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## Northern Michigan FruitNet 2007 Weekly Update NW Michigan Horticultural Research Station

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**May 1, 2007**

GROWING DEGREE DAY ACCUMULATIONS THROUGH APRIL 30 AT THE NWMHRS:

Year	2007	2006	2005	2004	2003	2002	17yr. Avg.
GDD42	253	312	272	202	200	197	211.0
GDD50	102	139	115	76	82	103	89.1

### Growth Stages at NWMHRS (4/30/07—8:00am)

**Apple:** Tight Cluster

**Pear:** Bartlett: Late Green Cluster

**Sweet Cherry:** Hedelfingen: Bud Burst; Gold: Early White Bud; Napoleon: 10% Bloom

**Tart Cherry:** Montmorency: Bud Burst; Balaton: Late Bud Burst

**Apricot:** Petal Fall

**Plum:** Early White Bud

**Grapes:** Chardonnay: Early Bud Swell

### WEATHER

Welcome to May! Last week, April brought in its usual showers, and we look forward to the start of May with warmer and dry weather, except for this Tuesday morning.

### CROP REPORT

**Tree Fruit:** Warm weekend weather is moving the trees along. In pears, we are at late green cluster for Bartletts and white bud in Potomac. All apples are in tight cluster. In tart cherries, we are at bud burst and late bud burst for Balatons. In sweets, we are seeing some differences between varieties: Hedelfingens are at bud burst, Golds are at early white bud, and Napoleons are at 10% bloom. Apricots are at petal fall, while plums are at early white bud. Grapes are at early bud swell.

### Pest Report

**Tree fruit:** Not too much to report in the insect world, except for low levels of two-spotted spider mites and green apple aphids. We have seen a few blocks with lots of apple rust mites. We have not seen any European red mite eggs. We have also trapped a few (~10) spotted tentiform leaf miners at the research station. We have a new experiment in place to investigate plum curculio overwintering and spring migration, and we have observed movement in the weevil population this past week in our emergence traps. In other words, plum curculio are up and moving. However, primary migration into the orchard occurs for up to six weeks after bloom, with the biggest flush of movement happening up to 14 days after petal fall. This movement indicates the beginning of migration.

With the wet weather of last week, all eight weather stations reported wetting events that resulted in a low to moderate apple scab infections. As of Tuesday morning (5/1), the Bear Lake and Benzonia weather stations are reporting wetting events, which have both resulted in low infection periods at those sites.

**Grapes:** A few climbing cutworms have been seen at the NWMHRS vineyard, but they were not feeding on buds; some were seen feeding on the bleeding sap from pruning cuts. Numbers were relatively low, about 1 per 70 vines. Growers should be scouting vineyards for symptoms and signs of last year's powdery mildew infections, making notes on relative levels of overwintering PM on canes. If dormant sprays are planned for powdery mildew control, these need to go on soon.

### MORE ON APPLE SCAB

Nikki Rothwell, District Horticulturist

Apple scab, caused by the fungus *Venturia inaequalis*, is the most important disease of apples in the northern United States. All unprotected green tissue and fruit of apple are attacked by the scab pathogen. Scab lesions on fruit and leaves can distort growth, reduce fruit value, cause defoliation and fruit drop, and weaken the tree. In the early spring, scab fungus, overwintering in apple leaves on the orchard floor, ejects ascospores during rain periods. The ascospores that land on green tissue of the host may initiate new

infections if environmental conditions are favorable. The primary scab period ends with the cessation of ascospore production a few weeks after petal fall. However, if scab infections were established during the primary scab period, conidia produced in these infections can infect new tissue in secondary phase of the disease cycle.

Early spring is the time growers should be diligent about primary scab control, and this season seems like it is shaping up to be a good one for scab. Fungicide applications between green tip and tight cluster can prevent early scab infections that often generate the secondary inoculum for infecting leaves and fruit between bloom and first cover. When we have severe fruit scab at harvest, we can often trace the origin of the problem to poor scab control during the prebloom period. On a good note, most orchards probably have low scab inoculum this season due to the hot, dry conditions (not conducive for scab) in 2006.

However, all eight northwest stations reported wetting events last Thursday and Friday that resulted in low-moderate scab infections. Here at the NWMHRS on 4/27, apples were in tight cluster, which is a susceptible stage for scab infection. The most effective apple scab control program is to start early—green tip bud stage. If growers are successful in controlling primary scab, the secondary phase of the scab life cycle or secondary scab, they will have good control for the rest of the season. Hopefully, most growers had a protectant fungicide application on all of their apples prior to this rain event. Protectant sprays are the best way to control apple scab. Due to resistance issues, eradicating scab post infection should be avoided if at all possible. In addition to resistance, post-symptom sprays are also expensive and are only somewhat effective. As we have documented sterol inhibitor (SI's) resistance in apple scab in Michigan orchards, many of these chemistries may not have any eradicating potential. For instance, SI's such as Rubigan, Nova, and Procure may not show any type of 'back-action' if scab resistant strains are present.

Therefore, a protectant spray program is the best management strategy for apple scab. Protectant fungicides are applied before an actual infection occurs. These fungicides form a layer between the plant material and the scab spore. In other words, the protectant fungicide must be on the plant before the spore. Remember scab ascospores are discharged during the rain, which is why closely monitoring weather events is so important in the spring; protectant sprays need to go on prior to the rain event. There are many choices for protectant fungicides, and even those chemistries that have noted 'kick-back' should be used in a protectant manner.

Here is a list of the recommended scab materials:

#### *Anilinopyrimidines*

- Vanguard: 3 oz rate or 3 oz tank-mixed with Captan or EBDC
- Scala: 10 oz rate is most effective
- \*Efficacy—good against primary scab; less effective against fruit scab
- \*Best activity under cool conditions; early sprays (green tip-tight cluster)
- \*Resistance concerns

#### *EBDC's*

- Polyram, Dithan, Manzate, Mancozeb (6lb full rate or 3lb in mixture)
- \*Efficacy—very good at full rate against primary fruit and leaf scab
- \*Broad-spectrum protectant, good retention, good redistribution, **77-day PHI**
- \*No resistance concerns

#### *Dodine*

- Syllit, 24 oz rate
- \*Resistance is known in Michigan, not sure how widespread
- \*Good activity with later sprays, early sprays do not work well

#### *Stobilurins*

- Sovran: 6.4 oz rate
- Flint: 2 oz rate
- \*Efficacy—excellent against primary scab (fruit and leaf)
- \*48 hour post-infection activity, but best used as protectant
- \*Best chemistry for apple scab right now
- \*Resistance concerns—only two sprays early in season, but not back to back

#### *Sterol Inhibitors*

- Nova: 8 oz rate
- Rubigan: 12 oz rate
- \*Resistance in apple scab in Michigan, control failure risks

#### *Phthalimides*

- Captan: 6-8lb rate
- \*Efficacy—good to very good scab control, especially secondary scab
- \*No PHI concerns
- \*Broad-spectrum protectant, very good retention and redistribution
- \*Not compatible with oil, can tank mix with Topsin-M for summer disease control
- \*No resistance concerns

#### HOW TO USE THE APPLE SCAB MODEL ON ENVIROWEATHER

Nikki Rothwell, District Horticulturist

Three models are used in the Apple Scab Report—infection, symptom expression, and ascospore maturity.

**Primary infection model:** Scab infection prediction helps the grower to determine his/her fungicide control options. Some fungicides can eradicate an infection if applied within a specified time of the start of an infection period. Infection is predicted by the Mills table system for apple scab, as modified and adapted by A. L. Jones of Michigan State University. Once green tissue of apples is exposed in the spring, apples are vulnerable to scab infection. The apple scab infection model predicts if a wetting period was sufficient to initiate an infection.

A rain of at least 0.01 inches is needed to soak overwintering leaves to initiate release of ascospores. Depending on the temperature and duration, the wetting period may result in infection or no infection, as given by the Mills/Jones table.

For primary scab: a wetting period ("mother" wet period) begins when measurable precipitation is collected (i.e. 0.01 or more inches). This infection period lasts until the RH drops below 90% and leaf wetness proportion for the hour is less than 0.25. However, the spores do not die immediately and can resume if moisture becomes available soon enough. This is how the scab model handles "interrupted" wetting periods.

A "daughter" wet period begins if measurable precipitation occurs or leaf wetness proportion for the hour is at least 0.25 or RH is at least 90% within 8 hours from the time the last wetting period ended. A daughter wet period ends for the same reasons as a mother period (RH drops below 90% and leaf wetness proportion for the hour is less than 0.25). More than two wetting periods can be linked together into a single infection event (multiple daughters). The "span" contains both wet and dry hours. When a "mother" and "daughter(s)" wet periods are jointed together, both the hours and the temperatures of the intervening "dry" hours are not included when using the Mills table to see if infection has occurred.

Note: infection by conidia is not covered by this model. Conidia are produced in the tree leaves and fruit by successful ascospore infections. The time for infection by conidia is less than for ascospores because conidia are washed to a new infection site immediately by a rain, whereas ascospores are released only after the overwintering leaves on the orchard floor have absorbed sufficient water.

**Table 1.** Approximate wetting period required for primary apple scab infection at various air temperatures and time required for development of conidia.

Average Temperature (F)	Wetting duration (hr)	Incubation period (days)
78	13	-
77	11	-
76	9.5	-
63-75	9	9
62	9	10
61	9	10
60	9.5	11
59	10	12
58	10	12
57	10	13
56	11	13
55	11	14
54	11.5	14
53	12	15
52	12	15
51	13	16
50	14	16
49	14.5	17
48	15	17
47	15	-
46	16	-
45	17	-
44	19	-
43	21	-
42	23	-
41	26	-
40	29	-

39	33	-
38	37	-
37	41	-
33-36	48	-

Adapted from Mills, 1944; modified by A.L. Jones. The infection period is considered to start when rain begins. The incubation period is the estimated number of days required for conidial development after the start of the infection period.

**Scab symptom appearance model:** Once infection has been established for a wetting period, symptoms will show up after an incubation period of one to several weeks, depending on the temperature during incubation. Symptoms are expected 330 degree days base 32 following infection. If 330 DD is not reached in the forecast period, the last 3 days of the forecast are repeated to estimate when symptoms are first expected.

**Apple scab ascospore maturation model:** The supply of ascospores on the orchard floor can be predicted by degree day models developed by Gadoury and MacHardy. Their model initiates at the start of green tip growth stage of apples and uses a base of 32 F to estimate ascospore maturity. The purpose of the model is to predict when growers can relax their fungicide program for scab. Warning: the ascospore maturity model is less reliable in unusually dry and/or hot years. Under such conditions, ascospore catch has been detected in spore traps in significant numbers beyond 1000 degree days base 32 F.

**Table 2.** Cumulative Percentage of Ascospores Matured at Various Degree-Day Accumulations ( 32 F Base)

Cumulative Degree-Days [1]	Cumulative Ascospores Matured (%)	90% Confidence Interval for Estimate [2]
35	1	0-7
110	3	0-14
145	5	1-19
215	10	2-32
325	25	7-55
450	50	21-80
575	75	46-94
685	90	69-98
740	95	79-99
790	97	86-100
865	99	93-100

[1] Degree-Days should be recorded from the date when 50% of McIntosh fruit buds are between silver tip and green tip. Data of Gadoury and MacHardy, 1982.

[2] The width of the 90% confidence interval is a statistical measure of the precision of estimated maturity. It is the range within which the estimate should fall 90% of the time. Source: 1998 Cornell Pest Management Recommendations for Commercial Tree-Fruit Production

#### Use of the models

Typically, the apple scab models start at green tip and are discontinued by the end of June. The infection-prediction model can be used as a guide to determine the need for eradication sprays if a protectant coverage was weak during a rain episode. The model should not be used as a routine guide for eradication spray applications—a **protectant spray program is the most reliable approach for control of apple scab**. The incubation period model is used to predict when scab symptoms should appear on unprotected apple tissue.

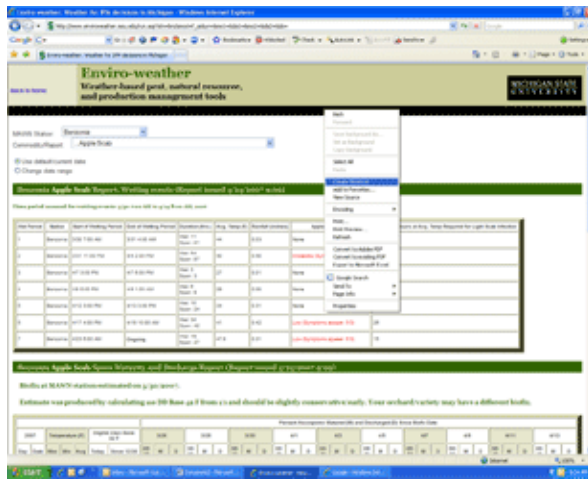
The model is useful for comparing predicted apple scab infection activity between years.

To read the Apple Scab Spore Maturity and Discharge Report, locate the date of McIntosh Green Tip across the top of the chart. Follow that column down to today's date to find the estimates of spore maturity and discharge. The ascospore maturation model has not been particularly useful in recent seasons in Michigan.

#### Enviro-weather tip: Create shortcut to key reports

Mark Trent, Enviro-weather

Create a shortcut on your desktop to your favorite Enviro-weather report. Here's an example for users of Internet Explorer. If you are keeping track of apple scab infection periods, go to the apple scab report for your station and right click anywhere on the screen. A menu will pop-up, select "create short" from the menu. The next time you want to access a current apple scab report just open the short cut on you desktop and you will go directly to the report.



### CODE-A-PHONE, YEA OR NAY?

Now that we all seem to be moving into the technological age, we would like to ask all of you if the Code-a-phone is a service that you find valuable and necessary. As many of you already know, the same information is available via the weekly FruitNet. Enviroweather also provides valuable pest insect and disease information, and this information is updated hourly, rather than 1-2 times weekly. Because the code-a-phone service is costly to operate, we would like to know how many growers find it useful and would like to see the code-a-phone continue. We will determine if we maintain this service if we hear from you! Please contact Jackie by phone, 231/946-1510 or by email, [baase@msu.edu](mailto:baase@msu.edu), before **May 15<sup>th</sup>** if you would like to see the code-a-phone service continue.

### TRACTOR SAFETY CLASS

Do you have any 14 or 15 year olds that will be working on your farm that missed the Tractor Safety Program in April and want to take it? Please let us know! We could possibly hold another class in June if there are enough interested teens. Contact Annette at the Leelanau County Extension office at 231/256-9888 or [msue45@msu.edu](mailto:msue45@msu.edu).

### Attention All Winegrape Growers!

We will be rolling out a new scouting program in northwest Michigan this spring, and the information will be made available to all growers/managers who want it! Growers in southwest Michigan had this program available to them last season, and we are fortunate to have the program move north. Each week, we will scout two vineyards, one on Old Mission and one on Leelanau Peninsula; results will be posted on a website, but if you sign up soon, an email will be sent to you with all of the most recent information. The first available scouting report will be posted on **Monday, May 7<sup>th</sup>**. The information is FREE and will help you make important pest control decisions this season. Please email Steve VanTimmeren at [vantimm2@msu.edu](mailto:vantimm2@msu.edu) to sign up for this terrific new opportunity.

### First Winegrape IPM Day

A reminder to winegrape managers/growers that we are hosting the first of four winegrape IPM days this **Friday, May 4<sup>th</sup>**. The location for this week's event will be held at Northwest Michigan Horticultural Station.

### Need Honeybee Information?

Dr. Zachary Huang has put together a terrific website for all honeybee related information: <http://www.cyberbee.net/>. Within this site, there is a section devoted to the colony collapse disorder (CCD) and the latest updates on this strange new problem causing major declines in honeybee populations. Another valuable section of this site contains a beekeeper database; this database allows growers to locate a beekeeper within the state, which may be especially important if a grower has a shortage of bees this season.

Insect and disease predictive information is available at:  
<http://www.enviroweather.msu.edu/home.asp>

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

### ACTUAL AND PREDICTED DEGREE-DAY ACCUMULATIONS SINCE MARCH 1, 2007

### Please send any comments or suggestions regarding this site to:

Bill Klein, [kleinw@msu.edu](mailto:kleinw@msu.edu)

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**May 8, 2007**

GROWING DEGREE DAY ACCUMULATIONS THROUGH MAY 7 AT THE NWMHRS:

Year	2007	2006	2005	2004	2003	2002	17yr. Avg.
GDD42	343	405	317	237	256	240	281.6
GDD50	147	186	134	89	103	119	124.1

### Growth Stages at NWMHRS (5/7/07- 8:00am)

**Apple:** Pink

**Pear:** Bartlett: 90% Bloom

**Sweet Cherry:** Hedelfingen and Gold: Full Bloom; Napoleon: Early Petal Fall

**Tart Cherry:** Montmorency: 10% Bloom; Balaton: 60% Bloom

**Apricot:** In The Shuck

**Plum:** 80% Bloom

**Grapes:** Chardonnay: Late Bud Swell

### WEATHER

The weather has been unseasonably warm and dry for this time of year. All crops seem to be moving along quickly with these conditions. Bartlett pears are at 90% bloom, and most apples are in pink. We could be in apple bloom by the weekend if temperatures stay warm. Montmorency is at 10% bloom while Balatons are at 60% bloom. All sweet cherries are in full bloom.

### Pest Report

**Apple:** With the dry weather, we have not reported an apple scab infection period since 1 May. We have not observed lesions from the previous scab infection periods. The forecast predicts a 75% chance of rain on Wednesday, so a protectant spray will be warranted to cover up for scab if a grower has not applied a fungicide in 7-10 days. See the article below as to why protectant applications are so vital when controlling this disease.

Since apples are at pink, we do not need to control for fire blight yet. Although we have not seen powdery mildew on apples yet this season, pink is a critical time period for controlling this disease. The SI's and the strobilurins provide protectant control for powdery mildew, and if an orchard does not have SI resistance in apple scab, these chemistries also control scab. However, if a grower has seen even the reduced efficacy with SI's in scab management, he/she should use strobilurins at this time. We have no data that show strobilurins have back action, so they should be used on a protectant schedule.

For insects, we have seen lots of rosy apple aphids, some obliquebanded leaf roller larvae, and European red mite nymphs.

**Cherry:** Not much moisture for cherry leaf spot infection, but very few leaves out at this point for the pathogen to infect. Most sweet cherries are in bloom in the region, so it is too late for copper applications to reduce bacterial canker infection.

American plum borers are flying here at the station, and we picked up an average of 5 moths/trap. Obliquebanded leaf roller larvae are also moving around, and we have seen a few green fruit worm larvae.

**Grapes:** Many varieties are now in late bud swell or early bud break. At the research station vineyard and other sites (in both vineyards and other habitats) numerous dead climbing cutworms have been seen, showing symptoms of virus infections. Climbing cutworm injury has not been reported at significant levels. Flea beetles should be active now, but these are rarely a problem in commercial vineyards.

### European Brown Rot

European brown rot is caused by the pathogen, *Monilinia laxa*, a similar species to the more common American brown rot, *Monilinia fructicola*. European brown rot is more common during cool, wet periods during bloom, and the current weather forecast does not show

these conditions for this week. European brown rot is more problematic on Balaton and Meteor trees, but last season, we found many Montmorency trees infected with this pathogen. Sweet cherry cultivars are resistant to *M. laxa*.

If growers are planning to make a fungicide application for European brown rot control, they should be applying two sprays: one at white bud and one again at bloom. At this time, we know that Indar (2oz) provides excellent control of European brown rot. This season we are conducting a study to investigate the potential of other fungicides against this disease.

### American Brown Rot

Like its European cousin, American brown rot (*Monilinia fructicola*) moves into orchards in spring and can cause blossom blight. The inoculum overwinters on mummies and cankers, and the spores are released during rain and carried to the blossoms by wind. Infection of the blossoms is dependent on temperature and the amount of precipitation, like most of our other fungal diseases. If blossom blight is not controlled at bloom, this disease can wreak havoc on mature fruit, especially in sweet cherry. If mature fruit is vulnerable later in the season, high inoculum levels and ideal weather conditions can easily result in total crop loss very quickly.

In cherry, blossom infections can be controlled with fungicides sprays during bloom. The number of applications will vary based on weather conditions and susceptible varieties (again sweets are more vulnerable than tarts). All SI materials are excellent against American brown rot, but we do not recommend using them at this time because of resistance issues. We have documented SI resistance issues in cherry leaf spot and apple scab, but we believe the SI's still provide good control against American brown rot—we want to keep it this way! Therefore, we should avoid using the SI's during bloom, so we can save them for when we really need them around harvest time. The best material for Am. brown rot in sweet cherry during bloom is Rovral. This material is rated excellent against the Am. brown rot pathogen and since we can only use this material during bloom, we should take advantage of Rovral's alternate mode of action to prevent against SI resistance.

### Fire Blight Heads' Up

As mentioned above, most apples in northwest Michigan are anywhere from tight cluster to the pink stage. At this point, growers do not need to worry about fire blight control as we have no open flowers. Blossoms are the initiation point for a fire blight infection, so without available flowers, the *Erwinia amylovora* (fire blight) bacteria cannot be washed into the bloom and cause infection. The fire blight model on ENVIROWEATHER may indicate that the EIP is at or over 100 (the typical indicator for applying a fire blight control measure), but at this time we do not have open flowers to cause infection. However, with this warm weather, we may see flowers opening some time this weekend or early next week. Growers should keep an eye out for open blossoms.

### APPLE SCAB and POST INFECTION ACTIVITY

**Here in Michigan, we have reported SI resistance in our apple scab populations, so I thought I would include this nice article from [Wolfram Koeller](#) at Cornell University. He provides some great data that show the SI's are not effective against controlling scab in New York, but I think the message still applies to growers here in Michigan.**

The earliest scab infection periods are behind us, we are approaching tight cluster and/or pink, and decisions have to be made on how to continue the management of apple scab. Two options exist: To continue applying the purely protective EBDCs or Captan, either alone at their high label rates or mixed at a lower rate with Captan, at a tight spray interval not to exceed 7 days. Or to apply a fungicide with post-infection activity in order to halt the infections that 'slipped through' the first protective sprays and, at the same time, to protect against the next following infections.

Several classes of fungicides are labeled for post-infection control of scab, but all of these various classes have developed or will develop resistance. For the past 15 years, the SI's (Nova, Procure, Rubigan) have been our 'mainstay' in providing 'kick-back' activity so crucial at the stage of pink and beyond. We started to test the development of resistance to the SI's shortly after they were introduced in 1987, and the pathway of how the scab fungus developed resistance to the SI fungicides available to us became more and more clear.

We found that individual strains of the fungus were 300-fold different in their responses to these fungicides, with very few strains highly sensitive and very few strains responding very 'robust'. After many years of orchard testing, manufacturers of the different SI's had settled on the recommended label rates of their products. Approximately 80% of the strains of the scab fungus were fully controlled, but 20% of the more 'robust' strains survived the treatments and could still reproduce. Over the many years of using the SI's, these 20% of strains had gained an advantage and slowly took over the orchards where SI's were applied. Less than 1% of these 'survivors' turned out to be the cause of control failures experienced after SI's had fulfilled their 'kick-back' promise for a decade. These strains were only marginally or not at all controlled at the recommended rates of the currently available SI's. We determined that a 20% level of such strains established in an orchard will cause a minimum of 15% scab on fruits at harvest. We consider this limit as the threshold of practical SI resistance.

In how many apple orchards have we reached or even exceeded this threshold of resistance? To answer this question, we modified our test procedures starting in 2002 to allow for an increased number of orchards to be tested. By 2006, we have tested a total of 77 commercial orchards, mostly from New York but also from the New England states and West Virginia. The results obtained from NY and 'out-of-state' orchards were the same.

Our test procedure allows us to distinguish between three levels of orchard sensitivities:

BASELINE describes the sensitivity of the scab fungus at locations where SI's and other 'kick-back' fungicides were never used. SHIFTED describes the sensitivity of orchards that have not yet reached the level of practical resistance. Here, the SI's have not fully lost their former activity, but they must be applied at the highest rate permitted in their product labels.

RESISTANT describes commercial orchards where the use of SI's contribute very little to the control of scab. In these orchards, the protective fungicide used in mixture with an SI, mostly mancozeb (Dithane, Manzzeb, Penncozeb) at a low rate, will be responsible for most of the scab control achieved.

Table 1. Status of SI resistance in 77 commercial orchards tested from 2003-2006.

Year	Baseline	Shifted	Resistant
2003	1	0	3
2004	1	5	11
2005	0	4	16
2006	0	5	31

The results describe a rather bleak status quo. According to these test data, 80% of the commercial orchards we tested had reached the level of practical resistance. Were the orchards we tested representative of all orchards where SI's had been in use? At this point in time, the question cannot be answered with certainty, because the majority of diseased leaf samples we tested originated from orchards where SI's were found to provide poor levels of scab control. In all cases, the observations made by respective growers were accompanied by a test result of 'SI-resistant'.

Can a judgment be made without tests of orchard sensitivities? We had found in 1999 in an experimental orchard at our Experiment Station dedicated to the testing of 'soft' mite control that 44 SI sprays in total applied over 11 years had resulted in the loss of scab control. The number of SI sprays made in orchards diagnosed SI-resistant ranged from 40 to 60.

Two major reasons call for caution in using this 'total-number-of-sprays' rule in scab management decisions:

Over the past 20 years of SI availability, the management of many orchards has changed hands, and the SI history of these orchards is rarely known to current managers.

SI's might have performed well in their mixture with a low rate of mancozeb, even though orchards had already reached the status of SI resistance. In these cases it must be assumed that the mixing partner mancozeb was sufficient to control scab in 'normal' seasons. Under more heavy infection pressure, however, mancozeb, and therefore the mixture, failed to control scab.

We have experienced this latter scenario in 2006. SI's in mixture with mancozeb had been used in an orchard four times per season since their introduction in 1987, until a very severe control failure on McIntosh trees was experienced during the early part of the unusually wet season of 2006. Sensitivity tests showed that the scab strains in this orchard had even surpassed the level of SI resistance. Very apparently, mancozeb in mixture with the SI's had provided adequate control of scab until a control failure was experienced during an unusually 'heavy' scab year.

ACTARA LABEL—NO CHANGE IN TIME!

There were suggestions that Actara's label was going to change for 2007 to be better suited for insect control in cherries. We anticipate the label to change this July, but that timing will be too late for this season. The Actara label, confusing as it was last year, will remain the same for 2007. Growers can apply Actara twice per season, once pre-bloom and once post-bloom. The first spray timing, pre-bloom, does not provide any activity for cherry pests as we have nothing active at this timing. Therefore, growers can spray one application post-bloom, which is a good timing for plum curculio. The rate of Actara is 4.5-5.5oz for plum curculio. The total product that can be sprayed for the season is 8.0oz, but again, there is only ONE spray allowed for post-bloom timing. DO NOT spray Actara more than once after bloom.

Insect and disease predictive information is available at:

<http://www.envioweather.msu.edu/home.asp>

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

<http://www.maes.msu.edu/nwmihort/faxnet.htm>

[ACTUAL AND PREDICTED DEGREE-DAY  
ACCUMULATIONS SINCE MARCH 1, 2007](#)

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## Northern Michigan FruitNet 2007 Weekly Update NW Michigan Horticultural Research Station

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**May 15, 2007**

GROWING DEGREE DAY ACCUMULATIONS THROUGH MAY 14 AT THE NWMHRS:

Year	2007	2006	2005	2004	2003	2002	17yr. Avg.
GDD42	460	504	402	335	340	280	367.9
GDD50	215	236	182	145	144	129	169.9

### Growth Stages at NWMHRS (5/14/07—8:00am)

**Apple:** 85% Bloom

**Pear:** Bartlett: Petal Fall

**Sweet Cherry:** Hedelfingen, Gold, and Napoleon: Shuck Split

**Tart Cherry:** Montmorency and Balaton: Petal Fall

**Apricot:** 11mm Fruit

**Plum:** Petal Fall

**Grapes:** Chardonnay: 1" – 3" Shoots

### WEATHER

Last night, Monday, 14 May, we had some extremely high winds in the area. There have also been reports of hail in some locales. Last week, the weather was sunny and pleasant, but on Mother's Day evening, we finally had significant rain. At the research station, we received 0.92" on Sunday evening and Monday morning. More rain is predicted for this week. Most cherries in the southern part of the northwest are in some stage of petal fall, but further north, they are still in full bloom. Apples at the research station are in various stages of bloom: MacIntosh are at 85% bloom, Gala and Golden Delicious are at king bloom, and Red Delicious are at 60% bloom.

### Pest Report

Apple: The major disease of concern today is fire blight in apples. Most apples in the region are in bloom, and we have had a recent rain event, and the forecast is calling for more rain today. According to the MaryBlyte model on Enviroweather, five stations in the northwest have EIP's over 100: Elk Rapids, NWMHRS, Bear Lake, Benzonia, and East Leland. The Kewadin station is at an EIP of 95, which is extremely close to the necessary heat accumulation for an infection. Northport and Eastport both have EIP's in the mid-70's. Growers should also be concerned about trauma blight with the high winds of last evening, particularly in susceptible varieties or in orchards that had fire blight problems last year. Based on the current forecast, the potential for fire blight remains high for much of the week; however, the forecasts change quickly, so growers should refer back to the Enviroweather model often.

Although we had rain on Sunday night, the wetting period ended in most areas, and a scab infection period was not reported. However, the East Leland and Northport areas have recorded continuing wetting events (spans of 34 and 33 hours respectively), and both stations are reporting a high apple scab infection. We have not yet observed lesions from previous scab infection periods. Powdery mildew is still a concern at this time. Powdery mildew overwinters in buds infected the previous summer, and about the time of tight cluster, spores start to be released. Therefore, infections can occur at tight cluster and through pink and bloom. Hence, controlling mildew early is advantageous so growers do not have to fight it all season long. We can also hope that the last rain event washed off some powdery mildew spores.

For insects this week, we have seen lots of rosy apple aphids, obliquebanded leaf roller larvae, and European red mite nymphs. Our spotted tentiform leaf miner count rose dramatically this week; we captured over 300/trap at the station. We captured a few oriental fruit moths, and we caught our first codling moths this week at the station. We have also seen predator mites for the first time this week.

Cherry: Leaves are starting to really move along in cherry, and we need to be sure to be making Bravo applications at this time for cherry leaf spot (CLS) control. For some growers that may have missed a needed spray on Mother's Day, the strategy should still be to apply Bravo through shuck split. For those growers that were not able to make a pre-rain

application, we can assume we have a bit of CLS started in those small leaves, so making sure to cover up the rest of the foliage from here on out is extremely important. Growers should be using a full rate of Bravo at this time. Remember that we have documented sterol inhibitor (SI) resistance in CLS, so growers should NOT be applying an SI for its back action against CLS. If growers missed a spray for CLS, we recommend full sprays to ensure proper coverage.

American plum borers are still flying here at the station, and we picked up an average of 14 borers/trap. Obliquebanded leaf roller larvae are also moving around, and we have seen a few green fruit worm larvae. Plum curculios are migrating into the orchard at this time.

Note: The forecast shows that high winds will continue for a few days this week. Growers should make spray applications under calm conditions to ensure pesticides hit their intended targets.

**Grapes:** At this time, powdery mildew is our only concern and will continue to be for the next few weeks. Also, another reminder that we have rolled out a new scouting program in northwest Michigan this spring, and this information is available to all growers/managers who want it! Results from this scouting program will be posted on a website, but if you sign up soon, an email will be sent to you with all of the most recent information. The information is FREE and will help you make important pest control decisions this season. Please email Steve VanTimmeren at [vantimm2@msu.edu](mailto:vantimm2@msu.edu) to sign up for this terrific new opportunity.

#### ROSY APPLE APHIDS

Nikki Rothwell, District Horticulturist, MSUE

Lots of rosy apple aphids (RAA) have been spotted in apples so far this season. This pest's feeding activity curls leaves, deforms shoots, and stunts fruit. We can have three generations of RAA, and the first nymphs are present in the trees at ½ inch green. Ida Reds, Cortlands, Romes, Rhode Island Greenings, and Golden Delicious are particularly susceptible. To monitor for RAA, examine 100 fruit clusters from tight cluster through petal fall stages in a susceptible variety. We recommend treating for RAA if an average of one or more colonies is found in these susceptible blocks. The optimal time to treat for RAA is early, from tight cluster to pink. If growers missed this window, we are concerned about the high numbers of aphids present in the orchard this year, and the longer we wait to control RAA, the higher the potential damage to the fruit. At this later time, the best materials for controlling RAA are insecticides with systemic activity, insecticides that can kill aphids that are feeding inside curled up leaves. The neonicotinoids is a class of insecticides that is translaminar or locally systemic and would be a good choice for RAA. However, the recommendation from Dr. Zachary Huang, MSU Honeybee Specialist, is avoid neonicotinoid sprays around bloom time. Many of these materials are considered 'soft' on honeybees, but there are indications that neonicotinoids may be playing a role in the decline of honeybees (Colony Collapse Disorder). Although this hypothesis has not been fully documented, we want to err on the side of safety. Thus, growers should avoid neonicotinoid sprays for RAA until honeybees have been removed from the orchard.

#### FIRE BLIGHT TIME!

Nikki Rothwell, District Horticulturist, MSUE

Fire blight is caused by the bacterium *Erwinia amylovora*, and this disease has the potential to cause tree death in susceptible apple varieties. Growers can best control this pathogen during bloom by preventing blossom blight. Blossom infection is predicted when four conditions are met: 1) open blossoms, 2) a wetting event (fog, dew, spray), 3) average daily temperatures are at least 60 F, and 4) sufficient warm temperatures over the past several days to increase pathogen growth on blossoms. Bacteria colonize the stigmas of open flowers, and moisture, most likely rain, washes the bacteria into flower nectaries where infection occurs. The key to controlling fire blight is to eliminate this bacteria build up on the stigma. In the north, the best control for preventing blossom blight is the antibiotic streptomycin. We have not documented strep resistance in our area, unlike other regions of the state. Most recently, researchers have found strep resistance moving northward, and it has been found in the Hart area.

Our current recommendation for growers in the north is to apply streptomycin for blossom blight. We want to make sure we do not overuse this material, but since it is the best product we have available, we want to use it. Growers should not be rotating for resistance management, as there is no evidence that rotating strep with other materials is beneficial in areas without strep resistance. The following paragraphs provide an excellent explanation on avoiding streptomycin resistance in bacteria from Dr. Dave Rosenberger from Cornell University:

"Strep-resistant strains of *E. amylovora* are now prevalent in some areas of Michigan, Missouri, Washington, and California, but strep resistance is uncommon or absent in New York, New England, and the Mid-Atlantic States. Why has strep resistance developed in some geographic regions, whereas streptomycin is still effective in other regions? Various explanations can be provided, but probably none of them can be proven. However, strep resistance appears to have emerged primarily in areas where growers applied streptomycin repeatedly after bloom to control the shoot blight phase of fire blight. To understand why post-bloom strep sprays trigger resistance, one must understand the ecology of bacteria.

Only small populations of the many species of non-pathogenic bacteria that live on plant surfaces and in orchard soils are present in spring when apples and pears are in bloom. However, these populations increase rapidly with warmer summer weather. The current hypothesis for development of strep resistance in *E. amylovora* is that summer applications of streptomycin rapidly select for strep resistance in the huge non-target bacteria populations that are exposed to summer strep sprays. The DNA that encodes for strep resistance in other bacterial species is then passed to *E. amylovora*, thereby making the fire blight pathogen strep resistant. (Yes, bacteria have had nifty mechanisms for inter-specific "genetic engineering" before scientists even dreamed of that term!) The probability of triggering strep resistance via blossom blight sprays is relatively low, due to the small size of the non-target bacterial populations that are exposed to these sprays, but the probability of triggering resistance increases with increase population sizes during summer.

Unfortunately, some streptomycin alternatives are being inappropriately promoted as "resistance management tools" that will control blossom blight while prolonging the usefulness of streptomycin. There is absolutely no evidence to support the contention that strep alternatives are beneficial except where strep resistance is already present. The fact that streptomycin has been used for blossom blight sprays in New York for more than 50 years without engendering resistance suggests that development of strep resistance is unlikely so long as applications are limited to blossom sprays.

The main reason for using only streptomycin for blossom blight control is that none of the alternatives are as consistently effective as streptomycin. A review of recent publications showed that in more than 15 separate trials, biocontrols such as Serenade have never out-performed streptomycin for blossom blight control. In many cases the biocontrols were significantly less effective. Furthermore, the optimum timing for biocontrols remains uncertain and may be significantly different than for streptomycin. The existing blossom blight models were designed with the assumption that a fast-acting antibiotic could be applied ahead of predicted infection periods, so the models may prove less useful for timing sprays of biocontrols.

Thus, where strep resistance is not an issue, streptomycin is still the best and most reliable control for blossom blight. Needlessly integrating other blight control products into blossom sprays will increase costs, may result in control failures, and does not provide any

known benefits for resistance management. The key to resistance management for streptomycin is to avoid strep sprays after bloom. A single post-bloom strep spray is still recommended within 24 hours after a hail storm (if allowed by the PHI restrictions on the label), but that is the only scenario where postbloom applications of streptomycin should be used to control fire blight."

Timing a streptomycin spray is crucial for controlling blossom blight. Growers should be using some type of model to best predict when to apply streptomycin. In Michigan, most growers use the MaryBlyte model, and this is the model we are currently running on Enviroweather. This model is based on bacterial growth, which is calculated in degree hours (not degree days!). With degree hours, the model can change very rapidly throughout the day. Therefore, growers should check the model often to make the best management decisions.

The model expresses the heat accumulation needed to build up fire blight bacteria or in other words, the epiphytic infection potential (EIP). The model uses a 0-100 scale, where the EIP is calculated by dividing the current DH65 accumulation by 195, and then multiply by 100. If DH65 reaches 195 (EIP=100), then rain can wash bacteria down into the nectaries and cause a flight blight infection. An example of 'how to read' the model can be seen in the following figure:

**If first blossoms opened in the orchard on May 29, use this column**

	Temperature (F)			Rainfall	Forecast	EIP at Biofix Date (Bloom or sp)							
Date	Max	Min	Avg	(in.)	Probability of rainfall	5/29	5/30	5/31	6/1	6/2	6/3	6/4	
5/30/2005	73.8	49.9	61.9	0		26	24						
5/31/2005	78.3	46.6	62.5	0		75	73	49					
6/1/2005	81.7	48.5	65.1	0		146	144	120	70				
6/2/2005	78.2	51.8	65	0		201	201	177	128	58			
6/3/2005	75.9	61.2	68.5	0		168	168	168	168	97	39		

**If rain occurred on June 1, this would be a predicted blossom infection**

\*If first date of bloom is before the oldest column heading, then choose oldest column

\*If strep is applied, use column with date when the spray was used (strep kills bacteria

on open flowers, but can grow again on flowers that open after spray)

Apogee (prohexadione calcium) is a growth inhibitor that slows down shoot growth and has been effective in slowing growth in fire blight infected shoots. However, this chemical does not inhibit blossom blight!

FORECAST DATA for the FIRE BLIGHT MODEL ON ENVIROWEATHER  
Nikki Rothwell, District Horticulturist, MSUE

The fire blight model uses forecast data to help growers think about control strategies for the immediate future. Enviroweather uses forecast data from the GFSX model. The GFSX model is a gridded forecast model that is updated

twice each day (00-UTC, 12-UTC. We have access to the 00-UTC data a little after 2:30am, and the 12-UTC data is placed in our database at 2:30pm). However, the actual gridded datasets are so large the data that Enviroweather are actually accessing are text-based guidance reports for select sites across the state of Michigan (approx. 64 locations).

The following table shows how the GFSX stations are paired up with individual MAWN stations:

MAWN station	GFSX Forecast Station
Bear Lake:	Manistee, Manistee County-Blacker Airport
Benzonia:	Manistee, Manistee County-Blacker Airport
East Leland:	Traverse City, Cherry Capital Airport
Eastport:	Bellaire, Antrim County Airport
Elk Rapids:	Traverse City, Cherry Capital Airport
Kewadin:	Bellaire, Antrim County Airport
Northport:	Charlevoix, Charlevoix Municipal Airport
Old Mission:	Traverse City, Cherry Capital Airport
(NWMHRS):	Traverse City, Cherry Capital Airport

We have to keep in mind that the forecast data is simply a guidance based on a particular forecast model. The forecasts that we receive on radio and TV are typically adjusted by a local meteorologist based on how he/she interprets the data. However, those data are only as good as the local National Weather Service forecaster who is "tweaking" the model data. In other words, collecting and interpreting the ensemble data is not an exact science but will provide growers with a framework for making future management decisions.

Labor Meeting at the NWMHRS

The Michigan Apple Committee is hosting a meeting to discuss their efforts/plans to deal with the labor issue here in the state. The meeting will be held at the research station on **May 24th from 7-8:30pm.**

Leelanau County Extension Director Candidate Seminars

The public and all interested parties are welcome to attend the candidate seminars for the Leelanau County Extension Director position. The seminar will be held on **May 18th**, at the **NW MI Horticulture Research Station**. The seminar will begin with Roberta Dow, PH.D, at 2:00pm, J. Robert Sirrine, PH.D, at 2:45pm, and Adam Kantrovich, PH.D, at 3:30pm. Each candidate will be speaking about their professional accomplishments and what role MSUE will play toward making Leelanau County a place where people will want to live, work, play, invest and raise a family? There will also be a short question and answer period after each candidate's presentation.

TRACTOR SAFETY TRAINING PROGRAM - For 14 and 15 Year Old Youth

Improve your chances of employment this summer by completing a tractor safety training course! If you are a teen, 14 or 15 years old (as of June 1, 2007), then you are eligible to take the Tractor Safety Training Program being offered for youth in the Northwest Michigan area. Under the U.S. Department of Labor's Hazardous Occupation Order, successful completion of a tractor operation and safety

course is required for all youth under the age of 16 who perform farm jobs classified as hazardous.

This course will be held at the **NW MI Horticultural Research Station**, 6686 S Center Hwy, T. C.

Course: Chris Garthe, Instructor

***Mondays and Wednesdays, June 11, 13, 18 & 20 from 6:00 – 8:30 pm and test Saturday, June 30 from 8 am – 3 pm***

To become certified, participants must attend all five sessions of the course, pass a written test, and pass a tractor driving test. This class will also cover safety on other types of small engines and farm tools. Growers and MSU Extension Agents will be assisting with the hands-on tractor safety training.

Cost for the program is **\$60**, which is due at the time of registration. **Registration deadline is Tuesday, June 5** and space is limited. (You will be notified only if the class is filled.) The cost covers the course manual. Participants should dress to be outdoors. For Saturday, June 30, please bring a sack lunch (drinks will be provided). If you have any questions, please contact the MSU Extension office in Leelanau County at 231-256-9888.

2007 Tractor Safety Registration

(Please print clearly & copy form as needed)

Name \_\_\_\_\_ Phone \_\_\_\_\_

Address \_\_\_\_\_

(Street or Route and Box) (City, State and Zip)

Date of Birth \_\_\_\_\_ Sex \_\_\_\_\_ Ethnic Origin \_\_\_\_\_  
(Month-Day-Year) (Male or Female) (Optional)

Optional (circle): Do you live on a farm? Yes No Do you have a disability? Yes No

Return form along with \$60 by **Tuesday, June 5, 2007**

Mail to: MSU Extension, PO Box 987, Leland, MI 49654

Make checks payable to: MSU Extension

Registration fee is non-refundable (unless class is cancelled due to low enrollment.)

Insect and disease predictive information is available at:

<http://www.enviroweather.msu.edu/home.asp>

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

<http://www.maes.msu.edu/nwmihort/faxnet.htm>

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**May 22, 2007**

GROWING DEGREE DAY ACCUMULATIONS THROUGH MAY 21 AT THE NWMHRS:

Year	2007	2006	2005	2004	2003	2002	17yr. Avg.
GDD42	526	568	475	426	445	302	459.8
GDD50	244	264	216	194	198	137	220.0

### Growth Stages at NWMHRS (5/21/07—8:00am)

**Apple:** Petal Fall

**Pear:** Bartlett: 8 mm fruit

**Sweet Cherry:** Hedelfingen, Gold, and Napoleon: 8 – 9 mm fruit

**Tart Cherry:** Montmorency and Balaton: Early Shuck Split

**Apricot:** 17 mm Fruit

**Plum:** Petal Fall

**Grapes:** Chardonnay: 1" – 3" Shoots

### WEATHER

The weather has turned a bit chillier in the past few days. Temperatures have been hovering around the mid-50's (F) to the mid-60's (F) in the sun. However, temperatures are predicted to increase for the next three days, and we may see the temperatures hit above 80 degrees F on Wednesday. All apple varieties at the NWMHRS are at petal fall. Tart cherries are at early shuck split while sweet cherries are at 8-9mm fruit.

### Pest Report

**Apple:** As apples are still in bloom in the region, fire blight continues to be a concern. The fire blight model is forecasting EIP's over 100 for Wednesday and Thursday; however, these predictions may change as the forecasts are adjusted. The last apple scab infection period at the NWMHRS began on Friday, 18 May at midnight and continued until Sunday, 20 May at 9am; the infection period was recorded as moderate. Only the Elk Rapids and Old Mission stations also reported apple scab infection periods; however, these were considered low infections.

For apple insects, we have seen codling moth flying at the NWMHRS, Old Mission Peninsula, and in Benzie County. Spotted tentiform leaf miner and aphids are still out in apples this week.

**Cherry:** Although we had some rain this past weekend, we had cool enough temperatures that we did not accumulate enough wetting hours to cause a cherry leaf spot infection, but we were close in some locations. For example, here at the NWMHRS, we needed a minimum of 25 wetting hours at our weekend temperatures to have a CLS infection, and we accumulated 23 hours—good news. Other stations in the northwest had similar situations. However, growers should keep covered with Bravo in tarts as most orchards are not through shuck split at this time. Bravo is not an option for many sweet cherries in the region because sweets are beyond shuck split.

In the entomology block at the NWMHRS, we have seen plum curculio egg laying scars in the sweet cherries. We have also seen green fruit worm damage in that same block. Growers should be monitoring plum curculio, especially in 'hot spots' at this time. Plum curculio will really be moving if we have the temperatures they are predicting. Most sweet cherries are at the vulnerable stage of attack for plum curculio, and growers should be considering an insecticide application at this time. American plum borer trap counts remain high this week with over 22 moths/trap.

**Grapes:** Most vinifera cultivars have 1 -2" inch shoots with clusters visible. **Climbing cutworm** and **flea beetle** injury should no longer be a concern. No **potato leafhoppers** have been seen yet. **Powdery mildew** remains the principal concern at this time. In the spring powdery mildew is in the cleistothecia stage, which are the fungal fruiting bodies that overwinter in bark crevices of the grapevine. When spring conditions are right, ascospores are released from the cleistothecia to cause the primary inoculum for powdery mildew

infections. Ascospore discharge from cleistothecia is initiated if 0.1 inch of rain occurs with an average temperature of 50 degrees F. Mature ascospores are discharged within 4-8 hours and are carried by wind. The spores land on any green surface on the developing vine, where they germinate and enter the plant. In the past week, we have had rain and optimum temperatures to cause a powdery mildew infection. Growers/vineyard managers should be covered up at this time. We should also remember that this disease was particularly problematic last season, so there is lots of inoculum in the vineyard.

Also, another reminder that we have rolled out a new grape scouting program in northwest Michigan this spring, and this information is available to all growers/managers who want it! Results from this scouting program will be posted on a website, but if you sign up soon, an email will be sent to you with all of the most recent information. The information is FREE and will help you make important pest control decisions this season. Please email Steve VanTimmeren at [vantimm2@msu.edu](mailto:vantimm2@msu.edu) to sign up for this terrific new opportunity.

### **Plum Curculio—the Dreaded Weevil**

Nikki Rothwell, District Horticulturist, MSUE

As stated above, we have seen plum curculio oviposition scars in our unsprayed entomology block at the NWMHRS, but these insects are moving into all types of orchards at this time. Sweet cherries are particularly susceptible now as well. Plum curculio overwinter as adults in the soil, litter and ground cover in and around orchards. The rule of thumb for plum curculio movement into the orchard is as follows: 1) mean temperatures between 55 and 60 degrees F for 3-4 days, 2) mean temperatures above 60 degrees F for three days, or 3) maximum temperatures of 75 degrees for two consecutive days. These weevils particularly like humid or rainy conditions during migration time. High winds and low humidity cause weevils to burrow into the soil to find moisture. When weevils move into orchards, they feed as leaves begin to emerge. Their feeding activity expands to blossoms, stems and fruit as they become available.

Mark Whalon recommends treating weevils with only one insecticide between a season total (Jan. 1) 200 and 250 GDD50 in low pressure situations in apples and peaches. In cherries, he advises cover sprays from shuck split to 400 GDD50. However, plum curculio have the potential to lay eggs beyond 400GDD. If growers are trapping and are still catching weevils in the trap, a third cover beyond 400 GDD may be necessary.

Historical damage should be considered when determining the control options for plum curculio. The greater the plum curculio pressure from the previous one or two seasons, the greater the care and focus on plum curculio in the current season. If growers are not trapping for plum curculio, they should be scouting for oviposition scars. One good thing about looking for this type of injury on fruit is that these scars are very characteristic—they are moon or crescent shaped. Females deposit their eggs in the fruit, and each female can lay anywhere from 100-500 eggs/season. The larvae hatch and bore into the fruit where they feed until they pupate in late June.

Understanding insecticides' performance characteristics is important depending on the stage of plum curculio. For instance, some insecticides have curative activity (kills larvae in fruit) and the length of the insecticide residual action window is also important. Many new insecticides have different modes of activity: lethal activity, repellent, antifeedant and oviposition deterrents. For example, in apple, Avaunt should be used first in a program combination with a neonicotinoid (Actara, Provado, Assail, Clutch or Calypso). Avaunt's lethal activity on plum curculio is enhanced with adult ingestion. Neonicotinoids are antifeedants, which may prevent Avaunt's major mechanism of exposure, which is ingestion of the chemical. Guthion has been shown to have curative activity on plum curculio in cherries, where it can kill larvae that have already begun to develop in the fruit.

Weather can also play an important role in how insecticides last in an orchard. Rainfall, the primary weather event of concern, will cause growers to re-apply insecticides sooner than without any rain. However, we do not have good data to show how long insecticides last under certain amounts of rainfall.

Growers should keep in mind that There is a restricted amount of Guthion we can use in both apples and cherries. We can use 8 lbs in apple and 3 lbs in cherry. This reduced amount in cherry can be difficult to stretch in high pressure orchards. Growers could use other options early in the season when weevils are just migrating into the orchards. We do know that all plum curculio do not move at the same time, and some will move into the block earlier than others. We recommend saving those Guthion applications for when the majority or most of the weevils are in the orchard. Therefore, some early insecticide options are pyrethroids and in tart cherries, we can use Lorsban. Actara is a newer insecticide that is also an option at this time.

### **Trunk Applications for American Plum Borer in Cherry**

Nikki Rothwell, District Horticulturist, MSUE

**American plum borer** (APB) is a major pest in commercial cherries. We often observe APB larvae beneath the bark of wounded cherry trees where they feed on the cambium of the tree. We rarely see APB larvae in trees without damage, and as we have improved shaker technology, we have seen fewer APB infestations. Larvae will almost always be located in the 2-3 foot trunk area between the ground and the bases of the scaffold branches.

Many APB larvae can occupy a single wound. When larvae are in the wounds, they do not heal properly and if left untreated, larvae can girdle the trees. These pests can live in close proximity to lesser peach tree borer (LPTB), another pest that feeds on the cambium. The problem with both of these pests is that they are hard to detect; the bark over the feeding area can appear 'normal'. However, if left untreated, all borers can leave limbs unproductive.

American plum borer larvae overwinter beneath the bark, and when the temperatures increase in the spring, they continue to feed on the cambium. Larvae pupate in early to mid-April, and adult moths emerge in early May. Peak flight will be reached in mid-May. During this flight period females lay eggs in cracks or crevices near wounds. Larvae emerge in about nine days, depending on temperature. These larvae feed on the trees until they pupate in mid- to late June. Second generation adults emerge from early July, which corresponds with the mechanical harvest of cherry. These moths lay eggs in wounds and their larvae spend the winter under the bark.

American plum borer is flying at the research station, and this week we have captured an average of 24 moths/trap. We anticipate we are close to peak flight, but our erratic temperatures may have masked this flight a bit. We are targeting the egg hatch of this pest, and trunk sprays are the best control options. Lorsban is the best material in which to control APB. The application to the trunks should be made at egg hatch and in most years, we spray around petal fall for both sweets and tarts. This timing is beneficial as Lorsban has enough residual to also target LPTB, which begin to fly and lay eggs at the end of May. This petal fall trunk spray timing will do nothing for greater peachtree borers. All applications should be sprayed until runoff.

### **Trying to Control Codling Moth in 2007**

Nikki Rothwell, District Horticulturist, MSUE

Whether you believe it or not, codling moth (CM) are flying up north already this season. As of last week, we observed CM in traps in three locations in the northwest. We have been encouraging growers to trap their own farms for CM as we have seen drastic differences in emergence times, flight patterns, and overall numbers between farms. We suspect part of these differences can be attributed to CM pressure, but there may be other factors yet to be identified.



MSU researchers have been suggesting we use biofix as the primary indicator of when to apply insecticides, and most recently our CM control is based on biofix. Biofix is the first date at which moths are caught in traps, and the moths must be captured on two successive dates. In other words, biofix is the first sustained catch of moths. The biofix date is the point where we begin to collect degree days at base 50° F to accurately time insecticide applications according to CM development.

In recent years, biofix has been the primary way to time our CM insecticide sprays. However, 2007 CM reports from downstate have shown erratic CM flights. For example, many growers have set biofix dates for CM, and they were ready to put on their sprays to control for eggs (Rimon/Esteem), but they had not captured a moth in over a week. The current thinking is to continue using biofix as the key to target insecticide applications, but we should confirm we have moths flying when we actually make those applications. This threshold idea goes back to the old way of thinking when we used to use the ~ 5 - 7 moths/trap before applying an insecticide application. By combining biofix and a threshold (~5 - 7 moths/trap), we will ensure we are aptly targeting the proper life stage of CM.

We can think of these prediction tools as the emergence biofix, which is the sustained catch of moths at the beginning of the season, and another type of biofix, a treatment biofix for when to time insecticide sprays. This 'two' biofix thinking will only need to be applied when we have these crazy swings in temperature, like we have had this year. For instance, we had 80 degree temperatures in mid-May, and many growers reported CM catches. However, these temperatures dropped down, and we did not catch moths during these cold snaps. Growers do not want to apply insecticide during these cold snaps, even if we have reached our emergence biofix, because the current thinking is that spray would be wasted simply due to lack of moths in the orchard. We should be timing those insecticides when we have actively flying CM.

Dr. Larry Gut and his crew have been evaluating a new delayed timing approach. This program combines the very different modes of action of Rimon and Calypso or Assail, to allow for an extended interval between sprays without losing efficacy. Rimon applied at around 100 GDD kills eggs that would have hatched in the period starting at 250 GDD allowing growers an opportunity to delay the first larvicide application until 350-400 GDD. One of the nice features of this program is that the delayed application of the neonicotinoid is a more efficient timing than the standard first cover timing of 250 GDD. Only a small portion of the first generation egg hatch occurs between 250-350 GDD, about 15 percent, while more than 50 percent of the hatch occurs over a two to three week period beginning at 350 GDD. The combined strategy also shortens the period of time that larval control is necessary, presenting an opportunity to reduce the number of sprays needed to achieve control. In a trial at TNRC in 2006, codling moth control using a Rimon and a delayed Calypso or Assail application (two sprays) was equivalent to programs that required three insecticide sprays per generation.

#### **Insecticides Notes**

Dr. John Wise reports some good news about Rimon based on his studies at the Trevor Nichols Research Complex. He has observed that Rimon is a bit more forgiving than we had originally estimated. We usually time our Rimon application to go on at 100GDD post biofix, and if we missed that narrow window, we should move to another product. Dr. Wise's team surmises that we do not have to be exactly at 100GDD for Rimon. In other words, we have a little more flexibility with Rimon's timing. However, we should try and apply the insecticide as close to 100GDD as possible.

The new insecticide Proclaim is an excellent new material for both **codling moth** and **obliquebanded leaf roller**. The insecticide timing chart for Proclaim in the 8 May issue is incorrect. Proclaim should go on for CM control at 150-200GDD post biofix, not the 200GDD the chart suggests.

#### **Post Shuck Split Cherry Leaf Spot Control**

Nikki Rothwell, District Horticulturist, MSUE

As that last shuck is split, growers will need to be moving away from Bravo use in both sweet and tart cherries for cherry leaf spot (CLS) control. There are a few options for control at this time. The good choices after shuck split are the strobilurin, Gem (3.0 to 3.8 oz / A) or the strobilurin/boscalid, Pristine (10.5 to 14.7 oz / A) at the first cover timing. These materials are an excellent choice because both provide great protectant activity for powdery mildew control. Remember that both Gem and Pristine are excellent fungicides that are at risk long-term for the development of fungicide resistance. Growers need to think about long-term protection of these materials such that they remain effective over a significant number of years. Overuse of these fungicides now could compromise this effectiveness. We suggest that both Gem and Pristine are not used more than two times per season.

#### **Sulfur for CLS - No Data as of Yet**

Nikki Rothwell, District Horticulturist, MSUE

There have been a few questions about the use of lime sulfur for CLS control, especially since there is the new material Sulfurix. We have not tested this material in recent trials, but we intend to do so in the near future. However, we have referred back to old management guides (spray guides) to look at the efficacy of lime sulfur for CLS control. The 1946, 1958-59 calendars do not recommend lime sulfur for control of CLS, and more specifically the only recommendation for this material is for control of blossom blight in peach. Lime sulfur was also not to be used later than the pink stage in peach. There were also many cautions about this material in these guides about the caustic nature of lime sulfur. Some of the results from lime sulfur applications include dwarfing of foliage, reduction in the ability for the plant to manufacture food, decrease in blossom bud formation and lower yields when compared to trees sprayed with wettable sulfur. However, we need to keep in mind that this past information is with the OLD formulation of lime sulfur. Sulfurix is made up of 27.5% calcium polysulfide and is a lime sulfur product that acts as a contact fungicide, insecticide and miticide. At this time, we do not have data in cherry to show that this product has efficacy against CLS. However, in recent trials in blueberry, they do not recommend using BSP Sulfurix within 14 days of an oil spray or when temperatures are above 85°F as burning of foliage may occur.

Insect and disease predictive information is available at:

<http://www.enviroweather.msu.edu/home.asp>

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

<http://www.maes.msu.edu/nwmihort/faxnet.htm>

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**Please send any comments or suggestions regarding this site to:**

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## Northern Michigan FruitNet 2007 Weekly Update NW Michigan Horticultural Research Station

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**May 29, 2007**

GROWING DEGREE DAY ACCUMULATIONS THROUGH MAY 28 AT THE NWMHRS:

Year	2007	2006	2005	2004	2003	2002	17yr. Avg.
GDD42	674	701	589	498	545	383	562.9
GDD50	338	349	275	217	251	183	276.0

### Growth Stages at NWMHRS (5/29/07—8:00am)

**Apple:** 9 mm fruit**Pear:** Bartlett: 9 mm fruit**Sweet Cherry:** Hedelfingen, Gold, and Napoleon: 11 mm fruit**Tart Cherry:** Montmorency and Balaton: 11 mm fruit**Apricot:** 29 mm fruit**Plum:** 9 mm fruit**Grapes:** Chardonnay: 10" – 16" Shoots

### Weather

The Memorial Day weekend was fairly cool in the north. We had some rain on the 26 May, which resulted in infection periods for all diseases. The most noticeable weather event for the past few days has been the extremely high winds. The forecast for the next few days predicts spotty rain showers and thunderstorms throughout the region.

### PEST Report

**Apple:** After much discussion about **codling moth** biofix so far this season, the NWMHRS biofixed for this pest on May 14. As of today (May 29), we are at 136GDD post biofix. We have also seen **plum curculio** (pc) moving around in minimally managed apple blocks.

The Saturday rain even resulted in low to moderate **scab infections** for all stations in the region. We have not seen apple scab lesions from previous events. Based on the apple scab model, the NWMHRS is at 100% spore maturity and 87% spore release. We have noticed that we have had quite a few apple scab infection periods considering we have had so little total rain accumulation this season.

Apples at the NWMHRS are at 8mm for Red Delicious and 6mm for Gala and Golden Delicious, which means growers should be planning their thinning strategies this week and into next week. Temperatures are predicted to be warm this week—a good forecast for thinning.

We have finally started catching **oblique banded leaf rollers** (OBLR) at the NWMHRS, and we averaged 43 moths/trap. **Spotted tentiform leaf miner** numbers are down to 54.5 miners/trap. **Oriental fruit moths** are still flying at low numbers.

**Cherry:** Again, **plum curculio** are moving around in stone fruits, and we have detected egg laying scars in unsprayed sweet cherries. However, we have seen minimal scarring in conventional cherry blocks. If growers are using the Postponed Insecticide Treatment Strategy for pc in tart cherry, we are at 189 GDD (base 50) post biofix at the NWMHRS. PC egg laying after 375 GDD after full bloom may result in larvae in fruit at harvest. The biofix for this delayed treatment strategy is full bloom. Remember, this model only works for tart cherries and is only recommended for growers that are actively scouting their blocks. With the warm temperatures predicted and with the cherries at a susceptible stage, growers should be diligent about pc control.

We had a **cherry leaf spot** (CLS) infection period throughout the region on May 26. We have also seen some CLS lesions showing up in blocks that had a missed spray.

We have our first catches for **lesser peachtree borers** (LPTB) this week with an average of 4.3 moths/trap. **American plum borers** are still flying and are at their highest numbers so far this season. With both of these pests active at this time, trunk sprays should be going on ASAP.

**Grapes:** Most varieties are now at 8 – 12" shoot length and clusters are clearly visible. No symptoms of **powdery mildew** or other foliar diseases have been seen yet in unsprayed vines at NWMHRS. No **potato leafhoppers** have been reported yet, but they have been seen in West Central Michigan. Adults of potato leafhoppers could arrive in our area at any time. A few **8-spotted forester moths** have been seen; larvae typically appear just before bloom but they are seldom numerous enough to be a concern. Injury from **grape erineum mite** has been reported in Grand Traverse County – more next week. A number of clearwing borer adults closely resembling **grape root borer** were trapped in the last week. If this tentative identification is verified, this will be the first record of this pest which is a serious problem in other eastern U.S. growing regions. For additional information please go to the grapes.msu.edu website and click on "View latest 2007 Scouting Report."

Sulforix Data  
Nikki Rothwell, District Horticulturist, MSUE

Thanks to Mike Fiery of Miller Chemical and Fertilizer, we have data to share regarding Sulforix on cherry leaf spot (CLS). The following information is from an evaluation of early season applications of Sulforix followed by Syllit, DMI and Strobilurin fungicides in a full season program vs. season-long Elite applications for control of cherry leafspot 'Meteor' tart cherry. This study was performed by Donald C. Ramsdell, Ramsdell Chemical Testing Inc., Northport, MI 49670.

Data is presented in [Table 1](#). Cherry leaf spot (CLS) disease was controlled best by three early season sprays of Sulforix compared to two, along with other types of fungicides applied in a season-long program. The three application schedule was significantly better than the untreated check, giving about a 20-fold reduction in the yellow leaf symptom of CLS disease. Elite as a full season disease program was numerically in between the two Sulforix programs, but did not differ significantly from either of them (first evaluation done 7/19/04). On the second evaluation done 8/5/04, percent tree defoliation was rated. Both the three and two application schedule for Sulforix resulted in good defoliation prevention. Elite gave commercially acceptable defoliation prevention also. All three schedules differed significantly from the untreated check, but not from each other (Table 1). It should be noted here that most growers will apply Bravo (chlorothalonil) at least once post-harvest to ensure that leaves will remain on trees long enough for carbohydrate reserves to be built up for winter survival of the trees.

**Table 1.** Early season use of Sulforix followed by mid- and late-season of Syllit, DMI and Strobilurin fungicides vs. Elite in a season-long program for control of Cherry Leaf Spot (CLS) disease on 'Meteor' tart cherry<sup>a,b</sup> Suttons Bay, MI – 2004.

Treatment	Mean % leaves with CLS yellowing 7/19/04	Mean % tree defoliation by CLS 8/5/04
1. Untreated Check	40.25 z	40.0 z
2. Sulforix 4, 2 qt/A (twice), Syllit 65WP 2#/A, Elite 45WG 6 oz/A (twice) and Flint 50WG4 oz/A (twice)	2.05 y	11.75 y
3. Sulforix 4, 2 qt/A (three), Syllit 65WP 2#/A, Elite 45WG 6 oz/A (twice) and Flint 50WG 4 oz/A (once)	1.50 y	0.0 y
4. Elite 45WDG 6oz/A (7 applic.)	4.60 y	5.8 y

a - Solo mist blower mist application; 50 gpa.

b - Means followed by letters in common do not differ at  $P=0.05$ , Duncan's Multiple Range Test.

**Limb Angles and Shoot Spreading:** If growers are planning to use of clothespins to help establish limb angles on 1-2 year old trees, they need to do it before the new growth reaches over 6 inches in length (3-4" is most optimal). Large clothespins applied just above newly emerging shoots tends to promote good (ideally, 90° or horizontal) crotch angles for future scaffold branches.

**Date of Interest:** A sweet cherry variety showcase will be held on 12 July 12th at Annette and Randy Biorgy's in southwest Michigan.

**Reminder for Winegrape Growers/Vineyard Managers:** This **Friday, June 1**, we are holding an IPM Update at **Shady Lane Vineyards at 3 pm**. Drs. Rufus Isaacs, Annemiek Schilder, and Paolo Sabbatini will be on hand to provide new information regarding insects, diseases, and horticulture. We look forward to seeing you this Friday!

**OBLR Populations:** Dr. Larry Gut and his crew are looking for oblique banded leaf roller populations to start up a colony at the Trevor Nichols Research Station. If your farm has a population of OBLR, we would appreciate a call to pick up some larvae before insecticides are applied. Please call the NWMHRS at 946-1510. Thanks for your help!

Gibberellic Acid on Cherry  
Jim Nugent, Retired District Horticulturist

Gibberellic acid (GA) may be used to reduce flowering and fruiting of young tart and sweet cherry trees to maximize vegetative growth. Do not treat trees the first year they are planted in the orchard. Application of GA must be made the year prior to the desired result.

To reduce flowering in non-bearing cherries, apply at a rate of 50 to 100 ppm three to four weeks after normal bloom time. If tree vigor is low, a second application about three weeks later may be helpful. Two applications at 50 ppm about three weeks apart are more effective than a single application at 100 ppm. Do not treat more than twice in one year.

To avoid over production immediately following treatment during non-bearing years, reduce the rate over a two-year period. Apply 30-40 ppm in a single application in the first year, followed by 15-20 ppm in the second year. This will allow flowering at a reasonable level and avoid the extremely heavy bloom and production which often occurs and significantly reduces growth in future years.

In mature tart cherry trees, gibberellin can help maintain and extend high fruiting capacity and reduce occurrence of blind nodes by stimulating lateral shoots and spurs. Apply about three weeks after full bloom. Concentrations of 10 to 20 ppm are used, with 15 ppm most common. Use lower rates on more vigorous trees. Apply when high temperatures are expected to exceed 70 degrees F for the next 2 -3 days. For dilute application, 4 fl. oz. of product containing 4% GA per 100 gals. of water provides a 10 ppm solution. For concentrate application to full sized tart cherries, 6 fl. oz./acre provides a 10 ppm response. Surfactants and wetting agents may enhance response, but the response varies greatly by surfactant; therefore, surfactant is not recommended. In particular, do not use with a silicone based surfactant as these have caused leaf drop following application and virtual shutdown of flowering the following year at low GA rates.

**RINSE AND RECYCLE AGRICULTURAL PESTICIDE CONTAINERS**

East Lansing, Mich. -- Unrinsed and improperly stored empty pesticide containers are more than a nuisance around the farm—they can also contaminate surface and groundwater. Properly rinsing and later recycling these containers protects the environment, saves landfill space and puts the plastic to use in new products.

Farmers are encouraged to take advantage of the pesticide container recycling program coordinated by the Michigan Groundwater Stewardship Program (MGSP) and the Michigan Agribusiness Association. Through this program, clean, empty pesticide containers are collected, chipped and recycled into a variety of products, including new pesticide containers, truck and manure spreader deck boards, field drain tile, pallets and parking stops.

"The best way to handle the containers is to rinse them right after they are emptied so that no residue dries to the inside of the container," says Allen Krizek, Michigan State University (MSU) Extension liaison to the MGSP. "The containers must be either triple rinsed or power rinsed, and any rinse water should be added to the spray tank to get the most out of the product and to keep the pesticide out of nearby waters."

Clean, empty containers should be stored in large plastic bags until fall. These bags are available from any MGSP technician. Technicians are based in local conservation district and MSU Extension offices. To find the one near you, visit:

[www.michigan.gov/documents/Groundwater\\_Techs\\_Map\\_111332\\_7.pdf](http://www.michigan.gov/documents/Groundwater_Techs_Map_111332_7.pdf)

Rigid, high-density polyethylene (HDPE) crop protection containers that hold U.S. Environmental Protection Agency-registered products that are labeled for agricultural, professional turf, forestry and aquatic uses are eligible for recycling. Look for the HDPE 2 symbol on the bottom of the container. Adjuvants, crop oils and surfactant containers can also be recycled. All containers must be 2.5 gallons or smaller.

Pesticide container collections are scheduled for a number of locations across Michigan during the first two weeks of September. To find a collection site near you, contact your local conservation district or county MSU Extension office.

Animal health care, consumer home and garden, and swimming pool maintenance product containers are not eligible for recycling under this program.

To learn more about the Michigan Groundwater Stewardship Program, visit [www.michigan.gov](http://www.michigan.gov) and search for Michigan Groundwater Stewardship Program.

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