Northern Michigan FruitNet 2015
Northwest Michigan Horticultural Research Center

Weekly Update

May 5, 2015

CALENDAR OF EVENTS

2015

5/5-7/14 **Leelanau County IPM Updates**
Bardenhagen Farm

5/5-7/14 **Grand Traverse County IPM Updates**
Wunsch Farm

5/6-7/15 **Antrim County IPM Updates**
Jack White Farms

5/6-7/15 **Benzie County IPM Updates**
Blaine Christian Church

5/9 **Hazardous Waste and Pesticide Collection for Antrim County**

5/30 **Hazardous Waste and Pesticide Collection for Leelanau County**

GROWING DEGREE DAY ACCUMULATIONS AS OF MAY 5, 2015 AT THE NWMHRC

Year	2015	2014	2013	2012	2011	2010	25 Yr. Avg.
GDD42	225	114	185	482	141	450	254.5
GDD50	91	27	90	242	43	205	109.9

Growth Stages at NWMHRC (April 27, 2015, 2:30 p.m.)

Apple: Red Delicious – Tight Cluster
Gala – Tight Cluster
Yellow Delicious – Tight Cluster
Pear: Bartlett: Green cluster
Sweet Cherry: Hedelfingen – Ear. White Bud
Napoleon – Ear. White Bud
Gold – Late Bud Burst
Tart Cherry: Ear. Bud Burst
Balaton: Bud Burst
Apricot: 40% bloom

Grapes: Chardonay – Scale Crack

Northwest Michigan Fruit Regional Report – May 5, 2015

Warm weather has accelerated development in all tree fruit crops, and growers will be applying protectant fungicides to protect green tissue prior to predicted rainy weather this weekend.

Nikki Rothwell and Emily Pochubay

Weather Report
The weather in northwest Michigan has gone from winter directly to summer without even stopping for spring. Last week's daytime highs were in the low to mid-50s with cold north winds. Those conditions were replaced by warm and dry air over the weekend; we reached 80 degrees F at the NWMHRC on Sunday. Despite the warm weekend, we are still lagging behind in our degree-day accumulations. Thus far, we have accumulated 225GDD base 42 and 91GDD base 50. Our 20+-year averages are 254GDD base 42 and 110GDD base 50. If the weather forecasts are correct, we will be on target with our GDD average and tart cherry bloom around May 12 here at the NWMHRC. Prior to last evening, the region was dry as our last significant rainfall was on 20 April. We also had high winds on 3 May, but despite the dry conditions, there is still moisture present in the soil. We received only 0.1" of rain over Sunday night that was replaced by a dense fog on Monday (4 May) morning. Current conditions are sunny and dry, which are predicted to continue throughout the week. The weekend forecast is for rain on Friday, Saturday, and Sunday and potentially into Monday. Growers will be covering the fast growing tissue to protect from diseases prior to the weekend. No frosty overnight conditions are in the forecast.

Crop Report
After a week of developmental standstill, the crops are again moving along—quite quickly with the recent warm weather. Cherries have seemed to move to bud burst almost overnight. If the weather predictions are correct, we will be in sweet cherry bloom on 7 May and tart cherry bloom on 12 May; these dates are similar to our 'old' bloom times we saw on a more annual basis in the mid-90s. There is and will continue to be lots of activity in the orchard to cover new growth prior to this weekend's coming rains.

Most pruning is winding down at this time. Growers are busy planting, and the soil moisture below the first few inches is a pleasant surprise for the newly planted trees. Honeybee rental time is approaching, and beekeepers are trying to move bees back from other locations to prepare for the region's upcoming cherry bloom. Honeybee hive strength is unknown at this time, but growers are hoping for good weather and strong hives as we head into the 2015 bloom.

Pest Report
Sunday evening rain and the dense fog into Monday morning was brief and did not result in an apple scab infection event at any of the northwest Michigan Enviro-weather stations. Scab spore counting is underway, and we are monitoring spore discharge in a minimally managed Jonamac block in Leelanau County. Although the scab model on Enviro-weather did not result in an apple scab infection event, we did find an average of 3 spores per spore rod that were discharged during the Sunday-Monday wetting period. As mentioned above, tree growth was accelerated during the weekend warm conditions, and considerable green tissue is present on

apples and will need to be covered prior to the possible predicted rains on Thursday evening/Friday morning through Sunday to prevent infection during the primary scab season. Protectant materials are the best option for control at this time; these products also are less at risk of resistance development and should be used at this early season timing.

With warm and wet conditions in the forecast, American brown rot (ABR) blossom blight will be a concern in sweet cherries as they approach bloom likely over the weekend. Although the potential for infection is highest when flowers are open, the pathogen can infect flowers at white bud under favorable conditions, which has been documented as 68-86 degrees Fahrenheit (75 degrees is optimal) with a minimum wetting period of 5-10 hr. Infection at the white bud stage has been severe if temperatures reach 75 degrees F with 24 hr of wetting. Growers should be protecting against the blossom blight phase of this disease if we do have warm and wet conditions toward the end of the week as we move into sweet cherry bloom. Rovral is the product of choice for ABR control at this time.

European brown rot (EBR) will also be developing and producing spores during this week's warm temperatures. With an increased spore count and extended wetting period over the weekend, we have a chance of EBR infection. Based on the predicted weather forecast, we are recommending that growers treat for EBR following the traditional two applications timings: popcorn and one week later. If Montmorency orchards had past EBR infections, growers should make sure these orchards are treated this season. At this time, Indar is the best control option for EBR. Balatons are more susceptible than Montmorency to EBR infection, and Balaton growers should be applying Indar at these two timings regardless of predicted weather conditions. However, we have also observed infection in Montmorency blocks, in particular in areas that commonly have spring fogs that settle over these orchards. Growers with this situation should also consider Indar applications.

As we approach the time to begin protecting for cherry leaf spot (CLS), growers should consider their options for early season leaf spot management and check with processors on any fungicide (and insecticide) restrictions, in particular possible restrictions with the use of chlorothalonil. Additionally, growers should be aware of the 10-day retreatment interval for Bravo products. According the Michigan Department of Agriculture and Rural Development (MDARD) and the chlorothalonil pesticide labels, there must be a minimum of 10 days between applications of Bravo, whether the application is a full cover or alternate row middle spray. We would also like to remind growers that CLS infection can occur prior to bloom when this fungus can infect stomata on open bract leaves if conditions are favorable for CLS infection. Infected bract leaves have been observed in previous seasons and could contribute to season-long challenges of keeping leaf spot in check and or severe cherry leaf spot infection and early defoliation.

Green fruit worm and American plum borer are active at the station at this time.

Grapes

Very early signs of bud swell has been seen on canes close to the ground where they have received extra heat from the soil surface, but up in the canopy of the vine buds still appear entirely dormant. Further examinations of cane cambium tissues has revealed lots of injury to all parts of canes that were above the snow cover line during the cold temperatures in February and March. I would not expect much from any buds on vinifera varieties that were not covered by snow. Some of the hybrid cultivars at the research center showed a lot of very poor cane wood during pruning, so we may see some challenges in these as well.

There is a lot of powdery mildew on canes in many sites. Dormant sprays for PM are suggested, and there is plenty of time left to get these on before bud break.

Saskatoons

Bushes are into the green tip to tight cluster stage in the Grand Traverse area. We are setting up a demonstration of pruning practices for mature bushes at Jacob's Farm (on M-72 west of Traverse City). Pruning methods are based on the Saskatoon Production Guide from the Province of Alberta and methods typically used by Michigan highbush blueberry growers. At harvest time the fruit yield and quality from the different pruning regimes and harvest systems will be compared.

HOUSEHOLD HAZARDOUS WASTE AND PESTICIDE COLLECTIONS:

Leelanau County : upcoming collection on May 30
Antrim County : upcoming collection on May 9

**Reservations are required, every county has different requirements for materials they will take back.

Grand Traverse County Hazardous Waste and Pesticide collection will be towards the end of the month--they don't announce the dates until two weeks prior. The date will be provided once it is announced.

2015 Tree Fruit IPM Update Series

Emily Pochubay and Nikki Rothwell
Michigan State University Extension

Tree Fruit IPM Updates beginning the first week of May through mid-July (as needed) will highlight management of the season's current potential pest challenges dictated by weather and pest biology. Attendees are encouraged to bring examples of pests and damage found on the farm to these workshops for identification and discussion. Workshops will be held weekly in Leelanau and Grand Traverse counties and bi-weekly in Antrim and Benzie Counties. Tree fruit growers are welcome to attend meetings at any of the locations and times that are most convenient (see below). These workshops are free and do not require registration. Certified crop advisor continued education credits (two per meeting) and pesticide recertification credits (two per meeting) will be available. We are looking forward to seeing you in a few weeks! For more information, please contact Emily Pochubay (pochubay@msu.edu), 231-946-1510.

IPM Update Dates, Times, and Locations

Leelanau County
Location: Jim and Jan Bardenhagen, 7881 Pertner Rd, Suttons Bay
Dates: May: 5, 12, 19, 26; June: 2, 9, 16, 23, 30; July: 14
Time: 12PM – 2PM

Grand Traverse County

Location: Wunsch Farms, Phelps Road Packing Shed, Old Mission
Dates: May: 5, 12, 19, 26; June: 2, 9, 16, 23, 30; July: 14
Time: 3PM – 5PM

Antrim County
Location: Jack White Farms, 10877 US-31, Williamsburg (is not correct in Google Maps) *North of Camelot Inn and South of Elk Rapids on the southeast side of US-31*
May: 6, 20; June: 3, 17; July: 1, 15
Time: 10AM – 12PM

Benzie County
Location: Blaine Christian Church, 7018 Putney Rd, Arcadia, MI 49613
May: 6, 20; June: 3, 17; July: 1, 15
Time: 2PM – 4PM

European Brown Rot Control in Tart Cherries for 2015

Nikki Rothwell, George Sundin, Tyre Proffer, and Emily Pochubay

Predicting if growers need to apply a fungicide to Montmorency tart cherries can be difficult with changing weather conditions.

European brown rot (EBR) is a disease whose infection has been hard to predict and control in the past few years. This disease caused by the pathogen *Monolinia laxa* has traditionally been a problem in Balatons, but in 2013, this disease had devastating effects on blocks of Montmorency that had slow drying conditions, such as orchard surrounded by wind breaks or in low spots within an orchard. This disease also almost always impacts Montmorency trees and trees that become infected with EBR are almost always located in regions of northwest Michigan that commonly have spring fogs that settle over these orchards; for example, Northport growers regularly treat for EBR in both Balaton and Montmorency.

At this time, we have associated EBR with cool and wet conditions around bloom time. However, because we know so little about the EBR life cycle and its optimal development conditions, applying fungicides for control of this disease has been challenging. For example, in 2013, we had warm and dry conditions during the popcorn stage of development. Under our current thinking, EBR does not develop optimally under warm and dry conditions, and as a result, most growers did not apply a fungicide at this popcorn timing in 2013. However, these conditions quickly changed, and the warm and dry weather turned to cold and wet. Consequently, many Montmorency blocks suffered atypically high levels of EBR infection in 2013. Conversely, in 2014, we had cold and wet conditions leading up to bloom, but during bloom, the weather was hot and dry. In this case, we had very few EBR infections, even with the high inoculum levels from the 2013 epidemic. In a nutshell, determining when and if we should spray for EBR is a challenging decision for growers.

Unfortunately, we are working our way toward that difficult decision later this week (week of May 4, 2015). Most orchards in west central and northwest Michigan will be approaching the popcorn stage of development toward the end of this week, and conditions are predicted to be warm and dry for the week (high 70s and low 80s). Rain is predicted to move into the regions

this weekend, and temperatures are forecasted to be close to 80 degrees F. In short, conditions leading up to bloom, including popcorn, will be warm and dry but will be replaced by warm and wet during the start of bloom. Therefore, growers need to make a decision to apply a fungicide at popcorn under conditions that would not typically be optimal for EBR development.

Our preliminary laboratory data and the EBR literature suggest that the EBR pathogen will produce spores under warm conditions, but infection is much more favorable under cool conditions. The wetting period for this weekend is predicted to last throughout the weekend and into Monday. Because this wetting period is forecasted to be so long (3+ days), there is potential for EBR infection, particularly if the temperatures do not get as warm as predicted. In a nutshell, with the predicted forecast of initial warm weather for the remainder of the week, we could see the EBR pathogen produce lots of spores. With an increased spore count and extended wetting period over the weekend, we have a chance of EBR infection. Dr. Tyre Proffer is currently conducting trials to determine the optimal temperatures for EBR infection, but those data are forthcoming.

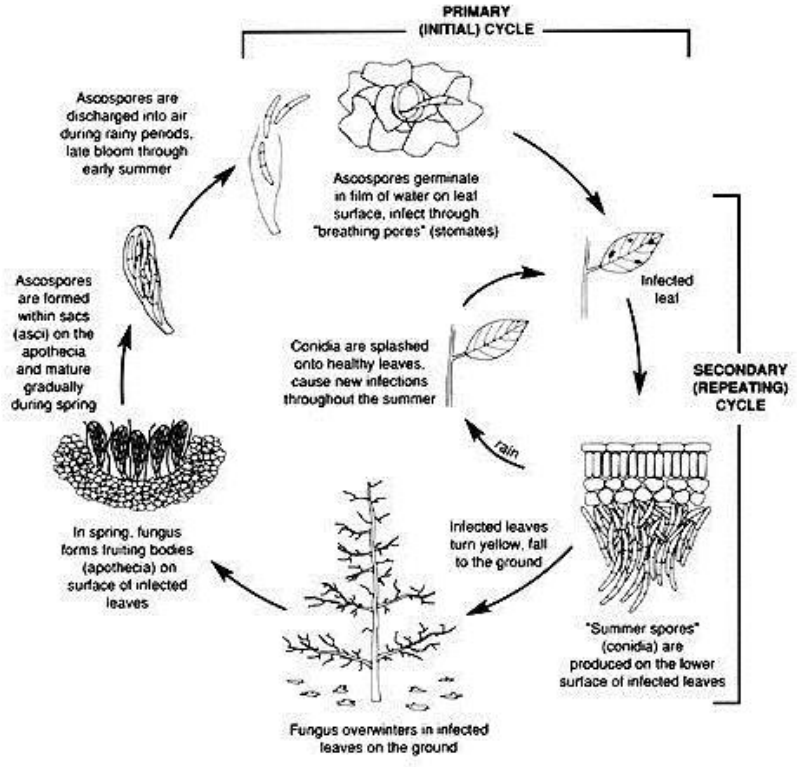
Based on our current EBR thinking and the predicted weather forecast, we are recommending growers treat for EBR following the traditional two applications timings: popcorn and one week later. At this time, Indar is the best control option for EBR. Two applications should be applied at the above timings at a rate of 6 fl. oz/acre. Vanguard has also shown some efficacy against the EBR pathogen under non-optimal conditions. All Balaton growers should be applying Indar at these two timings regardless of predicted weather conditions. We are currently screening other fungicides for control of EBR at the Northwest Michigan Horticultural Research Center.

CHERRY LEAF SPOT REVIEW

E. Pochubay, N. Rothwell, and G. Sundin

Biology and Infection

Cherry leaf spot (CLS) fungus overwinters in infected leaves on the ground. In the spring, ascospore producing bodies are formed on the surface of infected leaves. These ascospores mature and are discharged into the air during rainy periods early in the season. CLS infections occur when discharged ascospores germinate on wet leaf surfaces and infect through leaf stomates (i.e. breathing pores). Leaves need to be open and fully-expanded for CLS to infect the stomata. Ascospores can be released from overwintering fruiting bodies for up to 6 weeks after petal fall, and the highest rate of spore discharge occurs when temperatures are >61 degrees Fahrenheit. Fewer spores discharge when temperatures are in the 50s, and minimal



Cherry leaf spot disease cycle.

discharge occurs between 39-46 degrees Fahrenheit. If leaves become infected with CLS ascospores, a secondary life stage of the CLS fungus called conidia develop on the undersides of infected leaves and spread to adjacent leaves during rainy periods resulting in new infections (i.e. secondary infection cycle), if leaves are not protected with fungicide. Unlike apple scab, CLS control is needed season-long rather than just during the primary phase of this pathogen's development.

Michigan State University used to recommend that the first cherry leaf spot fungicide application be made around tart cherry petal fall to adequately protect the first fully expanded leaves from fungal infection. Because CLS infects leaves through stomata, these leaf structures are not open and functional until the leaves are open and mature. However, as we found in 2012 when we sustained early and epidemic levels of cherry leaf spot, the past strategy did not take the first bract leaves into account. Bract leaves open prior to bloom and have stomata that can be infected early. Early infection of bract leaves can set the stage for a high level of CLS infection which could likely require diligent control for the remainder of the season.

Protecting leaf tissue prior to possible infection events is critical because once CLS becomes established in the tree, the conidial stage of this disease will produce tremendous spore numbers from lesions established on the leaves. Controlling the ascopsores coming up from the orchard floor is easier to control than the conidia that are released from lesions on the leaves; there are more spores developing from lesions than ascospores that are coming up from leaves overwintering on the ground. Additionally, spores from lesions already present on the leaves are much more likely to find new leaf targets within the tree than spores coming up from the ground. The distance from one leaf to another leaf on a tree is minimal, and the potential for spores to infect by moving from one leaf to an adjacent leaf is "easier" than for spores shot from ground level to hit the leaf target up in the tree canopy. This early infection from leaf to leaf can result in a major infection event. Significant CLS infection can lead to early defoliation, reduced photosynthate storage in roots, increased susceptibility to winter injury, and decreased fruit set in the following season.

Prior to shuck split, the recommended fungicide for CLS management is chlorothalonil (Bravo and generics). This fungicide is a multi-site protectant, is excellent for leaf spot control and is not at risk for fungicide resistance development. Although these fungicides provide excellent control, they are not systemic and can wash off more readily than some of the more systemic fungicides. If we do come into periods of wet weather during the time prior to shucksplit (the recommended timing for the use of chlorothalonil) we want to remind growers of the 10-day retreatment interval. According to Michigan Department of Agriculture and Rural Development (MDARD) and all chlorothalonil labels, 10 days is the necessary retreatment time between any chlorothalonil applications – whether these applications are applied as full covers or alternate row sprays. Please make a note of this label requirement.

Additionally, it has been brought to our attention that chlorothalonil could be in short supply this season. Captan is a very good alternative to chlorothalonil for early season cherry leaf spot control. Captan 80 WDG at a rate of 2.5 lb/A can provide very good to excellent control of cherry leaf spot.

PRIMARY APPLE SCAB SEASON IN NORTHWEST MICHIGAN

Growers are protecting green tissue from possible apple scab infection.

E. Pochubay and N. Rothwell

Biology and Infection

Apple scab, *Venturia inaequalis*, is a fungal disease that infects both the leaves and fruit of apples. The fungus overwinters in leaf litter on infected tissue from previous season and produces ascospores in the spring. Ascospores are released from overwintering structures (pseudothecia) during rainy/wet periods, and they land on susceptible green tissue, germinate and penetrate the leaf tissue (note: tissue must be wet for spore germination). If fungicides do not prevent this penetration, the result is a primary scab infection.

Ascospore release is influenced by light, and 95-99% of all ascospores are released during the day. However, nighttime wetting events can stimulate spore release, especially in orchards with high levels of inoculum (~3-5% leaf or fruit infection in the previous season). Temperature, duration of wet periods, and leaf wetness are key factors influencing apple scab spore release and germination during infection events.

If tissue is not protected early in the season, and leaves become infected by ascospores during the primary disease cycle, preventing secondary infections on fruit can be challenging. If growers do not control primary infection and the disease takes a foothold in an orchard, excellent coverage is needed to prevent the spread of scab spores to other leaves and eventually the fruit. Achieving excellent coverage becomes increasingly difficult as the tree's canopy sizes throughout the season.

Scab infection events and their severity (i.e. low, moderate, high) are influenced by the level of inoculum present, the duration, frequency, and time of day of wet periods, and temperature during those wet periods. Additionally, temperature and the duration of wetness are key factors in germinating spores. For example, this table demonstrates the influence of temperature on spore germination:

Time to:	**41ºF**	**50ºF**	**59ºF**	**68ºF**
10% spore germination	11.8 hr	6.8 hr	8.1 hr	3.4 hr
50% spore germination & germ tube formation	24.2 hr	22.1 hr	17.1 hr	13.5 hr

Additionally, the following table shows the relationship of temperature and duration of wetness needed to initiate scab infection. The Enviro-weather model currently uses data from the Mills revised by Jones column to determine the onset of possible infection events. The MacHardy & Gadoury (1989) amended by Stenvand et al. (1997) is more a more conservative approach for determining scab infection. However, this revised portion of the table is more applicable for orchards that had high (at least 5%) apple scab infection in the previous season. Growers that have successfully controlled scab in past seasons can rely on the Mills table that Enviro-weather uses in its model.

Temperature Average	Mills revised by Jones	MacHardy & Gadoury (1989), as amended by Stenvand et al. (1997)
34	48	41
36	48	35
37	41	30
39	33	28
41	26	21
43	21	18
45	17	15
46	16	13
48	15	12
50	14	11
52	12	9
54	11.5	8
55	11	8
57	10	7
59	10	7
61-75	9	6
77	11	8

Management

The critical time for successful season-long scab management is early during the disease's primary cycle. Growers that prevent initial infections will reduce the potential for fruit scab as well as minimize a season-long spray program to control this disease. With this season's slow start followed by a warm weekend, apple growth stages vary across northwest Michigan, but most orchards have enough visible green tissue that is susceptible to scab. The wet and warm conditions predicted toward the end of the week and into the weekend will likely result in apple scab infection periods, and growers should protect green tissue with a protectant fungicide prior to this potentially long rain event.

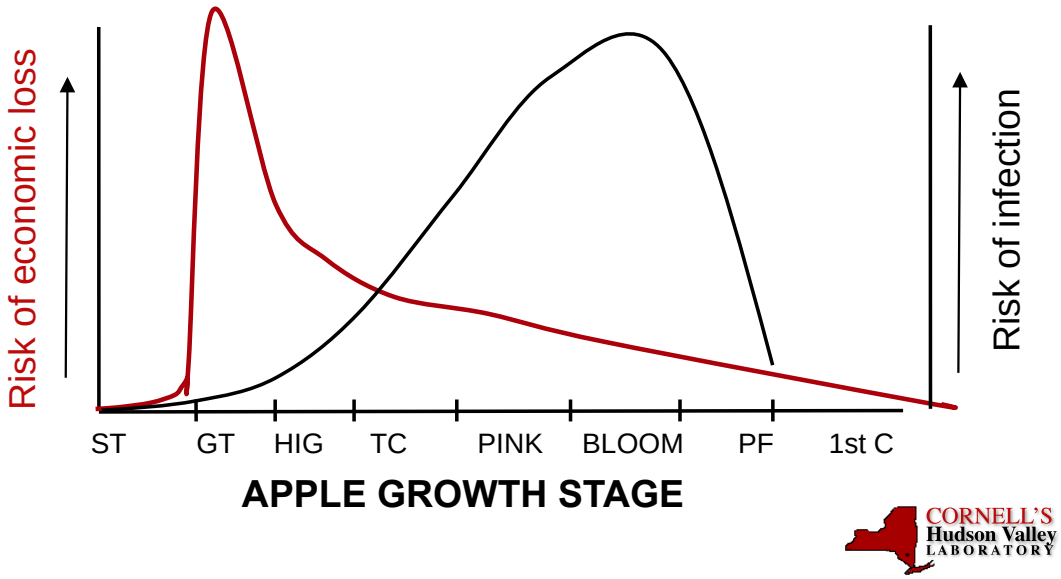
At this time in the early season, protectant fungicides should be used. As mentioned previously, fungicides need to be applied prior to rain and possible infection events to prevent scab spores from infecting green tissue. We have few fungicides that have 'back action', so growers must apply fungicides preventatively. Compounds that are at-risk of resistance development should be used when disease pressure is high and during periods of rapid leaf growth—we typically recommend these products to be use at or around pink when the majority of scab spores are released in an orchard. However, with the recent warm temperatures, tree growth was accelerated over the weekend and as this growth continues, growers will need to be diligent

with their protectant spray programs if the wet conditions continue into next week. The table below provides a non-comprehensive list of materials that are recommended for apple scab.

Protectants	EBDC, Captan, Sulfur
Anilinopyrimidines	Vangard, Scala
	Syllit
2nd Generation Sterol Inhibitors	Inspire Super
SDHIs	Merivon (pre-mix) Luna Tranquility (pre-mix) Fontelis (single component) Aprovia (single component)

Apple Scab Infection Risk

Risk of economic loss: Infections incurred soon after budbreak pose the greatest risks in sprayed orchards.



TRY THESE TOOLS TO TAKE THE WORRY OUT OF APPLE THINNING

Posted on **April 21, 2015**, MSUE News, by Philip Schwallier, and Amy Irish-Brown, Michigan State University Extension

Chemical thinning is the most difficult annual grower practice, yet the most important. Too little thinning will produce a crop of small fruit and poor return bloom. Over-thinning will produce a crop of large apples with quality issues. Michigan State University Extension recommends Precision Cropload Management as a strategy to use all available techniques and information to

thin to a precise target crop load. Thinning early and using crop load tools will make thinning easier, more successful, and precise, and also get best fruit quality with good return bloom.

The first step is to evaluate your block and set a target crop load. We use the target crop load to dormant prune to a 2x target bud load. If your target crop load is 100 apples on a tall spindle tree, then the dormant fruit bud load would be 200 per tree. Trees often have five times this target bud load before pruning. If still in the dormant season, prune each tree to 2x of the bud load. Then plan on using the Predicting Fruitset Model and the Carbohydrate Model to help fine tune thinning activities and rates. Plan on thinning early, starting at full bloom or at least at petal fall. Early applications of thinners will help get the thinning started. Usually thinning at full bloom or petal fall will thin at mild levels (0 to 15% thinning). In 2013 and 2014, aggressive thinning occurred at these timings because there was significant tree stress as predicted by the carbohydrate model and the predictions were correct.

At pink, set up the Predicting Fruitset model by marking 15 blossom clusters on 5 trees per block. These marked clusters will be used at the 6 mm stage to make set measurements and ultimately predict fruitlet abscission. The next step will be to spray a thinner at full bloom. I believe your three choices are ATS, NAA or MaxCel. One of these thinners should be used to get some thinning started. At full bloom, the set is unknown but apple trees usually will set 200 percent of a crop and perhaps more, if bud load was not reduced during the dormant season. At full bloom you will have some of the information to help predict fruitset, which is spring weather conditions and forecasts as well as flower health, potential bee activity, potential pollination and potential fertilization. If conditions appear to be good and the forecast is good, then fruitset should be good. Thinning at full bloom is a positive action. If conditions are poor, then wait until petal fall to thin. Before applying a full bloom thinner, use the predictions of the Carbohydrate Model. Throughout the chemical thinning window, the Carbohydrate Model can be used to adjust thinning rates up or down depending on the amount of stress predicted. If predictions are for no stress, then apply normal thinning rate or higher rates. If high stress is predicted, reduce rates or do no thinning. The same is true at other thinning times.

Next is the petal fall to 6-mm spray. Once again fruitset is unknown, but more actual bloom and bee information has occurred. Consult the Carbohydrate Model for stress prediction and adjust rates accordingly. Apply thinners when weather is favorable. Now at 6-mm stage, measure the blossom clusters marked at pink. This will give a baseline measurement to base fruitlet growth in the next measurement (about 5 to 7 days later). The difference between these two measurements will be used by the Predicting Fruitset Model to predict percent set and thus, determine if the target crop load is close. If not, thin again and measure again, but use the Carbohydrate Model to adjust this next thinning treatment.

Repeating fruit measurements; add this data to the Predicting Fruitset model; check the Carbohydrate Model; and re-thin. This routine will be continued until the thinning is correct or the fruits are too big to chemically thin. This leaves only hand-thinning to correct the crop load.

Using these tools and information will first get some thinning done early and the models will help adjust rates and repeat applications. By performing these Precision Cropload Management activities, early, successful, target thinning can be accomplished and growers will gain great experience and confidence in their thinning program while reducing the personal stress that so often makes thinning a difficult activity. For more information and to get a copy of the Predicting Fruitset Model, visit www.apples.msu.edu.

MITICIDES OPTIONS FOR CONTROLLING MITES IN FRUIT

Many options are available for mite control in fruit crops.

Posted on **May 4, 2015** by MSUE News, by John Wise, Rufus Isaacs and Larry Gut, Michigan State University Extension, Department of Entomology

Mites can be significant pests of fruit crops. There are many miticides available for control of European red mites (ERM), two-spotted spider mites (TSSM) and rust mites (RM), as well as apple and pear rust mites, pear blister mites, plum nursery mites and blueberry bud mites. However, according to Michigan State University Extension, 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.

Miticides to use on fruit crops to target certain mites.

Compound	Fruit crop	Mites	Life stage target	Seasonal timing	Residual control
Superior, Stylet Oils	All fruit crops	ERM, RM	egg/larvae	Early (pre-bloom)	2-6 weeks
Lime-Sulfur	Pome, stone, blueberry	RM[3]	motiles*	Early (delayed-dormant)	2-6 weeks
Dimilin	Pear	RM	Motiles*	Early (pre-bloom)	2-6 weeks
Savey	Pome, stone	ERM	Egg/larvae	Early***	8-12 weeks
	Pone, 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, strawberry	ERM, RM	Motiles*	Early****	8-12 weeks
		TSSM	Motiles*	Mid (or threshold)	6-8 weeks
Agri-Flex	Pome, grape	ERM, RM	Motiles*	Early****	8-12 weeks
Gladiator	Pome, stone, grape	ERM, RM	Motiles*	Early****	8-12 weeks
		TSSM	Motiles*	Mid (or threshold)	6-8 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	Egg, motiles*	Early (or threshold)**	8-10 weeks
	Stone fruits	TSSM	Egg, motiles*	Mid (or threshold)	6-8 weeks
Nexter	Pome, stone[1], 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
Nealta	Pome, grape	ERM	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	Eggs, motiles*	Mid (or threshold)	4-6 weeks
Vandex	Pome, stone	ERM	Motiles*	Mid (or threshold)**	4-6 weeks
	Pome, stone, grape, caneberry, strawberry	TSSM	Motiles*	Mid (or threshold)	4-6 weeks
Endosulfan	Apple, blueberry[2]	RM[3]	Motiles*	Mid (or threshold)**	2-6 weeks
Sulforix	Pear, blueberry	RM[3]	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 cherries
[2] Post-harvest only for blueberries
[3] Including pear blister mite

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WEB SITES OF INTEREST:

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

This issue and past issues of the weekly FruitNet report are posted on our website:
http://agbioresearch.msu.edu/nwmihort/faxnet.htm

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

Information on cherries is available at the new cherry website:
http://www.cherries.msu.edu/

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

Fruit CAT Alert Reports has moved to MSU News
http://news.msue.msu.edu