Northern Michigan FruitNet 2013
Northwest Michigan Horticultural Research Center

Special Update

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FUNGICIDE CONSIDERATIONS FOR CHERRY LEAF SPOT CONTROL AT FIRST COVER

George W. Sundin, Dept. of Plant, Soil, and Microbial Sciences, MSU
Nikki Rothwell, Northwest Michigan Horticultural Research Center

The first cover spray timing after shuck split is a critical disease timing in tart cherry orchards, and fungicide sprays must target both cherry leaf spot and powdery mildew diseases.

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. As spots accumulate on leaves, the leaves turn yellow and fall. The amount of lesions required to cause leaf yellowing and drop is variable. 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.

Ascospore discharge from the cherry leaf spot pathogen is highest over a wide temperature range (60 to 85°F) and lowest at 41 to 46°F. Ascospores are usually discharged starting at petal fall and continuing for the next 4-6 weeks. 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.

Prior to shuck split, the fungicide of choice for CLS management is chlorothalonil, because this is a broad-spectrum fungicide with excellent efficacy against CLS. After shuck split, Bravo WeatherStik is the only chlorothalonil fungicide that can be used for CLS, and must be used under conditions of the Section 24(c) label.

The first cover spray timing after shuck split is a critical disease timing in tart cherry orchards. This is not only because warming temperatures favor CLS spore discharge and infection, but also because other diseases such as powdery mildew (PM) become active (see accompanying article). At first cover, fungicide applications need to target both CLS and PM.

There are three currently-registered fungicides that effectively control both CLS and PM. These are the new SDHI premixes Luna Sensation and Merivon and the strobilurin fungicide Gem. Luna Sensation and Merivon both provide excellent control of both CLS and PM. These new or second-generation SDHI premixes are replacements for Pristine. Pristine contains the older or first-generation SDHI compound boscalid, and we have detected resistance to boscalid in CLS populations in NW and West central Michigan orchards. Our field trial results show that both Luna Sensation and Merivon effectively control boscalid-resistant CLS. For resistance management, these two practices are absolutely critical:

1. Use Luna Sensation and Merivon at high-label rates! Suggested rates are 5.6 fl oz/A for Luna Sensation and 5.5-6.5 fl oz/A for Merivon.

2. Both of these premixes should also be tank-mixed with Captan. A minimum rate of Captan 80 WDG to be included would be 1.75 to 2 lbs per acre.

Gem remains highly effective against both CLS and PM. This fungicide is also prone to resistance development and we have observed this happen with apple scab. Because of the length of time in years we have been using Gem on tart cherry, this fungicide definitely should be tank-mixed with 2 lbs Captan 80 WDG per acre.

LINKS
Video: Evaluation of SDHIs for control of cherry leaf spot, powdery mildew, and American brown rot
http://www.youtube.com/watch?v=eb6mbHfIY9k

Video: SDHI fungicide premixes: resistance management strategies for the SDHIs
http://www.youtube.com/watch?v=6nVuEI_qeww

Video: Identifying cherry leaf spot in tart cherry
http://www.youtube.com/watch?v=zrqHIJWnfjs

POWERY MILDEW CONTROL IN TART CHERRY ORCHARDS

George W. Sundin, Dept. of Plant, Soil, and Microbial Sciences, MSU
Nikki Rothwell, Northwest Michigan Horticultural Research Center

Control of powdery mildew in tart cherry orchards is best initiated at the first cover timing after shuck split. The new SDHI premixes Luna Sensation and Merivon, or the strobilurin Gem, are the most effective fungicides for powdery mildew control in tart cherry.

Powdery mildew (PM) can be a problem in tart cherry orchards, particularly in young orchards. This fungal pathogen can also cause defoliation during mechanical harvesting, if the infection is severe. PM infection tends to occur on the most actively-growing tissue.

The biggest issue for PM control is the prevention of initial fungal infection. We currently do not have fungicides that will eradicate powdery mildew, so growers need to control this disease before they see it by using protectant products. Thus, by the time you see the white mycelium on the leaves at or before harvest-time, it is too late for control.

The most important spray timing for PM control is the first cover timing, i.e. the first spray application after shuck split. Prior to shuck split, chlorothalonil (Bravo and other generics) is the fungicide of choice in tart cherry orchards due to its excellent activity in cherry leaf spot control. Chlorothalonil is not effective against poswdery mildew. Fortunately, at these earlier timings, the PM fungus is generally not active. The first cover timing represents the first chance to protect the orchard from the initial PM infection. *This spray is critically important*. We've shown in our previous research that if this timing is missed, the amount of PM-infected leaves can increase by at least threefold at harvest. We've also found that if fungicides targeting PM are only applied closer to harvest, PM infection can get completely out of hand by mid-August (~ 70% incidence of leaf infection).
The best fungicides currently available for PM control are the new SDHI premixes Luna Sensation and Merivon and the stobilurin fungicide Gem. Other fungicides including sterol-inhibitors and sulfur provide some PM control but are not nearly as effective as Luna Sensation, Merivon, or Gem. While copper fungicides or the combination of Syllit + Captan are both excellent for control of cherry leaf spot, they are weak against PM.

There is a PM fungicide available called Quintec (quinoxyfen). This fungicide has a mode of action that is different than the SDHIs or strobilurins so it is a good choice for resistance management. Quintec at 7 fl oz per acre has performed very well in PM trials on cherry in Washington state. However, Quintec has no activity against cherry leaf spot so that must be remembered if this fungicide is used. The best mixing partner for Quintec for cherry leaf spot control would be Bravo Weather Stik (used under the conditions of the Section 24(c) label).

LINKS
Video: Evaluation of SDHIs for control of cherry leaf spot, powdery mildew, and American brown rot
http://www.youtube.com/watch?v=eb6mbHfIY9k

Video: SDHI fungicide premixes: resistance management strategies for the SDHIs
http://www.youtube.com/watch?v=6nVuEI_qeww

THINKING ABOUT CODLING MOTH, THE MODEL, AND THE HOT AND COLD TEMPERATURES

N.L. Rothwell, NWMHRC

With the current temperature fluctuations, we have seen inconsistent activity of pest insects in orchard systems. Since May 1, we have seen more than our fair share of two or three warm, 75 degree F days followed by days that topped out in the mid-50s; it has not been usual to see temperature swings of 25 degrees this season. Because all insect development is based on temperature, we have seen bursts of activity during these warm periods, and little to no activity during the cold snaps.

Codling moth (CM), like all insects, is dependent on temperature for development, but for this insect to successfully lay eggs in fruit, a series of factors needs to align. First, in warm springs, we have earlier emergence of CM adults, and females will lay more eggs. In this situation, we can have a higher CM population, which in turn, has an increased potential for a higher proportion of larvae in the fruit at harvest unless a solid insecticide/mating disruption program is used. As with all different insect species, a smaller population is easier to control than a large one. We have also seen a third or a partial third generation of CM in years with warm springs because of the accelerated development of the first and second generations. However, in years with cool springs, nature is in our favor in terms of CM development: cooler dusks mean less activity and mating flights and for each day with cold temperatures, female CM fecundity or egg-laying potential is reduced. Few eggs are laid at temperatures below 62 degree F, but as temperatures approach 70 degrees, egg-laying increases greatly. After four days of temperatures at or below 60 degrees F, a CM female's egg laying capacity is reduced by 75%. In short, cooler temperatures help by naturally reduce CM populations.

The current codling moth model is designed to help growers best time insecticides to prevent entry of larvae into fruit. The model is initiated on March 1st. Using 50 degree F as a base, degree-days (DD) for codling moth activity are as follows:

1st generation

- 0 DD--first adult emergence (biofix 1)
- 250 DD--first eggs hatch β treat*
- 350 DD--20% egg hatch
- 550 DD--peak egg laying

2nd generation

- 1,060 DD--first emergence of second generation adults (biofix 2)
- 1,250 DD--first egg hatch β treat*
- 1,600 DD--peak emergence of second-generation adults
- 1,700 DD--peak egg laying by second-generation adults

The challenge for a year like this one with high and low temperatures is determining a 'biofix' date. For the past few years, we have been setting a biofix for each orchard based on monitoring with pheromone traps. We put pheromone traps into the orchard prior to bloom, and we begin accumulating degree days (base 50 F) on the day (biofix) at which the first moths (5+) are trapped after moths are captured on *two successive trapping dates*. For example, if we caught our first moths (5+) on Monday, June 3 and we catch moths again on Monday, June 10 (5+ moths), then the biofix date would be June 3, and we would start accumulating degree days from that date.

In talking with Dr. Larry Gut, he is thinking that maybe this mindset of biofix should be replaced with something more like a 'cohort'. A cohort in this situation is a group of moths that are flying on a warm night(s) and are captured in the trap—this group of moths is capable of mating, laying eggs, and the hatching larvae pose a threat to the fruit. When this first cohort is caught in the traps, this is our 'biofix' date because this group of insects has the potential to infest fruit. So, in a warmer season, these cohorts fly on the first warm evenings, and we catch the moths in our pheromone traps; when we come back the following week, we see another cohort of moths flying and set the biofix date at the first trap catch—the biofix concept. However, when we do not see a successive catch of moths two weeks in a row (i.e. growers catch moths the first week and not on the second week) should a grower set a biofix date on that first flight, even if he/she did not get moths in traps during that second week? This situation is typical in a year like this one where we have had a few warm evenings sprinkled in with cold temperatures—we caught moths last Friday and Saturday night (May 31 and June 1), but with cold temperatures for the remainder of this week, we will not likely have moths in the traps on this coming Friday and Saturday night—should we set the biofix date for May 31?

With this new cohort thinking, it becomes a numbers' game. If a grower caught ~20 moths on May 31 and there were no moths in traps this Friday (June 7), we would consider that first cohort a threat to fruit with higher traps counts of 20 moths/trap and set the biofix date on May 31. On the other hand, if we caught 1 moth on May 31, and again catch no moths on June 7, and with a trap catch so low on that first catch (1 moth/trap), we would not consider that first cohort a threat to fruit and would not set a biofix on May 31. The situation becomes more complicated if a grower catches ~5 moths on May 31 and nothing on June 7—is that first cohort a threat? At this point, a grower will have to take into account other factors to decide if this first cohort of minimal catch poses a potential problem: past history of CM, spray program, mating disruption, etc.

In short, the biofix or cohort strategy is only a guiding principle, and in a year with temperature fluctuations, it is a challenge to decide when to set this biofix and to use this date to best time insecticide applications for CM. In addition, population size influences trap catches: the higher the population, the higher the trap catches, the potentially more difficult to control the population. Therefore, growers should be trapping their own blocks rather than relying on the NW Station or a neighbor's trap counts. For instance, the CM populations are low here at the NW Station, and we have not yet set a biofix date, but growers that have higher populations set their biofix date two weeks ago. Despite this confusion with a biofix date, this date is important because all insecticide recommendation timings are based on this trap catch, so whether growers use a strict biofix or the cohort strategy, he or she will need to know this date to apply insecticide applications at the best timing.

Using the CM Model. Locate the Biofix Date (first date of sustained catch) on the top row. Follow that column down to determine the Base 50F Growing Degree Days (GDD) that have accumulated between the biofix date and the date listed at the left side of that row.

Sparta Codling Moth Assist Chart (Report issued 6/18/2006 15:21)

		Temperature (F)			Degree Days Base 50 F		Biofix Date (Sustained catch)														
Day	Date	Max	Min	Avg	Today	Since 3/1	5/10	5/12	5/14	5/16	5/18	5/20	5/22	5/24	5/26	5/28	5/30	6/1	6/3	6/5	6/7
Mon	6/12/2006	72.7	46.8	59.7	10	631	398	380	380	371	355	351	345	337	311	273	216	172	136	107	79
Tues	6/13/2006	75.8	49.4	62.6	13	643	411	393	392	384	368	364	358	349	324	286	229	185	149	120	91
Wed	6/14/2006	76.9	52	64.5	14	658	426	407	407	398	382	379	372	364	338	300	243	199	163	134	106
Thu	6/15/2006	80.7	54.2	67.5	18	675	443	425	424	416	400	396	390	381	356	318	261	217	181	152	123
Fri	6/16/2006	86.1	65.6	75.8	26	701	469	450	450	441	425	422	415	407	381	344	287	242	207	178	149
Sat	6/17/2006	90.4	67.6	78.9	29	730	498	479	479	470	464	451	444	436	410	373	315	271	236	207	178

Forecast data:

Compound trade name	**Chemical class**	**Life-stage activity**	**Optimal spray timing for codling moth**	**Mite flaring potential**
Guthion, Imidan	Organophosphates	Eggs, Larvae, Adults	Biofix + 250 DD	L - M
Asana, Warrior, Danitol, Decis, Baythroid XL	Pyrethroids	Eggs, Larvae, Adults	Biofix + 250 DD	H
Rimon	IGR (chitin inhibitor)	Eggs, Larvae	Biofix + 100 DD Residue under eggs	M*
Delegate	Spinosyn	Larvae	Biofix + 250 DD	
Altacor, Belt	Diamide	Eggs, Larvae	Biofix + 200-250 DD	
Assail, Calypso, Clutch/ Belay	Neonicotinoid	Larvae, Eggs & Adults (limited)	Biofix + 200-250 DD Residue over eggs	M*
Intrepid	IGR (MAC)	Eggs, Larvae, Adults(sublethal)	Biofix + 150-200 DD Residue over eggs	L
Avaunt	Oxidiazine	Larvae	Biofix + 250 DD	L
Esteem	IGR (juvenoid)	Eggs, Larvae	Biofix + 100 DD Residue under eggs	L
Proclaim	Avermectin	Larvae	Biofix + 200-250 DD	L
Granulovirus	Biopesticide	Eggs, Larvae	Biofix + 250 DD Residue over eggs	L
Voliam flexi	Diamide + Neonic.	Eggs, Larvae	Biofix + 200-250 DD Residue over eggs	

Tourismo	Diamide + IGR	Eggs, Larvae	Biofix + 200-250 DD	
Leverage	Pyrethroid + Neonic.	Eggs, Larvae, Adults	Biofix + 200-250 DD	H

*** May cause mite flaring in combination with carbaryl or pythrethroids that kill predacious mites.**

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 have moved to MSU News
http://news.msue.msu.edu