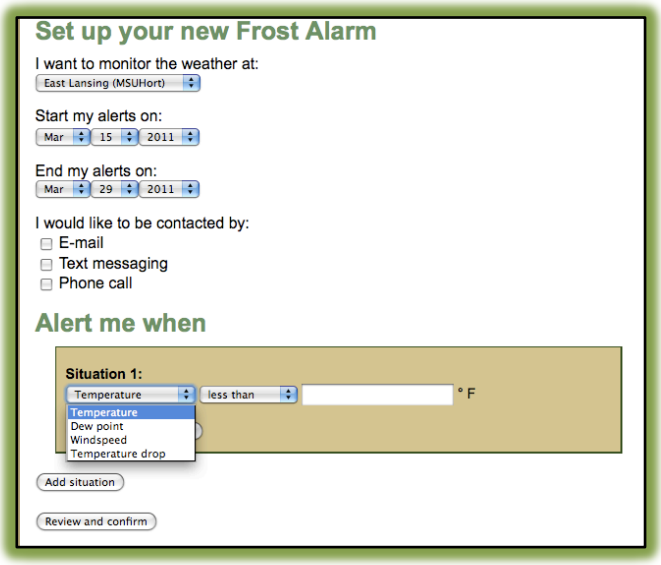
New Frost Alarm Available Now on Enviro-weather

Get notified of freezing conditions 24 hours a day, 7 days a week.

Beth Bishop
Enviro-weather Coordinator

If you'd like to receive advanced warning of potential frost-freezes, Enviro-weather's new Frost Alarm may be just what you are looking for. This new, premium service is available by subscription. For $100 per year, you can monitor weather at one or more Enviro-weather stations and choose the exact weather conditions you wish to be notified for. If the selected station(s) records weather data meeting specified conditions, an alarm is generated and you are notified by phone call, text message, and/or email.

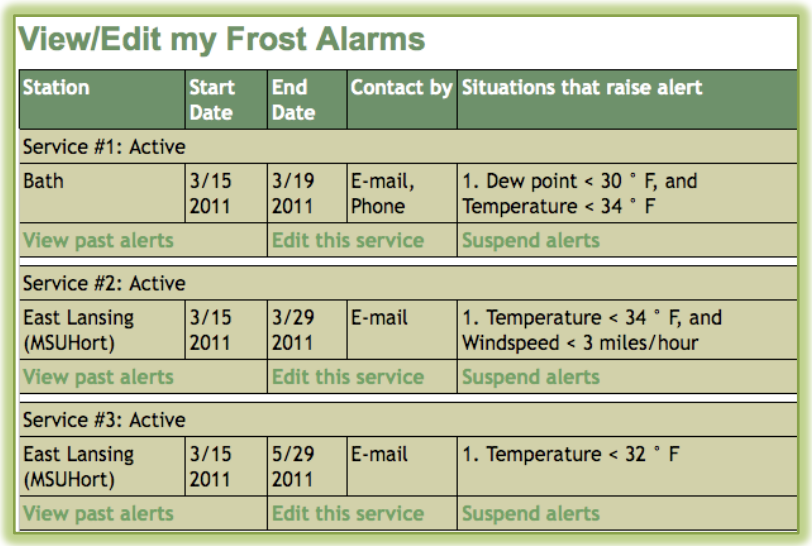


For each station chosen, users can select a combination of temperature, dew point, wind speed and temperature drop (Figure 1).

Figure 1. Setting up your frost alarm; selecting weather stations and conditions to generate alarm.

Users can combine as many weather conditions (temperature, temperature drop, wind speed and dew point) as they wish for one alarm. For example, users can choose to be notified if the temperature is less than 35F AND the dew point is less than 32F. In that case an alarm would be generated if the temperature was 34F and the dew point was 29F. But it would not be generated if the temperature was 34F and the dew point was 33F.

Users can also can also create multiple "situations" (unique combination of conditions) for a station. Each "situation" will generate a Separate alarm when conditions are met They can choose to monitor conditions at as many stations as they want (Figure 2).



View/Edit my Frost Alarms

Station	Start Date	End Date	Contact by	Situations that raise alert
Service #1: Active				
Bath	3/15 2011	3/19 2011	E-mail, Phone	1. Dew point < 30 ° F, and Temperature < 34 ° F
View past alerts		Edit this service		Suspend alerts
Service #2: Active				
East Lansing (MSUHort)	3/15 2011	3/29 2011	E-mail	1. Temperature < 34 ° F, and Windspeed < 3 miles/hour
View past alerts		Edit this service		Suspend alerts
Service #3: Active				
East Lansing (MSUHort)	3/15 2011	5/29 2011	E-mail	1. Temperature < 32 ° F
View past alerts		Edit this service		Suspend alerts

Figure 2. This user has set conditions for three different situations that could generate a frost alarm. He has chosen to be notified by email AND by phone if the Bath weather station registers dew points less than 30F and temperatures less than 34F. He will also receive an email notice if the temperature at the East Lansing (MSU Hort) station is less than 34 F with a windspeed of less than 3 miles per hour. He will receive an email alarm if the temperature at this station is less than 32F.

The frost alarm service is available now. To sign up, go to http://www.enviro-weather.msu.edu/frostalarm.php, click on "sign up beginning March 1" then select "Data and Service Subscriptions."

For more information, go to http://www.enviroweather.msu.edu/frostalarm.php. Please contact me, Beth Bishop at bishopb@msu.edu or (517) 432-6520 with your questions, comments and suggestions.

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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

April 26, 2011

GROWING DEGREE DAY ACCUMULATIONS through April 25th at the NWMHRS

Year	2011	2010	2009	2008	2007	2006	21 yr. Avg.
GDD42	97	325	136	220	205	262	179.7
GDD50	28	137	48	108	80	115	73.3

Growth Stages at NWMHRS (4/25/11 – 4:00 p.m.)

Apple: Red Delicious – Silver tip
Gala – Silver tip
Yellow Delicious – Silver tip
Pear: Bartlett: Swollen bud
Sweet Cherry: Hedelfingen: Side green
Napoleon: Side green
Gold: Green tip
Tart Cherry: Early side green
Balaton: Side green
Apricot: Bud burst
Plum: Bud swell
Grapes: Scale crack

Weather Report

Things are moving slowly in the north. We have only accumulated 28 GDD Base 50 and 97 GDD base 42. These accumulations are far behind a 21-year average, 180 GDD base 42 and 73 base 50. High temperatures reached into the mid-60's Monday, April 25, but most daily highs have remained in the 40's and low 50's.

We have had ample moisture in the past week and last Wednesday, the region received 6-8" of snow.

Crop Report

Green tissue is just starting to show in cherry and apples are only at silver tip. These differences are incredible as we were at full bloom in cherry at this time last year.

With the slow warm up, growers are still pruning, and the snow fall presented a challenge for removing brush from the orchard. Lots of tree planting will be taking place this spring, and growers are waiting for soils to dry out to begin.

Pest Report

Apples
Apples around the region are starting to move, and with rain in the forecast, the time for early season control and copper applications is now for many area growers (copper should not be applied past ¼" green). Although we cannot be sure that overwintering apple scab ascospores are mature and will discharge with these first rains of the season, protective copper applications are recommended, particularly in sites with high levels of infection in 2010. Early season control of primary scab is vital to mediating infection later in the season as leaf area expands. Bill Shane and George Sundin put together a great article on available copper formulations "Copper Formulations for Fruit Crops" that growers may find useful.

Cherry
Things remain relatively quiet in cherry, with sweets a little ahead of tarts with some varieties at the station showing a bit of green tissue. Bacterial canker is a concern as we head into some potentially 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 1.2-2lbs 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 1.2-2 lb actual copper rate at bud burst with weekly repeated applications until late May. Some of these later sprays may result in some leaf yellowing, bronzing, and potentially defoliation--adding hydrating lime at 6-9 lbs/acre will reduce the phytotoxic effects of copper. Do not apply copper at temperatures above 75 °F. Bill Shane and George Sundin put together a great article on available copper formulations "Copper Formulations for Fruit Crops" that growers may find useful.

NW Michigan Wine Grapes
Duke Elsner, MSU-E Educator

Continued cool conditions have kept grape bud development to a minimum, with no evidence of bud swell in NW Michigan vineyards. Crews are still pruning, having been delayed by the heavy snowfall on April 20th.

There have been no signs of insect pest activity. Overwintering powdery mildew is quite easily seen on canes in many blocks. There is still plenty of time for dormant applications of Sulforix or Stylet oil for powdery mildew control.

BACTERIAL CANKER REMINDER
Nikki Rothwell, NWMHRS

If growers are still out there pruning sweet cherries, just an obvious reminder to wait until this rain has passed. The forecast for much of the coming week is for continued rain and cool temperatures—perfect conditions for bacterial canker. These bacteria survive in bark tissues in cankers and systemically in the vascular system. They multiply and are disseminated with rainfall. Last year, we had severe bacterial canker infections in some orchards, and these orchards will likely have higher inoculum levels. Please see above comments on spray options for canker control. Lastly, Gisela rootstocks may be more susceptible than our standard Mahalebs, and growers should use caution when pruning Gisela in cool rainy conditions.

PREVENTING OBLIQUEBANDED LEAFROLLER INFESTATION IN CHERRY
Nikki Rothwell, NWMHRS
John Wise, TNRC

In recent years, obliquebanded leafroller (OBLR) has been observed more commonly in both sweet and tart cherry. These insects are not internal feeders in the fruit, and although they can cause some damage from defoliation, the greater concern is the threat as a contamination pest if they are found in cherry tanks at harvest. Despite the fact that the larvae are easily visible either in the tank or at the processor, growers need to take precautionary measures to prevent these insects from infesting the harvestable fruit. Growers with problem orchards risk having tank-loads rejected at the processor if OBLR larvae are present.

The likely reason for the rise in OBLR in cherry orchards is organophosphate resistance. Organophosphate-resistance was documented in OBLR in Michigan in the early 2000s, primarily in apple orchards. Because of OP-resistance in OBLR as well as in codling moth (CM) in apples, most apple growers have moved away or minimized OP use in their pest management programs. On the other hand, OP's are still the backbone of the insecticide program in most sweet and tart cherry orchards. We hypothesize continued OP use is the reason for increasing OBLR populations in cherry orchards over the past 3-5 years, while we have seen no increase in population in apples as growers have moved to other classes of insecticides, and as a result, are controlling OBLR.
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. Obliquebanded 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. Targeting this overwintering generation is an effective strategy, particularly as these larvae are small, hence easier to kill, at this time. At early petal fall, growers should scout their orchards by looking at 20 clusters/tree in five trees per orchard for larvae and/or feeding sites. An insecticide should be applied if they observe 2 + larvae or feeding sites/tree. The materials that target this life stage are Delegate, Belt, Altacor, Voliam flexi, Entrust, and *Bts* (Table 1). In most cases growers 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.

If larvae are not controlled in early spring, they will roll leaves and pupate. Summer generation adults will emerge from mid-June through mid-July. Growers should be scouting for adult flight with pheromone traps. However, because of OBLR's wide host range, trap catch interpretation can be difficult due to the sheer number of moths caught. Nonetheless, MSU has developed some rules of thumb for OBLR trap catch: 1) a consistent catch of 20-plus moths/trap for 2-3 wk usually indicates a problem or 2) low catch of <20 moths/flight period generally indicated a non-problematic density. Growers should use traps to set a biofix by using MSU's Enviroweather system (www.enviroweather.msu.edu). After adult emergence, growers should begin monitoring the ripening crop for summer generation larvae. These larvae have the potential to infest the crop during harvest. Growers should look at 10 fruit clusters and 10 terminals on five trees per orchard each week and should apply an insecticide if 3 larvae/tree are found. Monitoring should intensify as harvest approaches to help ensure larvae-free cherry tanks. The insecticides that we recommend for use at pre-harvest time are:: Delegate, Altacor, Belt, Voliam flexi, and for organic growers Entrust. All of these insecticides have shown to be excellent against OBLR. The Bts, because of their slower activity, may not eliminate canopy infestation sufficiently to prevent contamination from a pre-harvest spray. OP's should not be used to control the summer generation, just as with the overwintering generation.

This insect has been on the rise in Michigan cherry orchards, and growers should be able to identify both the larval and

adult stage of this pest. The larvae are caterpillars with a dark head capsule that appears flattened while the body can be green to brown in color (Figure 1). Adults are tan and striped and have a distinctive bell shaped appearance to their wings (Figure 2). Again, we recommend all cherry growers be on the lookout for OBLR this season, particularly in light of some infestations during 2010.

Table 2. Compound, chemical class, residual activity, pre-harvest interval (PHI), and standard degree-day timing of insecticides used for OBLR control in cherries.

Compound Trade Name	Chemical Class	Degree Day Spray Timing for OBLR	Residual Activity	PHI (days)
Dipel*, Deliver*, Crymax	*Bt's*	Biofix + 450 DD	5-7 days	0**
Altacor, Belt	Diamide	Biofix + 400-450 DD	10-14 days	10 7
Entrust*	Spinosyn	Biofix + 400-450 DD	7-10 days	7
Delegate	Spinosyn	Biofix + 400-450 DD	10-14 days	7
Voliam flexi	Diamide + Neonicotinoid	Biofix + 400-450 DD	10-14 days	14

* OMRI approved.
** Not recommended for pre-harvest sprays to prevent OBLR contamination because of slow action.

ARE SMALL FARMS EXEMPT FROM GOOD AGRICULTURAL PRACTICES CERTIFICATION?
Growers operating small farms may not be required to be GAP certified under the new Food Safety Modernization Act, but retailers, packers and shippers keep demanding proof of GAP
Carlos García-Salazar, Anamaría Gómez-Rodas, and Les Bourquin, Michigan State University Extension; Michigan State University Extension, Department of Entomology; and Michigan State University Extension, Department of Food Science and Human Nutrition

Small fruit growers wanting to sell their crop to traditional packers and shippers still have to comply with buyer requirements, and these can be very challenging.
In 1998, the U.S. Food and Drug Administration (FDA), in partnership with other federal and state agencies, developed a guidance document on food safety for fresh produce in response to several large food borne illness outbreaks associated with fresh produce in the preceding years. The document, *Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables*, was only guidelines for industry and not regulations. More recently, the signing of the Food Safety Modernization Act in January 2011 gives the FDA a mandate to pursue a system based on science and addresses hazards from farm to table, putting greater emphasis on **preventing rather than responding** to food-borne illness outbreaks. For small growers, the law provides exemptions. Small farms marketing directly to consumers and certain retailers and restaurants, and having total annual sales less than $500,000, are exempt from the produce safety standards. However, the law does not exempt them from demonstrating they have either "identified potential hazards associated with the food being produced," and "implementing" and "monitoring" preventative controls; or that they demonstrate compliance with "state, local, county, or other applicable non-Federal food safety law." Read the Food Liability Law Blog for more on the FSMA.
This apparent contradiction, "you are exempted but you aren't," creates confusion and false hope among small growers that in 2011 expect to sell their crop without requiring attending or implementing a Good Agricultural Practices (GAP) program in their farms.
Currently, our underserved, limited resources blueberry growers are in desperate need for assistance with their GAP training and certification. Major obstacles in complying with GAP for food safety are the complexity of the GAP program and the delivery methods of educational trainings by governmental, higher educational institutions and nonprofit organizations. So far, many of those growers have only attended **informational**meetings on food safety and GAP.However, information alone does not provide in-depth knowledge to allow for comprehension and retention ofcomplex technologies not easily grasped in informational meetings. Adoption of bundles of technology such as IPM and GAP require a comprehensive structured training curriculum integrating classroom and hands-on field training. For crops like blueberries and other small fruits, training curricula also have to be crop specific. **It is very important for underserved producers to have crop specific GAP trainings because they focus on a familiar crop, one they know and understand, thus making food safety issues in relation to their crop easier to grasp.**
At MSU Extension in West Olive, and the AgBioResearch Center at the Trevor Nichols Research Complex in Fennville, we are committed to support small producers with educational programs that may help them comply with food safety and other environmental regulations. In 2010, we provided crop specific GAP training to 96 blueberry growers through four two-day workshops including 38 Hispanics, two African Americans and 23 women. In March and April 2011, we have offered two trainings on Risk Management Tools for Food Safety: Blueberry GAP's, and one Traceability workshop for small producers. On May 26-27, we will again offer the Risk Management Tools for Food Safety: Blueberry GAP training.
For information and assistance on GAP implementation and training, contact Carlos Garcia-Salazar at 616-260-0671 or garcias4@mseu.edu, or Anamaria Gómez-Rodas at 269-561-5040 or gomezrod@msu.edu. For resources on GAP implementation and training, visit the MSU Extension Agrifood Safety Workgroup web site.

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: 4-26-11

How can we "rein in" scab infection during these monsoon-like conditions?

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

Cool weather for the last few weeks (April 12-26) has slowed tissue development in apple and also slowed release of primary apple scab spores. That's ancient history now. Rains, and heavy rains including intermittent intense rain showers have already occurred last night and are predicted over the next few days, combined with warming temperatures. These warming temperatures will facilitate more rapid tree development this week as well, meaning more unprotected susceptible tissue. Scab infection periods with average temperatures in the 50's require between 10 and 14 hours of wetting. I am anticipating a heavy scab infection event from today's (Apr 26) rains that could be prolonged over the next few days.

We are severely limited in Michigan regarding available scab fungicides due to fungicide resistance. Resistance is essentially complete and distributed throughout the state to strobilurins (Flint, Sovran). Our recent surveys have also revealed very high levels of resistance to sterol inhibitors (SI's; Rally, Procure, Vintage, Topguard). Resistance to dodine is present in some orchards and can be predicted to be present if dodine (Syllit) has been applied in the past few years. In many cases, individual scab fungal isolates are resistant to all of these fungicides.

Okay, that's the bad news, what other news is there?

First of all, all orchards should have been covered prior to the rain event of April 26. Apple scab is best controlled with fungicides applied with a protectant strategy, i.e. fungicides present on susceptible tissue in advance of infection periods. I heard many reports and spoke to several growers that had applications of copper and/or EBDC fungicides on trees put on during Monday's lull before the storm. That's great, and those trees should be protected through this current rain event.

However, prior to the next onslaught of rain, those trees will likely need another application of a protectant fungicide. I realize that there is a lot of standing water in orchards and there is a reluctance or inability to move equipment through. We do need to understand though that with current (2011) scab populations in Michigan, *fungicides applied prior to infection events are so much more effective than fungicides applied post infection*. Pre-infection applications will always be the best strategy for scab control.

If a switch to post-infection control efforts is necessitated, I have some guidelines on these strategies below.

The SI fungicides have historically been the best bet for post-infection activity and arrest of scab infection once the fungus has penetrated the leaf. However, SI fungicide resistance has essentially wrecked this option. There are three fungicides options currently available for post-infection control. *It is critical to acknowledge in advance that none of these options will be as effective as the SI's once were*. Thus, use of these fungicides now will not preclude an intensive implementation of protective fungicide applications in the forthcoming weeks. This increased care will be necessary to protect susceptible tissue from primary scab spores as well as secondary conidia that will be produced from any scab lesions originating from infections occurring this week.

<u>The three fungicide choices are</u>:

1. Anilinopyrimidines – Vangard and Scala – these fungicides posess about 48 hours of post-infection activity. In the 2011 Michigan Fruit Management Guide, I rate these fungicides as *good to very good* for scab control when used in a protective strategy. These ratings should be reduced at least a notch to *good* for post-infection control. These fungicides also appear to be highly locally

systemic in that they do not redistribute well and do not control fruit scab well, meaning applications later in the primary scab season are discouraged.

2. 2nd-generation SI's – Inspire Super and Indar – the 2nd-generation SI's are supposed to control SI-resistant scab strains. Inspire Super is a premix of the 2nd-generation SI difenoconazole and Vangard. We do not have data on the post-infection effectiveness of 2nd-generation SI's, but do not expect it to be equivalent to what was originally observed with SI's years ago. All scab isolates that we tested in 2010 were susceptible to difenoconazole, suggesting that these compounds can be used without problem in 2011.

However, my estimate on the potential longevity of these 2nd-generation SI's is that they will be susceptible to fungicide resistance development sooner rather than later. My reasoning for this is that we already have extensive, high-level resistance to the 1st-generation SI's signifying that the fungus has already done the heavy-lifting in SI resistance development. The step for the fungus to take to resistance to the 2nd-generation materials may be only a 100 meter dash compared to the half-marathon that was required to get to resistance to the 1st-generation compounds. Post-infection use will only hasten that resistance development.

3. Dodine – Syllit – dodine definitely has a place as a rescue fungicide for apple scab within about 24-48 hr after infection. The only difficulty with using dodine is the potential that dodine-resistant scab strains are present in your orchard. The percentage of dodine-resistant scab strains typically decreases over time in orchards when this fungicide is not applied. However, resistant strains can rapidly arise following use. A rule of thumb for dodine is if the fungicide has not been used in the previous 5 years, it can be applied as a rescue treatment.

Any of these fungicides (1 to 3 above) should be tank-mixed with an EBDC at 3 lb/A. The use of the EBDC protectant will have no effect on post-infection control but will protect newly-developing tissue and will be somewhat of a hedge for resistance management.

As soon as possible after this week, we need to get back to a protectant strategy for scab control. Always remember that the scab fungus never rests. Always remember the "blanket" strategy for coverage of susceptible tissue that I discussed a few weeks ago (CAT ref from April 12th article). As new tissue is developing more rapidly, the classic protectants (EBDC's and Captan) when used in combination provide advantages for the "blanket" strategy in that they provide a highly-effective barrier to infection and combine very good retention and redistribution properties with no risk of fungicide resistance development.

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Northern Michigan FruitNet 2011
Special Update
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April 28, 2011

NEVER ENDING RAIN AND COLD IN SWEET CHERRIES
Nikki Rothwell, NW Michigan Horticultural Research Station

This afternoon (28 April), we observed many sweet cherry varieties with the fresh ooze of bacterial canker. This symptom was not evident on Monday, but after three days of rain (between 4-7" of rain, depending on your location) and cold temperatures, these bacteria are now active and are oozing on spurs and around canker margins. These bacteria overwinter in the bark tissues as well as in healthy buds, and they thrive in cool and wet conditions. Growers that had problems with bacterial canker last season likely have higher levels of inoculum in the orchard and have a higher potential of infection this year.
At this time, if the ground will support a tractor and a sprayer in the orchard, an application of copper would be warranted. Copper will not totally eliminate the pathogen that causes bacterial canker, *Pseudomonas syringae*, but it has been shown to reduce the bacterial populations. Additionally, if these cold and wet conditions continue, a dose of copper now and another a week later may be a good insurance policy. Depending on the location of the orchard, we have some green showing while other sites are still dormant. If the trees are still in the dormant stage, two copper applications may be applied at one to two week intervals at a rate of 1.2 lb to 2 lb of metallic copper with either one pint of spray oil per 100 gallons of water or 6 lb to 9 lb 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 to 35 percent of the dormant RATE.

NEVER ENDING RAIN AND SCAB CONTROL
Nikki Rothwell, NWMHRS
Another issue with the rains and disease is protecting against apple scab. We have heard from Dr. George Sundin about making sure growers stay ahead of scab infections this season, particularly in light of the recent fungicide resistance issue and the limited products we have for controlling this disease. This latest continuing rainfall does not make growers' decisions easy or simple, but recommendations are to be aggressive against fighting scab this season.

Most growers probably applied an early season copper spray on Monday before the rain, but with the amount of rainfall we have had in recent days (4-7" depending on location), there is no material left on the trees. Growers also do not know when they will be able to get back into the orchards due to soggy conditions, but as soon as the ground firms, scab sprays should be applied. We recommend a full rate of Inspire Super with 3lb of EBDC followed by another shot of these materials seven days later. A good primary scab program will protect against fruit scab later in the season. Here is the link to the Supplemental Label for Inspire Super in Michigan

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: 4-26-11

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