¼" green). Dormant copper applications also help manage the risk of fire blight by killing the fire blight bacteria as they reproduce and ooze from cankers that formed last season. Apple scab spore trapping during last week's rain events captured very little ascospore discharge (one spore to be precise). This early in the season and with the cold temperatures, it is likely that very few of the ascospores are mature and ready to be discharged. Based on work by Dr. Jones, the scab model does not even begin accumulating degree days towards ascospore maturation until green tip in McIntosh, with an average of 450 DD32 required before 50% of the apple scab ascospores mature, this could be a long way off based on current conditions.

Growers should be on the lookout for European red mite eggs and activity too—checking crevices in the bark and around buds are good ways to assess potential populations. European red mite eggs are bright red and relatively easy to spot with a hand lens.

Cherry

Things remain relatively quiet in cherry, with development progressing slowly. Bacterial canker remains a concern as we head into more cool and rainy weather. Early copper sprays are the most common method of control for bacterial canker on cherry. Keep in mind that sweet cherry tissues are extremely sensitive to copper and the sprays must be accurately timed to reduce *P. syringae* inoculum without causing phytotoxicity. If the trees are still in the dormant stage, two copper applications may be applied at 1-2 week intervals at a rate 1.2-2 lbs of metallic copper with either one pint of spray oil per 100 gallons of water or 6-9 lbs of hydrated lime per acre. If the trees have broken dormancy and are in the pre-bloom stage (bud swell through white bud), copper rates should be reduced to 25-35% of the dormant rate. Up to two copper applications with a one week interval should be used at this time. In tart cherries, copper compounds can be used at the 1.2-2lb actual copper rate at bud burst with weekly repeated applications until late May.

NW Michigan Wine Grapes

Duke Elsner, Small Fruit Extension Educator

Similar to last week's conditions, cool weather has kept grape bud development at a very slow pace. Some cultivars have shown scale crack and the very early signs of bud swell, but you really have to hunt for this. Pruning and tying continues in area vineyards.

Our slow push to spring means there is still plenty of time for dormant applications of Sulfox or Stylet oil for powdery mildew control.

Parallel 45 Vines & Wines Inc. and MSU Extension are hosting a meeting at the Northwest Michigan Horticultural Research Station on this **Friday, May 6, 3-5 PM**. We will be demonstrating pruning and tying methods and materials, with "old pros" showing what they know for the benefit of newer vineyard managers and anyone that would like to learn more about this critical first step to high quality grapes. We'll see you there!

2011 HANDS-ON TREE FRUIT IPM UPDATE SERIES

Erin Lizotte, MSUE

Please note the changes to meeting times!

Once again, we will host a series of hands-on IPM workshops that will be held throughout northwest Michigan during the 2011 growing season. Tree fruit growers are encouraged to bring examples of pests and damage found on the farm to the meetings for identification and discussion. Each week will characterize a different time in the season and distinct weather patterns, which in turn will present a unique set of pest problems and management strategies that will be discussed. These meetings are **free** and do not require registration. Pesticide recertification credits and certified crop advisor continuing education credits will be available. Feel free to attend the meetings at any location or time that is convenient for you!

Leelanau County

Location: Jim and Jan Bardenhagen Farm, 7881 Pertner Road, Suttons Bay

Dates: May 11, May 18, May 25, June 1, June 8, June 15, June 22, June 29

Time: 12-2 pm

Grand Traverse County

Location: Josh Wunsch Farm, Phelps Road Packing Shed, Old Mission

Dates: May 11, May 18, May 25, June 1, June 8, June 15, June 22, June 29

Time: 3-5 pm

Benzie County

Location: Loy Putney Farms, 4286 Raymond Road, Frankfort

Dates: May 10, May 24, June 7, June 21

Time: 2-4 pm

Antrim County

Location: Jack White Farm, M-31, south of Elk Rapids on the southeast side of M-31

Dates: May 10, May 24, June 7, June 21

Time: 10-12 pm

WEBSITES OF INTEREST

Insect and disease predictive information is available at:

<http://enviroweather.msu.edu/homeMap.php>

60 Hour Forecast

<http://www.aqweather.geo.msu.edu/aqwx/forecasts/fcst.asp?fileid=fous46ktvc>

Information on cherries is available at the new cherry website:

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

Fruit CAT Alert Reports

<http://www.ipmnews.msu.edu/fruit/>

This issue and past issues of the weekly FruitNet report are posted on our website at:

<http://aqbioresearch.msu.edu/nwmihort/faxnet.htm>

[ACTUAL AND PREDICTED DEGREE-DAY](#)

[ACCUMULATIONS SINCE MARCH 1, 2011](#)

Please send any comments or suggestions regarding this site to:

Bill Klein, kleinw@msu.edu

Last Revised: 5-3-11

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May 10, 2011

GROWING DEGREE DAY ACCUMULATIONS through May 9th at the NWMHRS

Year	2011	2010	2009	2008	2007	2006	21 yr. Avg.
GDD42	134	418	202	248	269	347	237.7
GDD50	40	189	75	117	106	158	101.2

Growth Stages at NWMHRS (5/9/11 – 4:00 p.m.)

Apple: Red Delicious – Tight cluster

Gala – Tight cluster

Yellow Delicious – ½" green

Pear: Bartlett: Green cluster**Sweet Cherry:** Hedelfingen: Early white bud

Napoleon: Early white bud

Gold: Late bud burst

Tart Cherry: Bud burst**Balaton:** Late bud burst**Apricot:** First bloom**Plum:** Green cluster**Grapes:** Late scale crack

Weather Report

The past week saw cool temperatures, mostly in the 50's and 60's for daytime highs. Night time temperatures remained chilly. However, Sunday and Monday brought warmer temperatures, and daytime highs reached into the low 70's. Overall, we have accumulated 195GDD base 42 and 68GDD base 50, which are still behind our 21-year averages. We recorded rainfall in the area, and precipitation is expected to continue throughout Tuesday and Wednesday. Hail was reported in the region.

Crop Report

With the recent warm temperatures, crop development has picked up in the last few days. We are starting to see white in sweet cherries and green in apples. Apricots are now in bloom, and depending where they are in the region, they range from first to full bloom. Growers have been spraying orchards for early season diseases, and planting continues across the region. Growers are anxious for the season to get moving along.

Pest Report

Apple [Green apple aphid](#) nymphs were observed this week on opening buds. There was also evidence of two-spotted spider mite activity, with webbing and cast skins leftover from last year, which is a good reminder to keep an eye out for [European red mite](#), [rust mite](#), and [two-spotted spider mite](#) this season. Refer to the article [Control Options for Mites in Fruit Crops](#) for more information on management. With the scattered precipitation forecast for this week, apple scab control should be a priority. Despite the dry weather over the past week, ascospores on last year's leaves continue to mature on orchard floors, and a proportion of these spores will likely be discharged during this next rain event. A preventative scab program is critical, with the recent discovery of fungicide resistant scab isolates identified in Michigan apple orchards. Preventing scab infection at green tip helps delay the start of the secondary disease cycle until after the period of maximum susceptibility and leaf expansion (around bloom) has passed. Apple tissue should be kept covered with protectant fungicide applications. Early in the season when fruit scab is not a concern and temperatures are cooler, Scala and Vanguard are good options to tank mix with EBDCs for scab control. As we move into warmer weather and the risk of fruit scab increases, growers should be considering second generation sterol inhibitors (Indar and Inspire Super) or captan tank mixed with EBDCs.

Cherry As we approach bloom, [European brown rot](#) is of concern to many area growers, particularly on susceptible

European-type varieties. Indar applications for European brown rot should be applied with two applications: the first at white bud and a second at bloom is recommended on susceptible varieties such as Balaton and Meteor. We have occasionally observed EBR on Montmorency under cool and wet conditions. For [American brown rot](#) control, sterol inhibitors (Indar, Rally, Orbit, or Elite) or Rovral sprays may be used. Rovral may not be used after petal fall and is a good option prior to petal fall as it is a different mode of action. Spray programs for the blossom blight phase of American brown rot are initiated at 10-20% bloom. Infection rarely occurs at white bud, but if there is a large amount of inoculum from last year and a prolonged wetting period occurs during temperatures above 60° F, the maximum rate of Indar should be applied. [Green fruitworm](#) moths were caught in the plum borer traps this week. Immature larvae of the green fruitworm feed on flower buds and new foliage, but have not yet been observed. Mature larvae feed on blossoms, developing fruit and leaves. Early feeding injury often causes fruit to abort. Fruit remaining on the tree after GFW feeding exhibit deep holes sealed over with corky scar tissue.

Wine Grapes The warmer conditions of the past week have finally produced some early bud swell in early cultivars. There has been no sign of insect activity to this point, but if you manage a block that has had troubles with climbing cutworms in the past, be on the lookout for these in the upcoming weeks. Still plenty of time for dormant applications against powdery mildew.

AMERICAN BROWN ROT MANAGEMENT DURING BLOOM

George W. Sundin, Plant Pathology, MSU
Nikki Rothwell, NWMHRS

American brown rot (ABR) is caused by the fungus *Monilinia fructicola*. This fast-growing fungus is an important pathogen on cherry (sweet cherry in particular), peach, apricot, nectarine, and plum. The fungus attacks fruit, blossoms, spurs, and shoots; under ideal infection conditions, the fungus can rot individual cherry fruit within 24 hr (see figure). The fungus sporulates from infected fruit, continually increasing inoculum for further infections. Under ideal conditions, sporulation can be initiated within three days after infection. ABR causes fruit rot before and after harvest, greatly reducing the quality and quantity of the yield, particularly in heavily bunching sweet cherry varieties.

Our concern at this time is with the potential for infection during bloom resulting in blossom blight symptoms. The potential for blossom infection in Michigan is typically held in check by cooler weather as the optimal temperature for infection is between 72 and 77°F, and spore production is greatest between 59 and 74°F. Since ABR symptoms on fruit were prevalent in many sweet and tart cherry orchards in 2010, there is a risk of higher inoculum loads in orchards this year. However, remember that favorable conditions for ABR blossom infection include relatively warmer temperatures with some rain.

The ABR fungus overwinters in fruit mummies from the previous season and will sporulate from these mummies, producing conidia that are disseminated by wind and rain. Although blossom blight caused by ABR can be severe enough to cause yield loss, this mostly occurs in other more southern regions of the U.S. However, another important aspect of blossom infection is this enables the fungus to re-establish itself in orchards for the current season. Since the ABR fungus is a prolific sporulator, blossom infection will serve to increase orchard inoculum loads to critical levels.

The most efficacious fungicide for ABR control is the sterol-inhibitor (SI) fungicide Indar. **However, SI fungicides (Indar, Elite, Rally, Orbit) are at risk for the development of fungicide resistance and should not be used at this timing.** The best timings for use of Indar for ABR control are closer to harvest when we are working on reducing ABR infection of fruit. (We will discuss fruit rot management in a later article).

The best fungicide for ABR management during bloom is the dicarboximide fungicide Rovral. This is an effective ABR material during bloom because inoculum levels are lower and can be controlled. Also, since this fungicide has a different mode of action than SI's, it is an excellent alternate tool for SI fungicide resistance prevention. A maximum of two applications of Rovral can be used, and do not use this fungicide after petal fall.

CONTROL OPTIONS FOR MITES IN FRUIT CROP

MSU Trevor Nichols Research Center
Department of Entomology
John Wise, Rufus Isaacs and Larry Gut

Mites can be significant pests of fruit crops. There is an array of miticides available for control of the European red mite (ERM), two-spotted spider mite (TSSM) and rust mites (RM)(apple and pear rust mites, pear blister mite, plum nursery mite, blueberry bud mite), but their performance characteristics are not all alike. The following table is designed to summarize several key variables that can help you determine which miticides are optimal for your Integrated Pest Management program.

<u>Compound</u>	<u>Fruit crop</u>	<u>Mites</u>	<u>Life stage target</u>	<u>Seasonal timing</u>	<u>Residual control</u>
Superior, Stylet Oils	All fruit crops	ERM, RM	egg/larvae	Early (pre-bloom)	2-6 weeks
Lime-Sulfur	pome, stone, blueberry	RM3	motiles*	Early (delayed-dormant)	2-6 weeks
Savey	pome, stone	ERM	egg/larvae	Early***	8-12 weeks
	pome, stone, caneberry, strawberry		TSSM egg/larvae	Mid (or threshold)**	6-8 weeks
Onager	stone fruits	TSSM	egg/larvae	Mid (or threshold)**	6-8 weeks
Apollo	pome, cherry, peach	ERM	egg/larvae	Early***	8-12 weeks
TSSM	egg/larvae	Mid (or threshold)	6-8 weeks		
Agri-Mek	pome, stone, grape,	ERM, RM	motiles*	Early****	8-12 weeks
	pome, stone, strawberry, grape	TSSM	motiles*	Mid (or threshold)	6-8 weeks
ABBA	pome, plum, grape,	ERM, RM	motiles*	Early****	8-12 weeks
strawberry	TSSM	motiles*	Mid (or threshold)	6-8 weeks	
Agri-Flex	pome, grape	ERM, RM	motiles*	Early****	8-12 weeks
Zeal	pome, stone fruits	ERM	egg/larvae	Early(or threshold)**	8-10 weeks

pome,stone,strawberry,grape	TSSM	egg/larvae	Mid (or threshold)**	6-8 weeks	
Envidor	pome, plum, grape	ERM, RM	egg, motiles*	Early(or threshold)**	8-10 weeks
stone fruits	TSSM	egg, motiles*	Mid (or threshold)	6-8 weeks	
Nexter	pome, stone1, grape	ERM, RM	motiles*	Mid (or threshold)**	6-8 weeks
TSSM	motiles*	Mid (or threshold)	6-8 weeks		
Portal	pome	ERM, RM	motiles*	Mid (or threshold)**	6-8 weeks
TSSM	motiles*	Mid (or threshold)	6-8 weeks		
Kanemite	pome	ERM	motiles*	Mid (or threshold)**	6-8 weeks
pome, strawberry	TSSM	motiles*	Mid (or threshold)	6-8 weeks	
Acramite	pome, peach, plum	ERM	motiles*	Mid (or threshold)**	6-8 weeks
pome, peach, plum, grape,strawberry		TSSM	motiles*	Mid (or threshold)	6-8 weeks
Danitol	apple, grape	ERM	motiles*	Mid (or threshold)**	4-6 weeks
apple, grape, strawberry		TSSM	motiles*	Mid (or threshold)	4-6 weeks
Brigade	pear	ERM	motiles*	Mid (or threshold)**	4-6 weeks
pear, grape, strawberry,caneberry		TSSM	motiles*	Mid (or threshold)	4-6 weeks
Hero	blueberry,caneberry,strawberry		TSSM	motiles*	Mid (or threshold)** 4-6 weeks
Oberon	strawberry	TSSM	egg, motiles*	Mid (or threshold)	4-6 weeks
Vendex	pome, stone	ERM	motiles*	Mid (or threshold)**	4-6 weeks
pome, stone, grape, cane-,strawberry		TSSM	motiles*	Mid (or threshold)	4-6 weeks
Endosulfan	pome,stone, blueberry2	RM3	motiles*	Mid (or threshold)**	2-6 weeks
Sulforix	pear, blueberry	RM3	motiles*	Late (post-harvest)	2-6 weeks

* Motile forms include mite larvae, nymph and adult stages.

** Optimally used petal fall through August when mites reach threshold.

*** Optimally used pre-bloom through first cover.

**** Optimally used petal fall through second cover.

1 300 day phi for cherry

2 post-harvest only for blueberry

3 including pear blister mite

LOOKING AT GROWING DEGREE DAYS: JUST HOW FAR BEHIND NORMAL ARE WE?

Published May 3, 2011

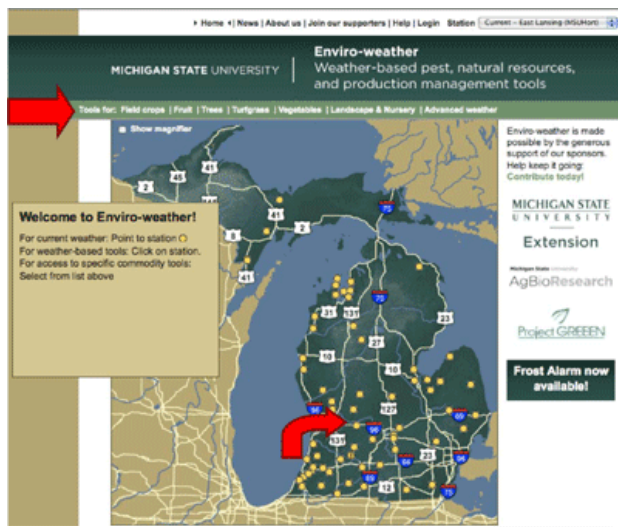
Beth Bishop, MSU Enviro-weather

Cool weather this spring has meant a slow start to the growing season. In Michigan, it's not unusual to be ahead of or behind "normal" temperatures, but for planning field operations, it's important that growers know the extent of the deviance. Crop growth and pest development (disease, insects, and weeds) depends directly on the amount of heat accumulated over a lower, base temperature. This heat accumulation is measured in units called "degree-days." Growers can get a good idea of how the season is progressing by comparing accumulated degree-days to what is normally expected or to previous seasons.

MSU's [Enviro-weather](#) calculates degree-days from data collected by the Enviro-weather stations throughout Michigan and other weather stations. Users can view a map of Michigan showing current degree-day accumulations (base 50) and maps showing the degree of departure from "normal." To get to these maps from the Enviro-weather homepage, select a commodity (from the light green bar at the top of the page) or a station (by clicking on a yellow dot corresponding to a station location).

Then, click on "Current Degree-Day Maps" link, listed under the "Degree-Day Tools" heading.

You will be taken to the degree-day maps. The map at the top of the page shows current degree-day accumulations (base 50) throughout the state. If you scroll down the page, the second map will display departures from normal. Figure 3 shows what this map looks like as of May 2,



2011. Most of the state is 1 to 2 weeks behind normal degree-day accumulations. Contrast this with the same map for one year ago (May 2, 2010), when most of the state was 1 to 2 weeks ahead of normal (Figure 4). Compared with last year, field operations may be as much as two to three weeks behind.

As always, if you have questions, comments, or suggestions for Enviro-weather please contact me, Beth Bishop, at bishopb@msu.edu , eweather@msu.edu or (517 432-6520).

2011 HANDS-ON TREE FRUIT IPM UPDATE SERIES

Erin Lizotte, MSUE

Please note the changes to meeting times!

Once again, we will host a series of hands-on IPM workshops that will be held throughout northwest Michigan during the 2011 growing season. Tree fruit growers are encouraged to bring examples of pests and damage found on the farm to the meetings for identification and discussion. Each week will characterize a different time in the season and distinct weather patterns, which in turn will present a unique set of pest problems and management strategies that will be discussed. These meetings are **free** and do not require registration. Pesticide recertification credits and certified crop advisor continuing education credits will be available. Feel free to attend the meetings at any location or time that is convenient for you!

Leelanau County

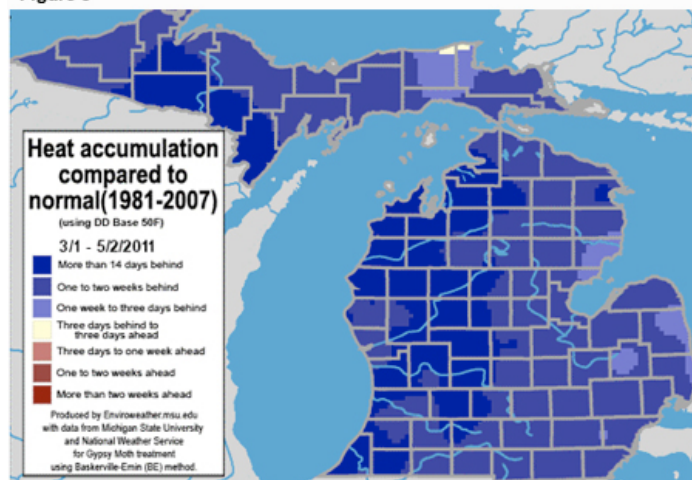
Location: Jim and Jan Bardenhagen Farm, 7881 Pertner Road, Suttons Bay
 Dates: May 11, May 18, May 25, June 1, June 8, June 15, June 22, June 29
 Time: 12-2 pm

Grand Traverse County

Location: Josh Wunsch Farm, Phelps Road Packing Shed, Old Mission
 Dates: May 11, May 18, May 25, June 1, June 8, June 15, June 22, June 29
 Time: 3-5 pm

Benzie County

Figure 3



<http://www.aqweather.geo.msu.edu/aqwx/forecasts/fcst.asp?fileid=fous46ktvc>

Information on cherries is available at the new cherry website:
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Fruit CAT Alert Reports
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This issue and past issues of the weekly FruitNet report are posted on our website at:
<http://aqbioresarch.msu.edu/nwmihort/faxnet.htm>

ACTUAL AND PREDICTED DEGREE-DAY

Location: Loy Putney Farms, 4286 Raymond Road, Frankfort
 Dates: May 10, May 24, June 7, June 21
 Time: 2-4 pm

Antrim County

Location: Jack White Farm, M-31, south of Elk Rapids on the southeast side of M-31
 Dates: May 10, May 24, June 7, June 21

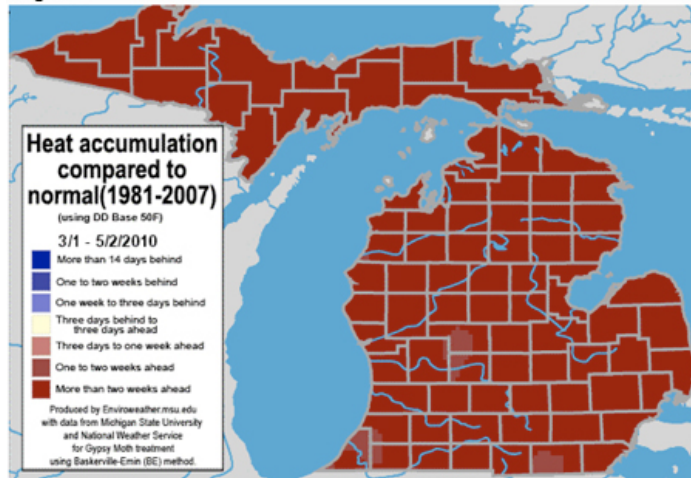
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WEBSITES OF INTEREST

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60 Hour Forecast

Figure 4



[ACCUMULATIONS SINCE MARCH 1, 2011](#)

Please send any comments or suggestions regarding this site to:

Bill Klein, kleinw@msu.edu

Last Revised: 5-10-11

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Agricultural & Regional Viticulture Agent

May 17, 2011

GROWING DEGREE DAY ACCUMULATIONS through May 16th at the NWMHRS

Year	2011	2010	2009	2008	2007	2006	21 yr. Avg.
GDD42	277	533	364	382	475	534	403.0
GDD50	102	236	154	174	220	250	186.7

Growth Stages at NWMHRS (5/16/11 – 4:00 p.m.)

Apple: Red Delicious – Pink

Gala – Early Pink

Yellow Delicious – Pink

Pear: Bartlett: Early white bud**Sweet Cherry:** Hedelfingen: Full bloom

Napoleon: Full bloom

Gold: 80% bloom

Tart Cherry: 10% bloom**Balaton:** 50% bloom**Apricot:** Late petal fall**Plum:** First bloom**Grapes:** Early bud swell

Weather Report

Temperatures are still cool here in the north other than our token 'hot' day in May on the 12th when most Enviroweather stations in the region hit the high 70's and low 80's. Otherwise, temperatures have remained cool in the daytime. We have had two nights of cold temperatures with spotty frosts, primarily in low lying areas. Conditions have also been windy for the past two days. We have accumulated 277GDD base 42 and 102GDD base 50, and our 20-year averages are much higher: 403GDD base 42 and 188GDD base 50. We had rain in the region on 11 May, and the NWMHRS received just over a half inch of rain. Rain was also recorded on Saturday, where we received under a quarter inch here at the NWMHRS.

Crop Report

We continue to move along slowly in the north. In most areas, we are at or close to full bloom in sweet cherry. Growers are concerned about the windy and cool conditions for pollination. We are also starting to see blossoms opening in tart cherries in the southern part of the region. These bloom times for this season are more typical than we saw in 2010 when we were in full tart cherry bloom on 28 April. We have had minimal reports of damage in tart cherry, and likely those trees were in a low area and were in the water bud stage.

Pest Report

Apple:

With the scattered precipitation forecast for this week, apple scab control should continue to be a priority. Ascospores on last year's leaves are maturing on orchard floors, and a substantial proportion of these spores will likely be discharged during this next rain event. A preventative scab program is critical, with the recent discovery of fungicide resistant scab isolates identified in Michigan apple orchards. Preventing scab infection at green tip helps delay the start of the secondary disease cycle until after the period of maximum susceptibility and leaf expansion (around bloom) has passed. Early in the season when fruit scab is not a concern and temperatures are cooler, Scala and Vanguard are good options to tank mix with EBDC's for scab control. As we move into warmer weather and the risk of fruit scab increases, growers should be considering second generation sterol inhibitors (Indar and Inspire Super) tank mixed with EBDCs or captan. As we approach bloom, it will be important to keep an eye on the [fire blight model](#). When the Epiphytic infection potential reaches 100 (or is forecast to do so) and the average temperature is greater than or equal to 60 °F, the corresponding boxes will turn red indicating that rain or trauma (high winds or hail) is all that is needed for infection to occur. At this time, the EIP is

predicted to climb to 100+ by this weekend, if the forecasts are correct. Additional instructions for utilizing the fire blight model can be found on the Enviroweather page. Things remain quiet in terms of insect activity, however [spotted tentiform leafminer](#) adult flight is high where we caught over 350 per trap this week. These adults are laying eggs on the underside of leaves which hatch into larvae and feed on plant tissue.

Cherry:

As many area growers are in the midst of sweet cherry bloom and starting to see bloom in tarts, [European brown rot](#) is of concern to many area growers, particularly on susceptible European-type varieties. Indar applications for European brown rot should be applied with two applications: the first at white bud and a second at bloom is recommended on susceptible varieties such as Balaton and Meteor. We have occasionally observed EBR on Montmorency under cool and wet conditions. For [American brown rot](#) control, sterol inhibitors (Indar, Rally, Orbit, or Elite) or Rovral sprays may be used. Rovral may not be used after petal fall and is a good option prior to petal fall as it is a different mode of action and will help preserve the efficacy of late season brown rot applications, such as Indar. Spray programs for the blossom blight phase of American brown rot are initiated at 10-20% bloom. Infection rarely occurs at white bud, but if there is a large amount of inoculum from last year and a prolonged wetting period occurs during temperatures above 60° F, the maximum rate of Indar should be applied at white bud. As the weather forecast is calling for cool and rainy weather area growers are concerned with bacterial canker. Unfortunately, apart from dormant copper applications little can be done to prevent bacterial canker. [Green fruitworm](#) moths continue to be caught in the plum borer traps this week with an average of 9 per trap. Immature larvae of the green fruitworm feed on flower buds and new foliage, but have not yet been observed. Mature larvae feed on blossoms, developing fruit and leaves. Early feeding injury often causes fruit to abort. Fruit remaining on the tree after GFW feeding exhibit deep holes sealed over with corky scar tissue. Area scouts are reporting some [oblique-banded leafroller](#) (OBLR) activity, but larvae are still small and hard to spot. Overwintering larvae feed inside bud clusters prior to bloom, and begin feeding on fruit after petal fall. Targeting this overwintering generation is an effective strategy, because they are small and easier to kill. At early petal fall, growers should scout their orchards by looking at 20 clusters per tree in five trees per orchard for larvae or feeding sites. An insecticide should be applied if they observe more than two larvae or feeding sites per tree. The materials that target this life stage are Delegate, Belt, Altacor, Voliam flexi, Entrust and Bts. Growers in northwest Michigan should not expect OP's or pyrethroids (due to OP-cross resistance) to provide effective control because of insecticide resistance. If there is evidence of OP resistance in your area, the insect growth regulator Intrepid may also have some level of cross resistance and will not be effective. Surprisingly, area scouts reported [plum curculio](#) adult activity in high pressure orchards last week. Plum curculio activity was confirmed at the NWMHRS this week with plum curculio in the pyramid traps this week. Plum curculio (PC) migrate from their overwintering sites to orchards in the spring when maximum temperatures are at least 75°F for 2-3 days or when mean daily temperatures are 55°-60°F for 3-6 days. Plum curculio is often found in the orchard before fruit is present, but this is not the ideal time for maximum control. Spring migration lasts about six weeks with peak activity and the critical time for control usually occurring 2-3 weeks after shuck split as young fruit develops.

Wine Grapes:

Earliest cultivars are in the late bud swell stage. There have been reports of a few climbing cutworms, but their feeding activity has been minimal due to relatively cool, evening temperatures. The window for getting on dormant sprays for powdery mildew will be closing soon, especially if we get a warm day or two this week.

Saskatoons:

Saskatoons are at about 50% bloom at the research station. No signs of pest activity at this time.

Time management for maximum impact on oblique-banded leafroller in cherry

Properly time management for maximum impact on overwintering oblique-banded leafroller larvae.

Erin Lizotte and Nikki Rothwell, MSU Extension

Oblique-banded leafroller (OBLR) has been observed more commonly in both sweet and tart cherry over the past seasons. These insects are not internal feeders in the fruit, and although they can cause some damage from defoliation, the greater concern is their threat as a contamination pest if they are found in cherry tanks at harvest. Growers with problem orchards risk having tank-loads rejected at the processor if OBLR larvae are present.

Organophosphate resistance (and pyrethroid cross-resistance) in OBLR is likely one of the factors contributing to larvae in the tank at harvest in northwest Michigan. Fortunately, there are several new insecticides that have been efficacious against OBLR, labeled for both apple and cherry. However, optimizing the timing of insecticide applications to effectively target these pests in cherry can be a challenge. There are two optimal times for control: spring and just prior to harvest. Oblique-banded leafroller overwinter as small larvae – within a hibernaculum – in cracks and crevices of the tree. In spring, when temperatures warm, overwintering larvae move out to feed on buds and emerging leaves, and as leaves expand, larvae web and roll leaves where they remain concealed except when feeding.

In the coming weeks, growers should be targeting this overwintering generation, particularly as these larvae are small and easier to kill. At early petal fall, growers should scout their orchards by looking at 20 clusters per tree in five trees per orchard for larvae or feeding sites. An insecticide should be applied if they observe more than two larvae or feeding sites per tree. The materials that target this life stage are Delegate, Belt, Altacor, Voliam flexi, Entrust and Bt's. Application of insecticides at too early a date will be wasted as larvae may not have emerged from overwintering sites and remain protected. Again, in most cases, growers should not expect OP's or pyrethroids to provide effective control because of insecticide resistance. If there is evidence of OP resistance in your area, the insect growth regulator Intrepid may also have some level of cross resistance and will not be effective.

About Sysstem-Cal in apples

Sysstem-Cal is a foliar fertilizer that contains calcium and copper as well as phosphite.

Phil Schwallier and Amy Irish-Brown, Michigan State University Extension

The Sysstem-Cal formulation links calcium to phosphite for rapid absorption and translocation into the plant. When this product is added to the spray solution at 2 qt/100, it lowers the pH to near 2.5. Sysstem-Cal can be mixed with Apogee and not reduce the Apogee activity as other calcium products can. Apogee has on its label, "do not mix with any calcium products" because this combination will lead to less vegetative growth control as the Apogee gets tied up by the calcium. The situation with Sysstem-Cal is different and it can be safely combined with Apogee.

Sysstem-Cal has also been shown to **increase** the activity of some other PGR's including NAA, Promalin, and MaxCel. In

preliminary trials, the combination of Sysstem-Cal and thinning PGR's (NAA and MaxCel) increased the thinning activity similar to thinning combinations of Sevin + NAA or Sevin + MaxCel. This does appear very promising as an additional approach to thinning. More research trials are needed to confirm Sysstem-Cal can be a reliable replacement for Sevin with these thinners.

Sysstem-Cal has 4% calcium included in the product. We are currently not aware of data that suggest mature fruit will have higher calcium levels, but suspect Sysstem-Cal will help fruit calcium levels. Sysstem-Cal is a strong acidifier and may have impact on other materials in the tank and perhaps on the tree. More experience is needed and growers who add it to their tanks are encouraged to leave check trees for comparison.

Revised information on spray adjuvants for fruit crops

Here is a guide to the wide assortment of additives sold to growers for improving spray applications to their fruit crops.

Bill Shane and Annemiek Schilder, Michigan State University Extension, Department of Plant Pathology

This is a revision of the adjuvant section of the 2010 *Michigan Fruit Management Guide*, Michigan State University Extension Bulletin E-154.

Spray adjuvants are products added to a spray tank to improve the performance of the treatment. Improper use of an adjuvant may result in poorer performance and possible phytotoxicity as well as increasing the cost of the treatment. An adjuvant may not be needed in some cases. Many agrichemical products are formulated with adjuvants and may not need an additional one. In some cases, the use of adjuvants is specifically prohibited. Check the agrichemical label to see what type of adjuvant, if any, is recommended. Check the adjuvant label to be sure that the target crop and the intended use are listed.

Avoid use of adjuvants with penetrating action with potentially phytotoxic fungicides. For example, do not use an adjuvant with strong penetrating action with copper compounds, Captan or Syllit. Be aware that soluble fertilizers may also have penetrant activity and can help move the copper or Captan into the plant tissue. Be careful when using adjuvants with penetrating action with herbicides that may come in contact with young tree trunks, vines and canes.

Emulsifiable concentrate agrichemicals contain oil and special adjuvants to allow them to mix with water. These emulsifiable concentrates will sometimes help other normally non-systemic agrichemicals to penetrate into plant tissue.

Systemic fungicides and insecticides are designed to move into plant tissue. With such agrichemicals it is best not to use an adjuvant with aggressive "sticking" action that would impede movement into plant tissue.

Avoid adjuvants with strong sticking action early in the growing season when redistribution of fungicides and insecticides by rain is desirable to extend protection to newly emerged green tissue. However, sticker action may be desirable under extended rain and cool conditions.

General terminology

Spreader: Also called surfactants, wetting agents, surface-active agents. An adjuvant with spreader activity helps to decrease water surface tension, encouraging spray droplets to land and spread over hard-to-wet surfaces such as waxy and/or hairy plants. A detergent can act as a spreader to prevent beading. Too much spreader can result in increased spray treatment dripping off of treated surfaces.

Non-ionic spreader: A surfactant with spreading action and relatively neutral charge. For general use, non-ionic spreaders are usually preferred over negatively charged (anion) and positively charged (cation) spreaders because non-ionic types are least likely to inactivate the chemicals being applied.

Penetrant: An adjuvant that enhances the movement of the agrichemical into the plant tissue. Penetrants may also help penetrate the cuticles of arthropods. Penetrants are used with many herbicides and defoliants and certain fungicides and insecticides. Many penetrants also act as spreaders and surfactants. Use penetrants with caution – they can cause phytotoxicity by helping to move non-systemic materials such as copper and Captan inside the plant cuticle. Penetrants should not be used with materials that should stay on the surface. Penetrants are not recommended on certain crops, such as grapes, where they may increase risk of damage to tender skin. Common penetrants include oils and methylated or ethylated oils, ethylenes, alcohols and aliphatic acids.

Sticker: Also called bonder. It is an adjuvant that enhances the adherence of agrichemicals to the target surface. Sticker activity is generally more useful for non-systemic agrichemicals than for systemic agrichemicals that work best inside plant tissue. Stickers are helpful for fungicide or insecticide products that are prone to wash-off, including biocontrol products. High rates of some stickers can immobilize agrichemicals. High rates of some stickers can result in excessive foaming and or result in a tenacious film on equipment. Latex-based stickers usually need to dry on plant surface before they provide protection. Terpene-based stickers (Nu-film products) need sunlight to set the film.

pH modification agents and buffers: An acidifier helps to reduce water pH. A buffer helps the spray solution to be stable at a specific pH, usually acidic. Buffers and acidifiers help guard against unwanted agrichemical breakdown, clumping and other effects that may occur because groundwater sources are often alkaline (high pH) in Michigan. Most agrichemicals are most stable at slightly less than neutral pH (below 7). Materials with a significantly shorter life at high pH include Captan and Imidan.

Drift retardant: An adjuvant that helps to inhibit the production of fine droplets by spray nozzles. It's usually used to help prevent off-target movement of herbicides or other potentially damaging agrichemicals.

Water conditioner: An adjuvant providing some benefit in the spray tank, such as protecting against negative effects of some water sources. An example is ammonium sulfate, which helps to prevent inactivation of glyphosate by tying up calcium, magnesium and iron in hard water that would otherwise bind to the herbicide. Ammonium sulfate replacements are available from several companies.

Foam retardant: This is commonly a dimethylpolysiloxane product that helps to suppress excessive foam in the spray tank that results from agitation of other materials and water. It works better if added to the spray tank before excessive foaming occurs rather than afterward.

Compatibility agent: This is useful when pesticides are combined with liquid fertilizers to help avoid breakdown of the pesticide by the salt solution from the fertilizer. Some troublesome combinations of products can be stabilized with a compatibility agent.

Silicon-based adjuvant: Reduces surface tension (aids wetting). Higher rates result in more penetration. These adjuvants are recommended for use with water-soluble pesticides only. This class of adjuvant contains some of the more aggressive penetrants.

Crop oil concentrate: An adjuvant that is a combination of surfactants (15 to 20 percent) and non-phytotoxic oil, either petroleum- or vegetable-based. Crop oil concentrates are used to increase effectiveness of herbicides by increasing wetting, spreading and penetration. Methylated seed oils tend to work better than petroleum-based oils as adjuvants for weed control where weeds are under environmental stress.

Link to view table of products and descriptions:

Bitterpit control in apples

Low calcium levels are the source of bitterpit in apples.

Philip Schwallier and Amy Irish-Brown, Michigan State University Extension

Bitterpit is serious physiological disorder related to low calcium levels in the fruit (especially just under the peel). The major calcium effect in apple is the maintenance of membranes and cell wall structures, which, in turn, slows breakdown and maintains firmness of fruits. Bitterpit is the breakdown of the cells just under the peel where calcium levels are too low. Therefore, the focus for controlling bitterpit is on soil, leaf and ultimately fruit calcium. Some varieties (such as Cortland, Honeycrisp, Northern Spy, etc.) have a genetic susceptibility to Bitterpit. Bitterpit in other apple varieties is influenced by other factors, such as climate, orchard block characteristics and especially cropload/tree vigor. Soil calcium levels, soil pH, other nutrient levels, cropload balance, calcium sprays and postharvest calcium treatments all affect calcium levels in fruit. Increasing calcium levels in the fruit will reduce this disorder.

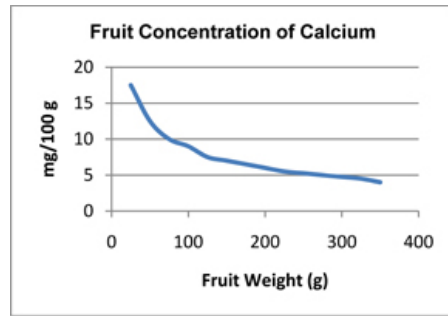


Figure 1. Apple fruit seasonal calcium concentration.

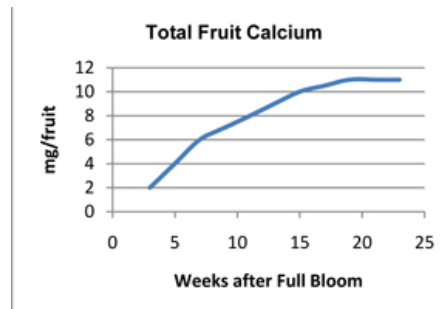


Figure 2. Seasonal total apple fruit calcium.

Fruitlets have high calcium levels in the spring (Figure 1) but as the fruit grow in size, fruit calcium concentration decreases. Fruit will accumulate calcium over the entire season (Figure 2), but environmental conditions can still cause bitterpit problems. Soil applied lime and gypsum will increase fruit calcium, but need to be applied annually and results will be slow to detect (2 to 3 years). Generally, spray applications of foliar calcium periodically improves control but might not cure the disorder. It is important to start foliar calcium sprays right after petal fall and continue applications until harvest. Frequent calcium applications are better than less frequent, high-rate applications. Some years on some varieties, weather can overwhelm even the best calcium program. Postharvest drenches are important to help stop this disorder from developing further in storage.

Methods to increase calcium

Keep soil pH at the optimum range for apples, 6.5 to 7.0.

Lime with high-cal lime where needed. Keep soil levels abundant.

Keep B and Zn levels at optimum levels as deficiencies will increase Ca disorders.

Keep Mg and K levels at optimum levels as excessive levels increase Ca disorders.

Consider Gypsum application in the early spring to provide luxury Ca.

Use tissue analysis to identify Ca needs. Leaf should be 1.3% to 2%. 1.6% or greater is usually required to minimize disorders.

Excessive pruning, excessive N, excessive vigor, low fruit loads and droughty conditions will increase bitterpit.

Try to achieve uniform moderate tree vigor with annual moderate croploads.

Apply calcium sprays to trees every two weeks, starting a week after petal fall.

Use 1 to 2#/100 of CaCl₂ early season and for the last 2 sprays, 2 to 4#/100.

A seasonal rate of 7 to 14# Ca is desired.

Avoid temperatures above 80°F and especially when humidity is high.

Maintain agitation in the tank when adding calcium.

Watch out for compatibility with other products.

Applications should be frequent and coverage complete. The calcium is taken in through the fruit skin and not the leaves.

Calcium postharvest dips will put more calcium in an apple than a whole season of sprays.

Apogee will help control vigor and may increase fruit Ca.

Irrigation will reduce drought/Calcium stress.

Cherry Leaf Spot Disease Biology and Rationale Underlying Fungicide Use

George Sundin, Dept. of Plant Pathology, MSU

Nikki Rothwell, Northwest Michigan Horticultural Research Station

This article summarizes cherry leaf spot biology and indicates the rationale underlying fungicide applications for disease control. The accompanying article summarizes where we are at regarding fungicide resistance management (or more accurately fungicide resistance prevention) as many of the fungicides used for leaf spot control are at risk for resistance development.

Cherry leaf spot is the most important fungal disease of tart cherry in Michigan. The leaf spot fungus *Blumeriella jaapii* infects leaves with symptoms first appearing on upper leaf surfaces as small purple spots often with yellow halos around the spots on the tops of the leaves. As spots accumulate on foliage, the leaves turn yellow and fall. The amount of lesions required to cause leaf yellowing and drop is variable, particularly among Balatons and Montmorency tart cherries. Sweet cherries can tolerate quite a few lesions before leaf drop occurs; however, Montmorency tart cherries will drop with only a few lesions, signifying the importance of proper leaf spot management. Balatons can have more lesions than Montmorency before leaf drop, but Balatons are just as susceptible to leaf spot as Montmorency.

As soon as leaves unfold in the spring, they are susceptible to leaf spot infection. Similar to apple scab, the leaf spot fungus overwinters in infected leaves on the orchard floor, and produces ascospores that serve as the primary inoculum. Ascospore discharge occurs during and shortly after rainfall from early bloom to about six weeks after petal fall. Ascospore

discharge is highest over a wide temperature range (60 to 85°F) and lowest at 41 to 46°F. The optimum conditions for lesion development are temperatures of 60-68°F with rainfall or fog. After lesions appear on upper leaf surfaces, examination of the underside of leaves reveals a proliferation of white spore masses. These spores are dispersed by rain and wind within trees and to adjacent trees; such secondary cycles can continue repeatedly under favorable conditions through autumn.

Preharvest defoliation can result in a crop that does not mature adequately in order to produce marketable fruit. Subsequent annual defoliation can cause serious tree damage and greatly reduce winter hardiness. Even late summer (August, early September) defoliation reduces the ability of trees to store photosynthate in roots, which can result in an overall loss of vigor and trees are more susceptible to winter injury and/or mortality. Early-defoliated trees also typically exhibit reduced flower bud formation and often set less fruit the following season.

The leaf spot pathogen is a prolific sporulator and can spread very quickly, initiating new lesions that will produce more spores. The rapidity of spread combined with the high susceptibility of Montmorency and Balaton trees is what drives leaf spot epidemics. Thus, the goal of a leaf spot fungicide program is to reduce infection to the extent that trees will hold their leaves into early September. The best way to do this is to delay the initial infection of trees starting at petal fall and to maintain this protection up to and continuously around harvest time when temperatures are usually quite favorable for leaf spot infection events. Usually, if trees are well protected through harvest and exhibit little to no infection, these trees will hold their leaves into September and beyond.

Cool Wet Season may Increase Bacterial Canker in Sweet Cherry Orchards

Nikki Rothwell, Northwest Michigan Horticultural Research Station

We have observed many sweet cherry orchards with the symptoms of bacterial canker caused by the *Pseudomonas syringae* bacterium. These bacteria overwinter in the bark tissues as well as in healthy buds, and thrive in cool and wet conditions. In addition to the current weather conditions that are conducive to bacterial canker infections, some growers faced bacterial canker challenges last season and will likely have higher levels of inoculum causing a higher potential for infection this year.

Most northern Michigan orchards are in some stage of bloom in sweet cherry with no effective control options for canker at this time. Prior to bloom, dormant copper sprays have shown to be somewhat effective against bacterial canker, but at this time copper sprays will cause phytotoxicity.

With the cool and wet weather conditions and high potential for bacterial canker infection in the region, we have had a number of questions about the efficacy of Serenade, *Bacillus subtilis*. The following data are from a trial Dr. George Sundin ran in 2004 using some of these biological agents for bacterial canker control. We monitored *P. syringae* populations on sweet cherry blossoms. We sampled for *P. syringae* on day 1 to get initial counts of the bacteria. We followed with treatments of Serenade, Citrex, and Summerdale on day 2, and then came back and counted the bacteria on day 3. The numbers below indicate the pre-counts of bacterial colonies (before the sprays) and the numbers of bacterial colonies/g after the sprays on day 3:

Serenade

Day 1 before application= 15,800

Day 3 after application= 31,600

Citrex

Day 1 before application= 31,600

Day 3 after application = 31,600

Summerdale

Day 1 before application= 25,100

Day 3 after application= 39,810

From these results, Serenade and Summerdale did not decrease the bacterial canker colonies, and Citrex only kept the numbers stable, with no increase or decrease in populations. Based on these data, Serenade is not recommended for canker control.

Fungicide Resistance Management Considerations for Cherry Leaf Spot Control

George Sundin, Dept. of Plant Pathology, MSU

Nikki Rothwell, Northwest Michigan Horticultural Research Station

Fungicide management programs for cherry leaf spot must be initiated around petal fall when leaves are unfolding. What we are hoping to accomplish with leaf spot sprays is preventing or actually delaying initial infection events. As with all other diseases, leaf spot infection will rise to epidemic proportions under conducive weather conditions. Thus, the purpose of early season sprays is to prevent or significantly delay initial infection events. This both provides disease control prior to harvest (severe early season infection can affect fruit ripening) and helps trees hold leaves into September and beyond.

Prior to shuck split, **the only logical choice for cherry leaf spot management is chlorothalonil** (Bravo and generics). This is a multi-site fungicide that is both excellent for leaf spot control and is not at risk for fungicide resistance development. At least two applications of chlorothalonil should be made before shuck split.

There are five major classes of fungicides and one mixture registered for leaf spot control that could be used as cover sprays (Table 1). Of the five classes, only the SI's are not recommended for management of CLS due to resistance to SI fungicides in the cherry leaf spot fungus; this resistance occurs universally throughout all Michigan orchards. Thus, SI fungicides should never be used for leaf spot control but will still have effectiveness against American brown rot if used as a tank mix partner. SI resistance is quantitative, meaning that leaf spot populations exhibit a wide range of susceptibilities to these fungicides (currently moderate to highly resistant). However, eventually the use of SI's will continually shift orchard populations such that they contain more and more highly resistant individuals. These shifts result in significant control failures across whole orchards, and we have observed such control failures in many orchards over the last few years.

After shuck split, the use of the strobilurin Gem (3.0 to 3.8 oz / A) or the strobilurin/boscalid Pristine (10.5 to 14.7 oz / A) at the 1st cover timing is an excellent choice because both of these materials are also excellent powdery mildew materials.

Preliminary data have shown early control of powdery mildew will result in better season-long control, so these two materials are optimal for first cover timing. Gem and Pristine are two excellent fungicides but both are at risk long-term for the development of fungicide resistance. Growers need to think about long-term strategies for use in order to for these materials to remain effective for a significant number of years. Overuse of these fungicides now could compromise the effectiveness of these products against leaf spot in the future. We suggest that both Gem and Pristine are not used more than two times per season.

More importantly, limiting the use of Gem and Pristine will provide **long-term preservation of these fungicides but will require more active resistance management strategies**. Strobilurin resistance has emerged in the apple scab pathogen *Venturia inaequalis* and is now completely widespread in Michigan. This emergence happened quite fast, and the first resistant apple scab strains probably developed in 2006—only seven years after the registration of the strobilurins. Because of the development of resistance in apple scab, we recommend the resistance management strategy for Gem and Pristine use in cherry leaf spot control needs to include the broad spectrum fungicide Captan. **Similar to tank mixing fungicides with an EBDC for apple scab control, tank mixes with Captan should be utilized for leaf spot control.**

Gem is also available as one component of the fungicide Adament. Adament is a mixture of two fungicides – Gem and the SI Elite. For leaf spot control, the Elite component of Adament would be essentially ineffective. Thus, Adament would be most effective when used at a timing where American brown rot control is also needed. It is also critical to use a rate of Adament that ensures that the Gem component is at a rate sufficient for leaf spot control. Adament at the 6 oz/A rate is equivalent to 3 fl oz Gem + 3.3 oz Elite. Adament at the 8 oz rate is equivalent to 4 fl oz Gem + 4.4 oz Elite. Adament should also be tank-mixed with Captan for resistance management.

Syllit (dodine), at 24-27 fl oz per acre, is an excellent leaf spot material. In a survey conducted in 2007, we did not isolate strains of the leaf spot fungus that were resistant to Syllit. However, experience tells us that Syllit is a fungicide that is resistance-prone, so, Syllit should also be tank-mixed with Captan as a resistance management strategy to prevent any buildup of dodine resistance. Also, Syllit is not as effective in controlling powdery mildew or brown rot, so Syllit is best used as a second or third cover sprays in a tank mix with Captan. The current Syllit label indicates an incompatibility with Captan, but these fungicides **can** be tank-mixed and a revised label indicating this is planned for 2011.

Copper has proven to be a highly effective fungicide for CLS control. Results from several years of experiments consistently show that CLS treatments utilizing one, two, or three cover sprays of copper sulfate (1.2 lbs metallic Cu per acre) provided excellent CLS control equivalent to or better than standard programs using conventional fungicides, such as strobilurins. Successful efficacy of copper compounds aids both conventional growers, as copper extends the life of traditional fungicides, and organic growers because copper is the only viable option for disease control in tart cherry. The only detriment to copper use is the potential for phytotoxicity effects to tart cherry trees. When copper compounds are applied to tart cherry trees in advance of hot, dry weather, the trees can exhibit phytotoxicity symptoms such as bronzing on the undersides of leaves, large yellow and brown blotches on the upper surface of a few leaves, or blackening of veins on the undersides of leaves. In severe cases, copper phytotoxicity can also cause leaf defoliation. Thus, the 2nd and 3rd cover timings are good for copper use if temperatures are not projected to remain above 80°F for several days. However, we have been trying to quantify the phytotoxicity of copper use for many years, and we have not been successful in showing the potential impacts of multiple copper sprays in hot conditions. Adding lime to the tank can help minimize phytotoxicity in hot conditions. Growers should also remember that the copper/lime combination in a tank will render Imidan ineffectual due to the lime component.

If leaf spot infections are visible in orchards at harvest, or if weather is highly conducive to infection events during harvest, we continue to suggest that chlorothalonil (Bravo) is the only real option for post-harvest CLS sprays. At the timings it can be used (before shuck split and post-harvest), Bravo is the resistance management (prevention) fungicide of choice because using it reduces the number of applications of other at-risk materials.

Table 1. Class of chemistry and fungicides registered for cherry leaf spot control.

Sterol-inhibitors (SI's)	Elite, Indar, Nova, Rubigana
Strobilurins	Gem, Pristine ^b
Mixture (strobilurin + SI)	Adament
Guanidine	Syllit (dodine)
Heterocyclic	Captan ^c
Inorganic metal ion	Copper

^a Because of widespread resistance in Michigan, SI's should never be used alone and are not recommended for leaf spot control.

^b Pristine is a mixture of a strobilurin and boscalid, another fungicide (separate chemistry).

^c Captan should only be used in combination with other fungicides because the rate (2.5 lbs/A Captan 80WDG) allowed on cherries is too low for effective disease control.

WEBSITES OF INTEREST

Insect and disease predictive information is available at:

<http://enviroweather.msu.edu/homeMap.php>

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/>

Fruit CAT Alert Reports

<http://www.ipmnews.msu.edu/fruit/>

This issue and past issues of the weekly FruitNet report are posted on our website at:

<http://agbioresearch.msu.edu/nwmihort/faxnet.htm>

[ACTUAL AND PREDICTED DEGREE-DAY](#)

ACCUMULATIONS SINCE MARCH 1, 2011

Please send any comments or suggestions regarding this site to:

Bill Klein, kleinw@msu.edu

Last Revised: 5-17-11

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Fire blight a Concern as Bloom Approaches in the North

If forecasts are correct, the EIP is predicted to climb to 100+ by this weekend in northern Michigan orchards where bloom began between 5/13-5/21.

Erin Lizotte, NWMHRS, MSUE

As we approach bloom, it will be important to keep an eye on the [fire blight model](#) to determine if antibiotic applications are needed. When the epiphytic infection potential (EIP) reaches 100 (or is forecast to do so) and the average temperature is greater than or equal to 60 °F, the corresponding boxes on the model will turn red indicating that rain or trauma (high winds or hail) is all that is needed for infection to occur (see picture of model below). At this time, the EIP is predicted to climb to 100+ by this weekend in orchards where bloom began between 5/13-5/21. Similar conditions are present at all northern Michigan weather stations.

Traverse City (NWMHRS) Fire Blight Assist Chart(Report issued 5/19/2011 11:23)

2011		Temperature(F)			Rain		EIP for Biofix Date: (Bloom or spray date)														
Day	Date	Max	Min	Avg	in.	Chance of rain	5/13	5/14	5/15	5/16	5/17	5/18	5/19	5/20	5/21	5/22	5/23	5/24	5/25	5/26	
Saturday	5/14	49.6	43.4	46.5	0.17		0	0													
Sunday	5/15	56	43.9	50	0		0	0	0												
Monday	5/16	56.3	36	46.2	0		0	0	0	0											
Tuesday	5/17	63.7	35.6	49.6	0		0	0	0	0	0										
Wednesday	5/18	67.6	46.7	57.1	0.01		0	0	0	0	0	0									
Today's data:																					
Note: Last time reported by station is (11:00-11:05AM)																					
Thursday	5/19	Forecast: 65	Actual: (1:25-1:30AM) 53.2	59.1	0.02	100%	0	0	0	0	0	0	0								
Forecast Data																					
Friday	5/20	71	48	59.5		23%	16	16	16	16	16	16	16								
Saturday	5/21	77	48	62.5		20%	58	58	58	58	58	58	58	58	42						
Sunday	5/22	78	58	68		87%	118	118	118	118	118	118	118	118	102	59					
Monday	5/23	75	56	65.5		81%	158	158	158	158	158	158	158	158	142	100	41				
Tuesday	5/24	61	50	55.5		48%	95	95	95	95	95	95	95	95	95	67	27	0			
Wednesday	5/25	63	40	51.5		30%	33	33	33	33	33	33	33	33	33	33	14	0	0		
Thursday	5/26	64	41	52.5		38%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Directions: Locate the Biofix Date (the date bloom opened or the date a spray was applied to control Fireblight) on the top row. Follow that column down to determine Epiphytic Infection Potential for that block on each date in the left column. If this number is greater than 100, and the average temperature is greater than or equal to 60 °F, this area will be shaded and rain or trauma (high winds or hail) is all that is needed for infection. Repeat for additional blocks that bloomed or were sprayed on a different date.

At this time streptomycin remains the bactericide of choice for controlling fire blight, however, if you are located in Grand Traverse County and have streptomycin resistance, Kasumin may be applied. See the article below for more information on Kasumin use. As temperatures fluctuate and scattered rainfall occurs around the region it is difficult to gauge fire blight infection potential, but we don't want to waste an antibiotic spray if it is not truly necessary. If the fire blight model's EIP is close to but not at 100, there are a few rules of thumb to determine if an antibiotic application is warranted: 1) a block with a history of fire blight, 2) susceptible varieties, or 3) visible cankers are all good reasons to go into a rainy period with an antibiotic spray.

Section 18 Specific Exemption for Kasumin for Fire Blight Control for 2011

George W. Sundin, MSUE, Department of Plant Pathology

EPA has granted a Section 18 Specific Exemption for the use of Kasumin 2L (kasugamycin) for the control of the blossom blight phase of fire blight in 2011. This use is for orchards where streptomycin-resistant fire blight bacteria are present. The Section 18 is applicable to Berrien, Cass, Grand Traverse, Ionia, Kent, Montcalm, Newaygo, Oceana, Ottawa, and Van Buren counties.

This Section 18 exemption applies only to counties where we have detected streptomycin-resistant isolates of the fire blight pathogen *Erwinia amylovora*. We currently have not yet detected any streptomycin resistance in Antrim or Leelanau counties or in eastern Michigan.

Kasumin 2L should be available in each region this year in time for bloom sprays. I want to publicly thank EPA for working quickly to grant the Section 18 this year so that product will be available even in Southwest Michigan in time. Make sure you have the Section 18 label in hand when you are applying Kasumin 2L. Do not apply Kasumin through any irrigation system.

The conditions and restrictions of the Section 18 specific exemption are as follows:

1. Apply Kasumin only when the pathogen is resistant to streptomycin. We have documented streptomycin resistance in all of the counties listed in the first paragraph above.
2. Kasumin 2L may only be applied when the following condition is met: only when the disease forecasting model and/or fire blight state expert determine that the weather conditions favor a disease epidemic.

This condition differs from previous years in that MSU Extension specialists do not have to call for a Kasumin application prior to growers using it. In the past, we have called for Kasumin applications when the Epiphytic Infection Potential (EIP) number from the MaryBlyt model reaches or exceeds 100. This model is available on the Enviroweather website; use the weather station closest to your orchard location to get local conditions. Make sure to document the MaryBlyt EIP prediction (by printout or screen capture) to include in your spray records.

In summary, the use of Kasumin 2L is limited to epidemic conditions; if these conditions are not present this year, other fire blight control materials such as Mycoshield should be used.

Authorization for use will also come from Michigan State University Extension fruit educators and tree fruit disease specialists via web, radio, recorded message, telephone, email, and handout. Code-a-phone messages (see numbers below) are the preferred method to get information on use authorizations from MSU.

3. A maximum of two sequential applications of Kasumin can be made at a rate of 2 quarts (64 fl. oz.)/acre. Applications are restricted to ground equipment and cannot be made through any type of irrigation system.

4. A maximum of three applications of Kasumin can be used (64 fl. oz. per acre), if authorized. Treatments can be made no later than petal fall.

5. Do not apply Kasumin as the first spray of the season. It should be applied only after the first spray of registered alternatives (usually oxytetracycline or Serenade MAX).

6. Do not use in orchards in which the soil has been fertilized with animal manure. This restriction addresses concerns that kasugamycin resistance could be transferred to *E. coli* bacteria present in animal manure.

7. Upon expiration of the exemption, all unopened and unused product must be returned to the dealer where purchased or to the manufacturer or disposed of in accordance with Resource Conservation and Recovery Act regulations following the expiration of the Section 18 exemption.

Kasumin 2L (kasugamycin), from Arysta, is an alternative antibiotic for fire blight management. Kasumin 2L will work equally on streptomycin-resistant and streptomycin-sensitive strains. The label rate is 2 quarts/acre. I am not aware of any potential issues such as pH sensitivities of Kasumin or possible incompatibilities with other spray materials at this time.

Please note that my lab will also be conducting resistance monitoring in selected orchards this year that use Kasumin. This is to satisfy an EPA directive that we monitor for the occurrence of kasugamycin resistance, and also the potential for resistance to other related antibiotics. We will be taking leaf and soil samples from approximately 10 orchards throughout the state. These monitoring experiments will be conducted after petal fall.

As always, I want to thank Brian Verhougstraete, Pesticide Registration Manager of the Michigan Department of Agriculture for his support of this Section 18 request. Brian submits our request each year and serves as our liaison to EPA.



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Northern Michigan FruitNet 2011 Weekly Update NW Michigan Horticultural Research Station

[Nikki Rothwell](#) District Horticulturist
[Erin Lizotte](#) District Fruit IPM/IFP Agent
[Bill Klein](#) Farm Mgr, NWMHRS
[Duke Elsner](#) Agricultural & Regional Viticulture Agent

May 24, 2011

GROWING DEGREE DAY ACCUMULATIONS through May 23rd at the NWMHRS

Year	2011	2010	2009	2008	2007	2006	21 yr. Avg.
GDD42	412	681	487	424	577	586	499.8
GDD50	186	330	229	185	280	272	240.0

Growth Stages at NWMHRS (5/23/11 – 4:00 p.m.)

Apple: Red Delicious – 85% bloom
Gala – 75% bloom
Yellow Delicious – King bloom
Pear: Bartlett: Petal fall
Sweet Cherry: Hedelfingen: Shuck split
Napoleon: Shuck split
Gold: Late petal fall
Tart Cherry: Petal fall
Balaton: Petal fall
Apricot: Shuck split
Plum: Late petal fall
Grapes: 1-3" shoots

Weather

The north experienced a warming trend in the past three days, where daytime temperatures reached into the 70's and even mid-80's on 23 May. Nighttime temperatures have been in the mid-50's. Soil temperatures have been warming slowly this season and finally reached into the low 60's over the weekend. This week, we are headed back into the cool cloudy conditions we have seen for most of the spring. Forecasts are also calling for frost for the overnight of 24 May. Overall, we have accumulated 412GDD base 42 and 186 base 50, and we are still 7-10 days behind our 21-year average. May rainfalls total under 2" of rain for the month thus far, and we received 0.55" this past Sunday night. This rainfall was accompanied by high winds and hail in select areas.

Crop Report

Growers have been particularly busy this spring with the wet conditions, and already this season, many sprays have been applied to all crops. There have been some challenges for growers to keep ahead of the rain events to provide adequate coverage. Cherry growers have been concerned about bacterial canker and the onset of cherry leaf spot while apple growers have been diligent with their apple scab sprays. This weekend, we also had perfect conditions for fireblight with the onset of bloom. Growers have also started to apply Apogee, and growers are starting to think about the thinning window for apples—thinning will be important this season as we have the potential to set a large crop this season. Because we have had no major spring frosts this spring, we anticipate setting a large crop in all crops. Pollination has been a concern for many crops with the cool wet weather. Sweet cherries did not have many days with warm temperatures during bloom, but tart cherries had two or three days of good weather. As we head into this week of cool weather, we are hopeful bees will fly to pollinate apples.

Pest Report

Apple

Things are heating up in the north, particularly in terms of pest and disease activity. The warm weather and rain over the weekend triggered a moderate scab infection that was confirmed with spore captures in one northern Michigan orchard. According to the [apple scab model](#), over 50% of overwintering spores have matured and 25% have discharged. A preventative scab program is critical, particularly with the recent discovery of fungicide resistant scab isolates identified in Michigan apple orchards. Early in the season when fruit scab is not a concern and temperatures are cooler, Scala and Vanguard are good options to tank mix with EBDCs for scab control. As we move into warmer weather and the risk of fruit

scab increases, growers should be considering second generation sterol inhibitors (Indar and Inspire Super) or captan tank mixed with EBDCs. As many orchards are in some stage of bloom, it will be important to keep an eye on the [fire blight model](#). Based on the weather and crop development many area growers have already made at least one antibiotic application. When the epiphytic infection potential reaches 100 (or is forecast to do so) and the average temperature is greater than or equal to 60 °F, the Enviroweather model will show the corresponding boxes on the chart turning red, which indicates that rain or trauma (high winds or hail) is needed for infection to occur. Based on the weather forecast, the EIP was predicted to peak Monday, and cooler temperatures and drier conditions are forecasted for the coming week. Additional instructions for utilizing the fire blight model can be found on the [Enviroweather page](#).

Things have picked up in terms of insect activity, and we likely hit the peak of [spotted tentiform leafminer](#) (STLM) adult flight this week. STLM adults are laying eggs on the underside of leaves which will hatch into larvae and feed on plant tissue. Oriental fruit moth adults were also trapped this week along with one [codling moth](#). Codling moth management will begin in the coming weeks as most treatments target egg hatch, a predicted 250 DD50 after sustained catch. Growers looking to use an ovicide and delayed larvicide program should look to apply ovicidal materials around 100-150GDD. Growers can track their progression using the [codling moth model](#). Small [oblique-banded leafroller](#) (OBLR) larvae are just becoming visible and active in area orchards. Widespread OBLR resistance to Guthion and pyrethroids exists in northwest Michigan, so growers should be applying non-organophosphate materials to control this insect this season. In apple, management of OBLR often occurs later in the season and populations are likely kept low by lepidopteron materials commonly used to combat organophosphate resistant codling moth. Adults OBLR moths are easily trapped with pheromone baited delta traps, and larvae are also relatively easy to locate due to their leaf rolling behavior. At this time of the year, look for larvae in the terminals.

Cherry

[Fewer green fruitworm](#) moths were caught this week in American plum borer traps. Immature larvae of the green fruitworm feed on flower buds and new foliage, but have not yet been observed. Mature larvae feed on blossoms, developing fruit and leaves. Early feeding injury often causes fruit to abort. Fruit remaining on the tree after GFW feeding exhibit deep holes sealed over with corky scar tissue. Area scouts are reporting some [oblique-banded leafroller](#) (OBLR) activity, but larvae are still small and hard to spot in cherry with leaves just unfolding. Overwintering larvae feed inside bud clusters prior to bloom, and begin feeding on fruit after petal fall. Targeting this overwintering generation is critical in cherry because they are small and easier to kill. At early petal fall, growers should scout their orchards by looking at 20 clusters per tree in five trees per orchard for larvae or feeding sites. An insecticide should be applied if they observe more than two larvae or feeding sites per tree. The materials that target this life stage are Delegate, Belt, Altacor, Voliam flexi, Entrust and Bts. Growers in northwest Michigan should not expect organophosphates or pyrethroids to provide effective control because of insecticide resistance. If there is evidence of OP resistance in your area, the insect growth regulator Intrepid may also have some level of cross resistance and will not be effective.

[Plum curculio](#) continue to migrate into orchards from neighboring wood lots with high trap counts this week, particularly in the edge rows of blocks at the NWMHRS. Plum curculio migrate from their overwintering sites to orchards in the spring when maximum temperatures are at least 75°F for 2-3 days or when mean daily temperatures are 55°-60°F for 3-6 days. Plum curculio is often found in the orchard before fruit is present. Spring migration lasts about six weeks with peak activity occurring 2-3 weeks after shuck split as young fruit develops. If growers are utilizing insecticides other than the organophosphates (Guthion, Imidan) the treatment timing is petal fall or shuck split depending on the mode of action. Consult the insecticide label and the MSU Extension Bulletin E154 "Michigan Fruit Management Guide" for more information.

As leaves unfurl and petals begin to drop, the potential for [cherry leaf spot](#) infections increase. With the wetting events over the past days two infection periods were recorded, one moderate and one low. CLS overwinters in fallen leaves on the orchard floor and produces apothecia (sexual spore-bearing structures) in the spring. Ascospore (sexual spore) dispersal occurs during the drying period that follows a wetting event and when temperatures are between 60-85°F. Following infection, acervuli (asexual spore-bearing structures) develop on the underside of the leaf and produce a visible mass of asexual spores called conidia. Spores are dispersed from leaf to leaf by wind or rain and this secondary infection cycle can be repeated several times within a season, depending on conditions. CLS is resistant to sterol inhibitor fungicides (Indar, Elite, Orbit) in all the major fruit producing areas of Michigan. Petal fall and shucksplit application of chlorothalonil are recommended. As orchards move into first cover, products that contain strobilurin fungicides are recommended as they provide excellent leaf spot and powdery mildew control. Remember to alternate the use of fungicide classes during the season to manage against resistance development.

NW Michigan Wine Grapes

Most early cultivars are at or fast approaching 1-3 inch shoot growth stage. Later cultivars, such as Riesling, and weak vines are still just in late bud swell. There is ample soil moisture, so if mild to warm weather allows, shoot growth will be rapid in the coming weeks.

Insect activity has remained relatively light. Grape flea beetles have been found in a few sites, but for the most part there has been little injury. They are quite common on some wild vines in NW Michigan. A little bit of climbing cutworm injury has been seen, but there have been no reports of significant losses of buds to this pest. As shoot growth continues the threat from flea beetles and cutworms will cease.

No grape berry moth adults have been taken in traps thus far. It will be interesting to see if any potato leafhoppers arrived in the thunderstorm front that passed through the area on May 22.

EFFECTIVELY CONTROLLING PLUM CURCULIO IN STONE AND POME FRUITS

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

John Wise, Nikki Rothwell, Mark Whalon, and Erin Lizotte

The plum curculio is a key early season pest on pome and stone fruits. There are many insecticides available for control of the 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 curculio injury via their oviposition (egg-laying) deterrence and anti-feedant modes of activity. Neonicotinoids and OP's 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.

Clutch is no longer available, but Belay is the replacement and is labeled for use in pome fruits and peaches. Voliam flexi can be used for plum curculio control, but only the neonicotinoid (Actara) component will be effective against PC. Also, growers should remember that 4.5 to 5.5 oz of Actara is the recommended rate for plum curculio control, and Voliam flexi is labeled at 4-7oz; growers should be sure to apply an adequate amount of Voliam flexi to meet these recommended rates. For organic growers, Surround WP can reduce plum curculio injury to fruit if applied to attain a heavy coating on the tree canopy; this kaolin clay product works as a plum curculio repellent. Building up and maintaining several coats of the clay on fruit as the fruit continues to grow is key to successful use of this product.

The following table 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 Rimon, Esteem and Delegate, are commonly used in tree fruit pest management programs and have modes of activity on plum curculio repellent 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, when ingested by plum curculio adults will cause moderate levels of mortality. 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 plum curculio control, but when used in pest management programs may contribute to overall plum curculio population management. Also of note is that we are testing Delegate for plum curculio control this season.

Optimal timing and order selection of insecticides for plum curculio management is based on matching the performance characteristics of each chemistry (Table 1) with plum curculio life-cycle development (Figure 1) and tree phenology (Table 2). 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, we do caution the use of 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.

Control Materials for Plum Curculio

Compounds ²	Chemical Class / Activity	Crop	Rate	Crop Stage and Initial Control Timing (DD50)
Guthion 50W**	Organophosphate	Pome fruit	2 lb	Petal fall (approx. 250 DD)
	Lethal via contact	Cherries	1½ lb	Petal fall (approx. 175 DD)
Imidan 70W**	Organophosphate	Pome fruit	3 lb	Petal fall (approx. 250 DD)
	Lethal via contact	Stone fruit	2½ lb	Petal fall (approx. 175 DD)
Actara 25WG**	Neonicotinoid		4½ oz	Petal fall + 3-5 days (approx. 300 DD)
	Lethal, Antifeedant and egg laying	Pome fruit		
		Stone fruit	4½ oz	Shuck-off (approx. 250 DD)
Calypso 480SC**	Lethal, Antifeedant and egg laying	Pome fruit	4 oz	Petal fall + 3-5 days (approx. 300 DD)
	Neonicotinoid	Pome fruit		Petal fall + 3-5 days (approx. 300 DD)
Assail 30SG**	Lethal, Antifeedant and egg laying	Stone fruit	6 oz	Shuck-off (approx. 250 DD)
	Neonicotinoid	Pome fruit		Petal fall + 3-5 days (approx. 300 DD)
Belay 2.13SC**	Lethal, Antifeedant and egg laying	Peach	6 oz	Shuck-off (approx. 250 DD)
	Oxadiazine	Pome fruit	1	Petal fall (approx. 250 DD)
Avaunt 30WG	Lethal via ingestion	Stone fruit	5 oz	Petal fall (approx. 175 DD)
	Particle film Repellent	Pome & Stone Fruits	Usually 16 lb by First Cover	Multiple applications starting before bloom to achieve complete coverage
Pyrethroids	Asana, Warrior, Baythroid	Pome fruit	Variable	Petal fall (approx. 250 DD)

	Lethal, repellent	Stone fruit		Petal fall (approx. 175 DD)
Rimon* (targeting codling moth)	IGR	Pome fruit	20-40 oz	Petal fall (approx. 250 DD)
	Egg sterilization			
Leverage	Pyrethroid + Neonictinoid	Pome fruit	4.4-5.1	Petal fall (approx. 250 DD)
	Lethal, repellent, egg laying	Stone fruit	4.5-5.1	Petal fall (approx. 175 DD)
Voliam flexi	Neonicotinoid + Diamide	Pome fruit	6-7 oz	Immediately following petal fall (approx. 250 DD)
	Lethal, repellent, egg laying	Stone fruit	6-7 oz	Shuck-off (approx. 250 DD)

*Not labeled for plum curculio

**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.

THINNING APPLES AT PETAL FALL FOR 2011

Philip Schwallier and Amy Irish-Brown, Michigan State University Extension

Follow these tips for thinning what looks like a large 2011 apple crop.

Published May 10, 2011

This year there are a number of orchards that had light crops in 2010. These blocks have returned this 2011 year with a heavy return bloom and abundance of stored energy that will promote the set of a heavy crop. On top of that is the late development of bloom across the state and little or no frost events to date, which will encourage additional successful set of apple fruits. Thinning a heavy, strong fruitset will require an aggressive plan commencing right after bloom. This may require multiple thinning applications.

Apples set during a period from bloom to 40 days after full bloom (DAFB). Fruitlets are responsive to stresses that occur during this time from both environmental or chemical influences. The natural sensitivity to stress changes during this important fruitset (thinning) window. At petal fall (5 DAFB), fruitlets are not very responsive to stress, but as they approach the 10-12 mm stage (15 to 25 DAFB) the sensitivity increases to a maximum level. This period of maximum sensitivity is when traditional thinning activities are performed and best thinning responses occur. The sensitivity to thinning then gradually declines to no response at around 40 DAFB.

When a heavy crop is predicted as there is for 2011, multiple thinning applications can help successfully reduce croplod to a desired level. Growers should consider applying a first thinning treatment at petal fall (5 to 10 DAFB). This timing, in most years, is a very low risk period to get some thinning started but, in most years, will not over-thin. Usually only 10 to 20 percent thinning can be accomplished during the petal fall timing, because fruitlets are not inherently stressed or responsive to stress at this time from either natural or chemical thinning activities. This petal fall timing is a low risk time to perform general overall crop reduction. Occasionally, thinning at petal fall will thin the croplod to a perfect level and no additional thinning is needed. This occurs 1 out of 10 years in Michigan. Most years little to no thinning occurs during the petal fall thinning time period. However, it is the first time to have the chance to reduce croplod with the benefit of being able to evaluate the results 8 days later and make a second thinning application during the main traditional thinning window (15 to 25 DAFB). Second thinning applications are almost always needed. An added benefit of early petal fall thinning is the increased fruit size and the greater chance of increasing return bloom.

All thinning chemicals and rates can be used at petal fall, however there are some cautions to consider. First, Sevin is toxic to bees and should not be used if beehives are still in the orchard. Second, NAA is not recommended on varieties (Red Delicious, Fuji, etc.) that may have an adverse response to NAA (setting pygmy fruits). Third, NAA and BA are not compatible on some varieties and thus if thinning at the traditional timing 10 to 12mm stage is planned, it would be wise to use the same chemistry at petal fall and at 10 to 12 mm to avoid any negative interaction by applying BA after NAA or vice-a-versa.

The 2011 apple crop has the makings of being large and will most likely need thinning. Consider starting your thinning program with a first treatment at petal fall and follow with touch up thinning later. The benefits of this approach will be worth it and the risk of over thinning is low. Remember, you are the best judge on what thinning is needed in your blocks and what materials or rates to use and what timing to apply the thinners. Leave a few check trees to help you evaluate your thinning programs.

A FEW TIPS ABOUT APPLYING APOGEE

Phil Schwallier, Clarksville Hort. Res. Station Coordinator

Nikki Rothwell, District Horticulturist, MSU-E

Apogee® is a plant growth regulator composed of prohexadione-calcium that can be used in apples with significant advantages to the grower. Prohexadione-calcium is a compound that is part of a new class of gibberellin biosynthesis inhibitors called the cyclohexanetriones. Prohexadione-calcium reduces terminal growth by inhibiting important enzymes that help form growth-specific gibberellins. This group of plant hormones is primarily responsible for regulating shoot elongation in apple trees. In laymen's terms, Apogee helps control tree vigor. Controlling vigor can reduce the amount/intensity of pruning, decrease internal shading, a major proponent to properly color apples, and reduce canopy density for thorough pesticide coverage. In one Canadian study, properly timed Apogee applications eliminated the need to summer prune. This product has also been a reliable tool for minimizing impacts of shoot blight caused by the fireblight pathogen, *Erwinia amylovora*. Shoots that have less growth are not as susceptible to fire blight. When applying Apogee to apples, growers should consider the following: timing, rate per acre, thinning relationships, and compatibility with other chemistries in the tank.

Timing

Apogee should be applied when vegetative shoot growth is less than three inches. To best time the application, there is a 7 to 10-day window beginning at king bloom petal fall. This timing applies to most varieties in most years. Two more applications should be made at two-week intervals following the bloom application. Sometimes a fourth application is needed when excessive rainfall or light crops increase vegetative growth.

Rate

The rate per acre is usually calculated on a tree row volume basis and can be adjusted to two-thirds of the full-rate. The two-thirds rate is the starting rate growers should consider if they have not had experience with using Apogee. Growers with past experience will know if this 2/3 rate is too high or too low for a particular block. This suggested two-thirds rate per acre is a season-long rate. For example, if trees are at 75% tree row volume, then 24 ounces per acre is the seasonal rate ($48 * 0.75 * 2/3$).

Best results are achieved when the seasonal rate is split into three or four sprays. For example, 8 + 8 + 8oz per acre for a total of 24oz per acre per season. When fire blight is a severe risk, the first application at king bloom petal fall timing should be increased, perhaps as much as 150 percent of the split rate. For example, the rate should be increased from 8oz per acre to 12oz per acre. If the first spray rate is increased, subsequent sprays (second and third sprays) should be reduced. The seasonal application would be 12 + 6 + 6 = 24 ounces per season instead of 8+8+8=24oz.

Thinning

Apogee tends to increase fruit set, hence more aggressive thinning is often needed. If using Apogee, growers should increase thinning by 10 or 15%. For example, if the rate to thin was 1 pt Sevin + 8 ppm NAA, the thinning rate in blocks where Apogee has been used should increase to 1 pt Sevin + 10 ppm NAA.

Compatibility

Apogee is not compatible with calcium or boron in the tank. We also recommend that Apogee be applied after thinner application. If the two-week timing interval is also the ideal time to thin, make the thinning application first and follow with Apogee a few days later. Growers should be sure to follow the label recommendations for AMS and surfactants.

To conclude, Apogee is an excellent tool to help control vegetative growth, which decreases the need for summer pruning and can suppress the spread of fireblight among shoots and within shoots. The above recommendations are the best way to maximize the use of Apogee.

WEBSITES OF INTEREST

Insect and disease predictive information is available at:

<http://enviroweather.msu.edu/homeMap.php>

60 Hour Forecast

<http://www.aqweather.geo.msu.edu/aqwx/forecasts/fcst.asp?fileid=fous46ktvc>

Information on cherries is available at the new cherry website:

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

Fruit CAT Alert Reports

<http://www.ipmnews.msu.edu/fruit/>

This issue and past issues of the weekly FruitNet report are posted on our website at:

<http://aqbioresearch.msu.edu/nwmihort/faxnet.htm>

[ACTUAL AND PREDICTED DEGREE-DAY
ACCUMULATIONS SINCE MARCH 1, 2011](#)

Please send any comments or suggestions regarding this site to:

Bill Klein, kleinw@msu.edu

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Northern Michigan FruitNet 2011 *Special Update* NW Michigan Horticultural Research Station

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May 26, 2011

HOW TO IDENTIFY A BROWN MARMORATED STINK BUG

Providing Growers Methods for Identifying this New Invasive Insect Species

Nikki Rothwell, NWMHRS

Larry Gut, Dept. of Entomology, MSU

As we move into the 2011 season, growers have two new pests that may appear in their orchards, vineyards, and fields. Identifying one of these insects, the Brown Marmorated Stink Bug (BMSB), has been slightly more challenging due to the presence of some native look-alike stink bug species in Michigan. This article is meant to provide growers with simple characteristics that will accurately decipher our native stink bugs with this new invasive pest.

First, all stink bugs are shield-shaped and have long piercing-sucking mouthparts. They also have incomplete metamorphosis, so they have nymphs that resemble the adults except for color and wing length. All stink bugs are aptly named as they emit an odor if disturbed, and the ones found in Michigan are often less than $\frac{3}{4}$ -1" in size.

The characteristics that sets the BMSB apart from our other sink bugs are as follows: 1) white (and alternating black) triangles on the abdomen, 2) the last two antennal segments have both white and black bands, and 3) the pronotum or the shield behind the insect's eyes is smooth and not toothed. This last trait is important and unfortunately difficult to see in the field. We recommend a 30X hand lens to aid in making out the shape of the pronotum; a 14X hand lens will work with good eyes, holding the insect at the correct angle, and ample light. All three of these identifiers on one bug are critical for proper I.D. BMSB are also brown-black in color as adults with a whitish underside. Unfortunately, a few of our other native stink bugs have similar traits. The pictures below should help in differentiating BMSB from other stinkbug species.



Figure 1. Adult brown marmorated stinkbug (antennal segments highlighted).
(Photo credit: Rutgers University)



Figure 2. Adult rough stinkbug, a common look-alike to brown marmorated stinkbug.
(Photo credit: R. Bessin, University of Kentucky)



Figure 3. Close up of the shield of brown marmorated stinkbug with a smooth edge (left photo) and the shield of the rough stinkbug with a toothed edge (right photo).
(Photo credit: D. Elsner, Michigan State University)

APOGEE FOR FIRE BLIGHT (shoot blight) MANAGEMENT!!!!

Heads up – consider the potential for fire blight in your orchard and act NOW.

Published May 12, 2011

George W. Sundin, Michigan State University Extension, Department of Plant Pathology

We are experiencing a period of extreme fire blight risk in many apple-growing areas of Michigan, but especially in southwest Michigan for the period May 12-15, 2011. Maryblyt epiphytic infection potential (EIP) values are higher than any we've observed in a number of years. Remember that the EIP addresses risk in orchards with *open bloom*. We've had enough warm days now in most areas that the fire blight pathogen should be activated and beginning to ooze from cankers. The flower is the site where the pathogen grows to extremely large numbers under conducive conditions. **The environmental conditions this year are optimal for pathogen growth and fire blight infection.**

For orchards with blocks of susceptible varieties in regions affected by streptomycin resistance, Kasumin is the antibiotic of choice for blossom blight management. [See my previous article for details on Kasumin use.](#)

It is inevitable that orchards will sustain some blossom blight infection this year. **With predicted inoculum loads of the pathogen at epidemic levels, we can't expect optimal control.** What else can be done? The most important next control measure is to use Apogee (prohexadione calcium) for shoot blight management.

Apogee is a growth inhibitor that provides excellent control of shoot blight. The first timing for an Apogee spray is at king bloom petal fall. In southwest Michigan, we will likely be there this weekend. Apogee is shoot specific, i.e., the effect is only observed if the shoot is covered; thus excellent coverage is essential. The "Apogee effect" on fire blight begins approximately 10-14 days after application and research from my lab suggests that it is associated with cell wall thickening in apple shoots.

Most growers prefer to space Apogee applications out using 3 to 4 applications (once every two weeks). This strategy is effective for shoot growth control and fire blight management under low and moderate disease pressure. However, under very high disease pressure such as what we are experiencing this year, use of a higher rate application provides better shoot blight control than lower rates.

I am suggesting two things for 2011: (i) that growers use Apogee and not miss the king bloom petal fall timing; and (ii) that growers in extreme risk areas increase the rate used for their first application by at least 50 percent and consider doubling the rate for the first application. Return to the usual rate of Apogee used in the second and third applications. For example, growers that use rates of 8 oz / A, 8 oz / A, and 8 oz / A for their three Apogee applications in typical years should go 12-16 oz / A, 8 oz / A, and 8 oz / A this year. (See page 216 of MSUE's *2011 Michigan Fruit Management Guide* for more information on Apogee rates and usage).

Extreme risk areas for 2011 include areas with trees past 50 percent bloom by May 14, 2011. This would include southwest Michigan and many orchards on the Ridge. Temperatures are predicted to cool into next week. Trees that are not at >50% bloom until into next week will not be subject to as significant a fire blight risk, and normal Apogee application strategies can be used.

Apogee must be used with an organosilicone surfactant, and an equal weight of spray grade ammonium sulfate should be applied. Do not use Apogee on 'Empire' or 'Winesap' because of the potential for fruit cracking.

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

CAT ALERTS TRANSITION TO NEW WEBSITE, KEEP FOCUS ON TIMELY INFORMATION

5/25/11

Growers previously receiving Crop Advisory Team (CAT) Alerts now have access to the integrated pest management (IPM) information they are used to, plus much more, through a new website developed by [Michigan State University \(MSU\) Extension](#). CAT Alerts have been published for more than 25 years as a way to share unbiased, science-based recommendations to farmers involved in any aspect of plant agriculture, including the landscape and nursery industry. The site, [MSU Extension News for Agriculture](#), was developed based on feedback from Michigan farmers and commodity groups indicating an interest in more CAT-like information for other areas beyond plant agriculture. It features timely articles about multiple subjects, including crop production and IPM.

"We were publishing in silos," said CAT Alerts editor Joy Landis. "Previously a farmer who grows fruits and vegetables for their own farm market would need to go to various websites to catch all the relevant information from MSU Extension. Now, all the information they need is in one website, available by clicking through links to different areas. It made sense to bring the IPM information from CAT Alerts into this new site where all agricultural production and business information is featured."

MSU Extension News for Agriculture features new articles daily, highlighting the most relevant, up-to-date information and research from MSU in one convenient location, including articles that would have been distributed through CAT Alerts previously. Time-sensitive articles, like those from CAT Alerts, are labeled as a "Hot Topic" in red text to ensure that

growers are aware of priority issues.

Landis encourages CAT Alert readers to visit the new site and investigate the various plant and animal agriculture sections to become familiar with the depth of information available and the organization of the website. She also notes that archives of CAT Alerts from the last five years will be added to the MSU Extension News for Agriculture website throughout the summer and will be accessible through the search engine feature.

"We know our CAT readers appreciated the way our information was tailored for the current season and delivered promptly," said Landis. "We are committed to continuing that service through the articles posted at the new site."

MSU Extension News for Agriculture can be found at www.news.msue.msu.edu and is designed with functionality for both smart phones and other mobile devices. For more information about the website, contact Landis at landisj@msu.edu or Beth Stuever at stuever@msu.edu.

WEBSITES OF INTEREST

Insect and disease predictive information is available at:

<http://enviroweather.msu.edu/homeMap.php>

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/>

Fruit CAT Alert Reports

<http://www.ipmnews.msu.edu/fruit/>

This issue and past issues of the weekly FruitNet report are posted on our website at:

<http://aqbioresearch.msu.edu/nwmihort/faxnet.htm>

[ACTUAL AND PREDICTED DEGREE-DAY
ACCUMULATIONS SINCE MARCH 1, 2011](#)

Please send any comments or suggestions regarding this site to:

Bill Klein, kleinw@msu.edu

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Northern Michigan FruitNet 2011 Weekly Update NW Michigan Horticultural Research Station

[Nikki Rothwell](#) District Horticulturist
[Erin Lizotte](#) District Fruit IPM/IFP Agent
[Bill Klein](#) Farm Mgr, NWMHRS
[Duke Elsner](#) Agricultural & Regional Viticulture Agent

May 31, 2011

GROWING DEGREE DAY ACCUMULATIONS through May 30th at the NWMHRS

Year	2011	2010	2009	2008	2007	2006	21 yr. Avg.
GDD42	502	893	573	520	732	771	614.3
GDD50	232	486	264	240	380	403	306.0

Growth Stages at NWMHRS (5/31/11 – 8:30 a.m.)

Apple: Red Delicious – Petal fall
Gala – Petal fall
Yellow Delicious – Full bloom
Pear: Bartlett: 7.5 mm
Sweet Cherry: Hedelfingen: 8.5 mm fruit
Napoleon: 9 mm fruit
Gold: 8.5 mm fruit
Montmorency: In the shuck
Balaton: In the shuck
Apricot: 13 mm fruit
Plum: In the shuck
Grapes: 1-3" shoots

Weather Report

A big thunderstorm rolled through the region on Sunday night, but the amount of rainfall was variable at each regional weather station. May rainfall totals at the NWMHRS are 2.24". Temperatures have been on the rise, and we hit the mid-80's on Memorial Day. We have accumulated 502GDD base 42 and 232GDD base 50. We are still behind our 21-year average by about 7-10 days. We did have reports of spotty frost in the early morning hours of 27 May. Humidity levels have been relatively high in the past four days. Weather forecasts are predicting a major storm today with very high winds and large hail.

Crop Report

Apples are in bloom across the region with some early areas starting petal fall. Growers are concerned about fireblight, thinning, and Apogee application; they have been diligent about providing good coverage for apple.

Wine Grape Report

Duke Elsner, MSU-E

Bud development is anywhere from bud break to 6" shoots depending on cultivar. No signs of disease or insect injury at this time. Less than one grape berry moth per trap has been found.

Pest Report

Apple

The apple scab model has quieted down with the cool weather last week but as things heat up and rain is in the forecast it is likely that we will see infection periods over the coming days. According to the [apple scab model](#), over 90% of overwintering spores have matured and 51% have discharged. A preventative scab program is critical, particularly with the recent discovery of fungicide resistant scab isolates identified in Michigan apple orchards. Early in the season when fruit scab is not a concern and temperatures are cooler, Scala and Vanguard are good options to tank mix with EBDCs for scab control. As we move into warmer weather and the risk of fruit scab increases, growers should be considering second generation sterol inhibitors (Indar and Inspire Super) or captan tank mixed with EBDCs. As many orchards are in some stage of bloom and there is potential for trauma blight, it will be important to keep an eye on the weather and the [fire blight model](#). Based on the weather and crop development many area growers have already made at least one antibiotic

application. When the epiphytic infection potential reaches 100 (or is forecast to do so) and the average temperature is greater than or equal to 60 °F, the Enviroweather model will show the corresponding boxes on the chart turning red, which indicates that rain or trauma (high winds or hail) is needed for infection to occur. Based on the weather forecast, the EIP will be extremely high in the coming week with forecasts predicting EIP levels well over 200. Additional instructions for utilizing the fire blight model can be found on the [Enviroweather page](#).

Things have picked up in terms of insect activity, and we likely hit the peak of [spotted tentiform leafminer](#) (STLM) adult flight last week with trap catches dropping this week to an average of 125. [Oriental fruit moth](#) adults were continued to be trapped this week with an average of 9 per trap. A total of 6 [codling moth](#) were trapped this week, this following a trap catch of one last week. Codling moth management will begin in the coming weeks as most treatments target egg hatch, a predicted 250 DD50 after sustained catch. Growers looking to use an ovicide and delayed larvicide program should look to apply ovicidal materials around 100-150GDD following sustained catch. Growers can track their progression using the [codling moth model](#). Small [oblique-banded leafroller](#) (OBLR) larvae are prevalent in area apple orchards. Widespread OBLR resistance to Guthion and pyrethroids exists in northwest Michigan, so growers should be applying non-organophosphate materials to control this insect this season. In apple, management of OBLR often occurs later in the season and populations are likely kept low by lepidopteran materials commonly used to combat organophosphate resistant codling moth. Adults OBLR moths are easily trapped with pheromone baited delta traps, and larvae are also relatively easy to locate due to their leaf rolling behavior. At this time of the year, look for larvae in the terminals.

Cherry

Area scouts are reporting some [oblique-banded leafroller](#) (OBLR) activity, but larvae are still small and hard to spot in cherry. Overwintering larvae feed inside bud clusters prior to bloom, and begin feeding on fruit after petal fall. Targeting this overwintering generation is critical in cherry because they are small and easier to kill. At early petal fall, growers should scout their orchards by looking at 20 clusters per tree in five trees per orchard for larvae or feeding sites. An insecticide should be applied if they observe more than two larvae or feeding sites per tree. The materials that target this life stage are Delegate, Belt, Altacor, Voliam flexi, Entrust and Bts. Growers in northwest Michigan should not expect organophosphates or pyrethroids to provide effective control because of insecticide resistance. OBLR do not feed internally in fruit but are problematic as contaminants in tanks at harvest. [Plum curculio](#) continue to migrate into orchards from neighboring wood lots with high trap counts this week, particularly in the edge rows of blocks at the NWMHRS. Plum curculio migrate from their overwintering sites to orchards in the spring with migration lasting about six weeks with peak activity occurring 2-3 weeks after shuck split as young fruit develops. If growers are utilizing insecticides other than the organophosphates (Guthion, Imidan) the treatment timing is petal fall or shuck split depending on the mode of action. Consult the insecticide label and the MSU Extension Bulletin E154 "Michigan Fruit Management Guide" for more information. Based on a full bloom biofix of 21 May, we have accumulated 124 DD50 towards the 375 DD50 window for organophosphate application. [American plum borer](#) (APB) is out and active in higher numbers this week. APB larvae attack the cambium and cause severe damage or tree death due to their feeding habits. APB has two generations per season with trunk applications of Lorsban targeted during adult flight.

As leaves unfurl and petals drop, the potential for [cherry leaf spot](#) (CLS) infections increase. Despite the wetting events over the past week no CLS infections periods were recorded because minimum rain or temperature thresholds were not adequate to initiate infection. CLS overwinters in fallen leaves on the orchard floor and produces apothecia (sexual spore-bearing structures) in the spring. Ascospore (sexual spore) dispersal occurs during the drying period that follows a wetting event and when temperatures are between 60-85°F. Following infection, acervuli (asexual spore-bearing structures) develop on the underside of the leaf and produce a visible mass of asexual spores called conidia. Spores are dispersed from leaf to leaf by wind or rain and this secondary infection cycle can be repeated several times within a season, depending on conditions. CLS is resistant to sterol inhibitor fungicides (Indar, Elite, Orbit) in all the major fruit producing areas of Michigan. Petal fall and shucksplit application of chlorothalnil are recommended. As orchards move into first cover, products that contain strobilurin fungicides (Gem, Pristine, Adament) are recommended as they provide excellent leaf spot and powdery mildew control. Remember to alternate the use of fungicide classes during the season to manage against resistance development.

FIRE BLIGHT AWARENESS WITH THE RECENT WEATHER FORECAST

Nikki Rothwell and Erin Lizotte, NWMHRS

The weather forecasts are predicting extremely high winds and potential hail throughout the region. Growers should be applying a bactericide for fire blight control *prior* to this event, which is forecasted to begin after 2pm today. We have lots of open blooms out in the orchard, and these blossoms need to be covered as these high temperatures are helping to build the fire blight bacteria population on flower parts. These bacterial populations increase quickly, with the EIP highly dependent on degree-hours. Growers should watch the fire blight model on Enviroweather (www.enviroweather.msu.edu) to verify the EIP in their location. However, with the recent high temperatures in the past 24H, the EIP's are well over 200 at all weather stations in the region.

If growers have put on a spray this morning or last evening, they would be covered for this afternoon's event. However, if we do get the extreme weather they are predicting, should growers go back in tonight or tomorrow morning in the case of a trauma event? Based on a discussion with the MSU Fruit Team, we are recommending that growers go back in with a follow-up application after this event if an orchard had hail or damaging winds, particularly in blocks where fireblight has been a problem in the past or in highly susceptible varieties.

At this time, there is one region in northwest Michigan where we have found streptomycin resistance, and Grand Traverse County has received a section 18 for Kasumin use. Those growers know that they must be using Kasumin for fireblight control. However, if a grower has used all of his Kasumin applications (the limit is 3 applications/season), growers should apply a Mycoshield tank mixed with streptomycin. All other northwest growers should be using streptomycin for fireblight control at this time.

EXTREME FIRE BLIGHT RISK IN NORTHWEST MICHIGAN!

George W. Sundin, Michigan State University Extension, Department of Plant Pathology
Erin Lizotte, MSUE, NWMHRS

We are experiencing a period of extreme fire blight risk in northwest Michigan apple-growing areas for the period of May 31-June 7, 2011. Maryblyt epiphytic infection potential (EIP) values are well above 200 today and predicted to remain high for the next week. The EIP addresses risk in orchards with *open bloom* or where potential trauma may occur (severe

weather is predicted the afternoon of May 31).

At this time, streptomycin remains the bactericide of choice for controlling fire blight in the northwest, however, if you are located in Grand Traverse County and have streptomycin resistance, Kasumin may be applied. See Dr. Sundin's article "[Section 18 Special Exemption Label for Kasumin for Fire Blight Control In 2011](#)" for more information on Kasumin use. It is inevitable that orchards will sustain some blossom blight infection this year. **With predicted inoculum loads of the pathogen at epidemic levels, we can't expect optimal control.** What else can be done? The most important next control measure is to use Apogee (prohexadione calcium) for shoot blight management.

Apogee is a growth inhibitor that provides excellent control of shoot blight. The first timing for an Apogee spray is at petal fall of the king bloom. In northwest Michigan, we will likely be there this week in most locations and varieties. Apogee is shoot specific, i.e., the effect is only observed if the shoot is covered; thus excellent coverage is essential. The "Apogee effect" on fire blight begins approximately 10-14 days after application and research from my lab suggests that it is associated with cell wall thickening in apple shoots.

Most growers prefer to space Apogee applications out using 3 to 4 applications (once every two weeks). This strategy is effective for shoot growth control and fire blight management under low and moderate disease pressure. However, under very high disease pressure, such as what we are experiencing this year, use of a higher rate application provides better shoot blight control than lower rates.

There are two management strategies that can help growers combat fire blight in the coming days; 1) use Apogee and not miss the petal fall of the king bloom timing; and 2) growers in extreme risk areas should increase the rate used for their first application by at least 50 percent and consider doubling the rate for the first application. Return to the usual rate of Apogee used in the second and third applications. For example, growers that use rates of 8 oz / A, 8 oz / A, and 8 oz / A for their three Apogee applications in typical years should go 12-16 oz / A, 8 oz / A, and 8 oz / A this year. (See page 216 of MSUE's *2011 Michigan Fruit Management Guide* for more information on Apogee rates and usage). Apogee must be used with an organosilicone surfactant, and an equal weight of spray grade ammonium sulfate should be applied. Do not use Apogee on 'Empire' or 'Winesap' because of the potential for fruit cracking.

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ACTUAL AND PREDICTED DEGREE-DAY
ACCUMULATIONS SINCE MARCH 1, 2011

Please send any comments or suggestions regarding this site to:

Bill Klein, kleinw@msu.edu

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